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Tradition & Discovery

Submission Guidelines

Articles, meeting notices, and notes likely to be of interest to persons interested in the thought of Michael Polanyi are welcomed. Manuscripts normally will be sent out for blind review.

- Articles should be 5,000 words (including abstract, notes, and references) and be sent to Paul Lewis at lewis_pa@mercer.edu.
- Book reviews should be sent to Andrew Grosso at atgrosso@icloud.com.

All manuscripts should be submitted as a Microsoft Word file (.doc or .docx) attached to an email message and formatted as follows:

- double-spaced, with 1" margins
- in a reasonable typeface (Times New Roman 12 is preferred)
- with paragraphs indented 0.25"

As to other matters of style:

1. *Spelling*: We recognize that the journal serves English-speaking writers around the world and so do not require anyone's "standard" English spelling. We do, however, require all writers to be consistent in whatever convention they follow.

2. *Citations*: We recognize that Polanyi's work connects with scholars who work in diverse disciplines and typically use different style guides such that we are "fluent" in different conventions for citations, capitalization of titles, and so forth.

- Our preference is for Chicago's parenthetical/reference style in which citations are given in the text as (last name of author year, page number), combined with bibliographical information at the end of the article.
- Endnotes should be used sparingly and be placed before the reference section.
- To the extent that our software allows, we will, however, accept other styles (e.g., APA or MLA) so long as the author is consistent and careful in following it. The main point, of course, is to give the reader enough information to locate and engage your sources.
- We do encourage one exception to this practice: Polanyi's major works may be cited parenthetically. For example, Polanyi argues that …. (*TD*, 56). Full bibliographical information should still be supplied in the references section since many of us may work with different editions of his works. If you take this option, please use the following abbreviations (note that abbreviations are italicized):

CF	*Contempt of Freedom*	*SFS*	*Science, Faith, and Society*
KB	*Knowing and Being*	*SM*	*Study of Man*
LL	*Logic of Liberty*	*STSR*	*Scientific Thought and Social Reality*
M	*Meaning*		
PK	*Personal Knowledge*	*TD*	*Tacit Dimension*
SEP	*Society, Economics, and Philosophy*		

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PREFACE

This issue of *Tradition & Discovery* is devoted to the topic of biosemiotics, an interdisciplinary field that connects biology, philosophy, linguistics, and communication theory. In the lead-off essay, Phil Mullins offers a primer to the field by introducing us to key thinkers and ideas. He also points to places where their work intersects with the ideas of Michael Polanyi. In the second article, Dániel Bárdos and Gábor Á. Zemplén offer a more detailed analysis of the work of leading biosemiotician Jesper Hoffmeyer. In the third article, Walter Gulick adds an analysis of *Retrieving Realism* by Hubert Dreyfus and Charles Taylor that brings more depth and perspective to the topic. In addition, we have reviews of two books on biosemiotics.

The issue is not all about biosemiotics, however. Spencer Case, now Book Review Editor, contributes a review of a book on knowledge in Chinese traditions. We also have the usual updates in News and Notes; be sure to check there for the latest information about matters of interest to readers of *Tradition & Discovery*. The e-reader instructions and Society information are can now be found in the website.

Do note, too, that this February issue is now the first issue of vol. 43 as we have now matched the publication schedule to the calendar year and made the deadline for dues Dec. 31 of each year. Remember to check your mailing label for the expiration date of your membership.

Paul Lewis

NOTES ON CONTRIBUTORS

Dániel Bárdos (bardos.daniel@filozofia.bme.hu) is a PhD student in Philosophy and History of Science at Budapest University of Technology and Economics, Hungary (BME). His main interest is philosophy of biology and the philosophy of the historical natural sciences, especially questions surrounding paleobiology, emergence, and reduction within evolutionary theory.

Spencer Case (casesj@colorado.edu) is a PhD candidate at University of Colorado, Boulder where he is currently working on a dissertation defending moral realism. A veteran of the Iraq and Afghanistan wars and a 2012-2013 Egypt Fulbright grantee, he also writes political commentary for *National Review Online* and other outlets.

Walter Gulick (WGulick@msubillings.edu) has left the position of *TAD*'s book review editor after 25 years, but that does not mean he is turning away from Polanyian studies. He and Phil Mullins will share in the teaching of a course on Polanyi's thought this May at BME in Budapest, where several young scholars do good work on Polanyi's thought.

Phil Mullins (mullins@missouriwestern.edu) is Professor Emeritus at Missouri Western State University in St. Joseph, MO and former *TAD* editor. He has long been interested not only in Polanyi's philosophical ideas but also those of Charles Sanders Peirce. His recent interest in biosemiotics came through work on Peirce whose work in semiotics has been assimilated by many biosemioticians.

Gábor Á. Zemplén (zemplen@filozofia.bme.hu) is Associate Professor at BME. An intellectual historian, his interests include metahistoric and historiographic problems, the history of philosophy of science, social epistemologies, and expertise. He is on the Editorial Board of *Polanyiana* and *Science and Education*.

NEWS AND NOTES

Did You Miss the Print Copy of this issue of *TAD*?

December 31 was the deadline for payment of annual dues. Remember that the due date now appears on mailing labels and that dues must be current to receive a print copy of *TAD*. The journal remains accessible at no cost online at www.polanyisociety.org.

International Conference on Persons May 2017

The 14th International Conference on Persons will be held from May 24-27, 2017 at the University of Calabria in Rende, Italy. The Call for Papers and other details can be found at http://www.icp2017italy.it/

2017 Annual Meeting Information

Date: The Board of Directors of the Polanyi Society is contemplating starting our meeting on Thursday night, November 16, 2017 with another two sessions offered on Friday, November 17, assuming there are sufficient good proposals. The proposed change would allow for fewer conflicts with the AAR, which officially begins November 18. *If this change would negatively affect anyone who is likely to attend the annual meeting, please let Polanyi Society President Phil Mullins* (mullins@missouriwestern.edu) *and Program Chair Walt Gulick* wgulick@msubillings.edu *know.* Check the Polanyi Society web site (www.polanyisociety.org) for updates.

Call for Papers*:* Regardless of the day and time, we welcome proposals on any topic related to the thought of Michael Polanyi and the issues he was interested in. Possible topics include: a) a workshop or panel on Polanyi's economics book, *Full Employment and Free Trade*, b) a Polanyian take on the culture of assessment (including if and how teaching assessment should be done), c) Polanyi as a social theorist (perhaps in comparison with Eric Voegelin), and d) Polanyian hands-on approaches to engineering, health care, and other professional practices. Graduate students and other younger scholars who submit proposals will be considered for the *Richard Gelwick Award*. Funding is available to provide modest cash awards to several persons. Funding is also available for younger scholars needing support for travel to the annual meeting (see www.polanyisociety.org for details about how to apply). All proposals should be sent to Walter Gulick, Program Committee chair, at wgulick@msubillings.edu by April 1, 2017.

Looking ahead: The Society is tentatively planning to offer a second conference at Nashotah House, Wisconsin, in late May or early June, 2018.

2016 Society Board Meeting

The Minutes of the November 18, 2016 Polanyi Society Board of Directors meeting are now posted at www.polanyisociety.org under Other Links.

Donations for Travel Fund

The Travel Fund enables young scholars to participate in our annual meetings. Because we held meetings in both Wisconsin and Texas last year, we need to replenish this fund.

In order to achieve the Society's goals, we depend on involving those who are presently, or have recently been, engaged in their academic studies. Already we have met an impressive number of new, talented, and young participants. But the

task of making this happen in the midst of the increasing burden of student loans, the escalation of travel costs, and virtually non-existent college resources to facilitate such involvement, is a daunting challenge.

We ask you to help by sending a tax deductible contribution to The Polanyi Society, C/O Charles Lowney, 10 Jordan Street, Lexington, VA 24450. Checks should be made out to the Polanyi Society and earmarked for the Travel Fund.

Recent Work of Interest

Carlo Vinti has translated *Meaning* into Italian as *Significato* (Rome: Città Nuova Editrice, 2016). He has also provided a new introduction to the work.

Marta Felis-Rota and **Eduardo Beira** have made Spanish language subtitles to the Polanyi film, *Unemployment and Money*. A link to the film is available on the Polanyi Society website.

Now on the Web

"Meaning: A Project" (1969) is now available through a link at www.polanyisociety.org. Originally published in *Polanyiana*, this is one of the sets of Meaning lectures that Harry Prosch used for the Polanyi and Prosch book, *Meaning*.

Another copy of Polanyi's 1951 and 1952 Gifford Lectures has turned up in William T. Scott's materials. This copy exhibits a few puzzling differences from the Duke copy already posted. See the Addendum to the Introduction to the Gifford Lectures on the Polanyi Society website for details.

TAD Changes Ahead

Beginning with this issue, the e-reader instructions and other Society information are now posted only at www.polanyisociety.org. Beginning with the July 2017 issue of *TAD*, News and Notes will be found only on the website, so check periodically for the latest updates on annual meetings, works of interest, etc. These changes will allow us both to get news out in a more timely fashion and to devote more of our limited print space to articles.

Back Issues Available for Purchase

A limited number of back issues of *TAD* are available for purchase as long as supplies last. The cost for a copy of issues up to and including Vol. 41:3 is $5.00. A copy of issues from 42:1 on is $7.00. All prices include shipping and handling.

For issues up to and including Vol. 39:2, contact Phil Mullins (mullins@missouriwestern.edu). For issues from 39:3 to the present, contact Paul Lewis (lewis_pa@mercer.edu).

Payment should be sent to The Polanyi Society, C/O Charles Lowney, 10 Jordan Street, Lexington, VA 24450. Checks should be made out to the Polanyi Society and earmarked for back issues.

MICHAEL POLANYI'S APPROACH TO BIOLOGICAL SYSTEMS AND CONTEMPORARY BIOSEMIOTICS

Phil Mullins

Keywords: biosemiotics, semiotic causation, semiotic scaffolding, habit and agency, Polanyi's criticism of the Modern Synthesis, Polanyi's account of life, evolution and biological study

ABSTRACT

Using the writing of Eliseo Fernandez and Jesper Hoffmeyer, this essay introduces important ideas in the emerging interdisciplinary field known as "biosemiotics." Later discussion summarizes Michael Polanyi's criticisms of the Modern Synthesis and his alternative constructive philosophical account of life, evolution and biological study, suggesting areas of overlap with contemporary biosemiotics.

Introduction

> I think the time has come when every statement on theoretical biology, or the logical structure of biology, should be made against a clear background of previous work that the author accepts or rejects. I have certainly been remiss in this respect, myself, in writing P.K. [*Personal Knowledge*] but I always felt that my own interpretation was so different from that of earlier writers that it would be excessively laborious to make their mutual relation clear. However, I regret the omission and hope you will be prepared to help me in remedying it.[1]

Michael Polanyi made this interesting comment in a January 14, 1963 letter to Marjorie Grene; it was his conclusion to a broader discussion about connections and

disconnections between his ideas about living entities and biological study and those of philosophical figures like Merleau-Ponty, as well as several other contemporary scientists writing about the nature of life. In this essay, I try to initiate the remedy Polanyi called for: I suggest it is worth exploring possible connections between some Polanyian ideas about living systems, evolution, and biological study and some ideas now discussed under the rubric of "biosemiotics." "Biosemiotics" is an emerging, interdisciplinary field that studies living things as environmentally embedded comprehensive entities whose agency and action can best be understood in conjunction with the operation of sign processes. Below, I first sketch important ideas developed in selected biosemiotic literature and then turn to a summary of Polanyi's main ideas about living beings, noting what seem to be possible bridges to biosemiotic approaches.

Biosemiotics: A Primer

In a very straightforward way, Eliseo Fernandez introduces the domain of inquiry of biosemiotics:

> Within each living being there is an unceasing deployment of signaling interactions between and among its constituent parts. These internal exchanges are regulated and coordinated with the assistance of another equally complex semiotic interplay. The second interactional traffic takes place between the whole organism and the entities and events occurring within its habitat (2014, 1-2).

As Fernandez sees matters, biosemiotics is an attempt to

> organize and reconceptualize our knowledge of living systems, their functions, origins and evolution, in terms of the crucial role played by semiotic causation and semiotic scaffolding in practically every aspect of their internal dynamics (i.e., energy and nutrients acquisition, metabolism, reproduction, etc.) as well as in their complex energetic and semiotic interchanges with their surroundings (2014, 1).

The primary issue here is concerned with what Fernandez and other biosemioticians such as Jesper Hoffmeyer term "semiotic causation" and "semiotic scaffolding" which are portrayed as the source of the telic in living beings.[2] Hoffmeyer suggests,

> The apparently purposeful nature of living systems is obtained through a sophisticated network of semiotic controls whereby biochemical, physiological and behavioral processes become tuned

> to the needs of the systems. The operation of these semiotic controls takes place and is enabled across a diversity of levels. Such semiotic controls may be distinguished from ordinary deterministic control mechanisms through an inbuilt anticipatory capacity based on a distinct kind of causation that I call…'semiotic causation' to denote the bringing about of changes under the guidance of interpretation in a local context (2007, 149).

Similarly, Fernandez contends that the "origin of purposive behavior" in living things resides "at the interaction of physical and semiotic causation" (2015, 1). Physical or ordinary efficient causation is triggered by signs or, more accurately, complex sign processes. In another essay, Fernandez suggests thinking of the sign process or "semiosis as a form of second-order causation: semiosis causes changes in the causal action itself. It alters the way in which energy is channeled by acting upon the habits embodied in the constraints that guide the flow of energy toward thermal equilibration" (2011, 4).[3]

The case for developing a rich semiotic account of living things can be put another way, which is akin to Polanyi's emphasis upon the achievements of living things. Polanyi masterfully portrays the continuity between living beings, simple and complex, making achievements through which they survive and flourish in the concluding three chapters of *PK* and in the concluding sections of several subsequent books and lecture series. Biosemiotics is an area of inquiry that appreciates this continuity among living beings; biosemiotic inquiry attends to, as Hoffmeyer puts it, not just natural selection but also natural play because all living creatures—while they are living—are striving:

> Making scientifically responsible sense of this "striving" is one of the challenges that the emerging field of biosemiotics sets out to accept, and it does so by presenting an understanding that biological communication is more than just machine-like exchange of information (2008, xiv).[4]

Semiosis is richer than the mechanical transfer of information "because the sign embraces *a process of interpretation*."[5]

> it is precisely the biological phenomena that comprise this interpretative activity that is neglected—or at least not recognized as engendering its own measure of causal efficacy in the world—in both traditionally conceived Information Theory and in most contemporary mainstream Evolutionary Theory" (2008, xiv).[6]

Hoffmeyer argues that, by focusing on semiosis which includes interpretative activity as essential to the dynamics of natural systems, biosemiotics is making an "empirically well-justified expansion" of science's basic view of nature; such a move

> reintegrates living creatures (including…human beings) into the natural world from which they came—but from which they have since been effectively excluded by a scientific ontology that has, at least since the time of Descartes, consistently encouraged scientists to de-semiotize all the naturally communicative and fundamentally interactive processes of living systems (2008, xiv).

Biosemiotics, Peirce's Triadic Semiotic Model and Habit

Fernandez, Hoffmeyer, and a number of other biosemioticians make ample use of Charles Peirce's ideas about semiosis.[7] Peirce's triadic approach recognizes signs as mediating between an object and an interpretant and sign processes are an ongoing cycle.[8] For Peirce, "the *telos* of semiosis is the generation of an interpretant, which can be a new sign, the performance of a meaningful action, or the acquisition of a new habit" (Fernandez, 2015a, 2).[9] Fernandez suggests that particularly the late Peirce's discussion of semiosis portrayed the mediating action of a sign as extracting a form from its object and conveying that form "through a suitable vehicle to a receptive structure capable of enacting its interpretation" (2015, 4).

Biosemioticians interested in "semiotic causation" and "semiotic scaffolding" argue for a dispositional account of causation, which is akin to Aristotle's notions about resident causal powers (i.e., intrinsic properties), which in Peirce's account of semiosis is recast in terms of the operation of habit.[10] A habit for a living creature is a disposition to respond in a particular patterned manner when some particular thing or process in the larger context triggers that particular response. Such a disposition for response can be viewed as an interpretant, an interpretative effect of the triggering sign which itself is a mediator of a predecessor object. For Peirce, "'habit taking'…can be seen as an act of interpretation, i.e., the formation of a mediating link between one regularity and another…Habituation, in other words, is semiosis (sign activity) in its most general sense…" (Hoffmeyer, 2007, 150).

Fernandez describes a dispositional account in terms of how "interactions transpire between energetic causal chains and a wide range of converging semiotic transactions unfolding within each individual organism and between organisms and their environment" (2015, 1). There is a pattern or a concatenation of elements or processes. Fernandez succinctly schematizes a dispositional account as follows:

> According to the dispositionalist standpoint an event **A** causes an event **B** when causal powers (which are latent in **A**) manifest themselves in a well-defined manner to produce **B**, contingent upon the occurrence of activating circumstances of a well-defined kind. For instance, a match has an intrinsic disposition to ignite which does not become manifest under usual conditions. When specific triggering circumstances occur (friction, dryness, etc.) the disposition to ignite manifests itself: the match ignites (2015, 2).

In this example, event A triggers event B when event A's latent powers come to be realized. Fernandez thus tries to "visualize the way in which chains of efficient causation become coordinated by the actions of signs into mechanisms that bring about goal directed actions" (2015, 2). But to speak of "mechanisms" is a heuristic way to point to the complex, interactive operation of dispositions within living beings and between living beings and their lifeworld.[11] This complex, interactive operation of dispositions is a process in which forms are conveyed through suitable vehicles to receptive structures that enact the interpretation of such forms.

Like Fernandez, Hoffmeyer (and others biosemioticians following Peirce) emphasizes that living beings develop habits. Living beings have complex, related internal habit patterns but, because such beings are always embedded in a niche, these internal habit patterns, of course, are intimately connected with and related to elements of that niche. That is, the operation (and reform) of internal habits is bound up with the contributions to semiosis that originate outside in the niche. The fabric of internal habits operative at any given time in living beings is the outgrowth of evolutionary history; evolutionary history is always a complicated dynamic narrative in which the internal and the external are deeply intertwined. Put less abstractly, Hoffmeyer's concrete discussions as a biochemist often emphasize the importance of things like semi-permeable membranes through which elements pass as semiosis occurs (2007, 153 and 2008-17-31); both the distinction between internal and external and the connections or interactions between (1) patterns of internal habits and (2) habits in the environment in which living things are embedded are important in biosemiotics. In biosemiotic approaches to living beings, there is an internal-external dialectic grounded in a relational ontology.

Scaffolding, Dispositions and Anticipation

What Fernandez calls "mechanisms" and Hoffmeyer sometimes terms "scaffolding mechanisms" (2007, 160) operate in living things to realize anticipations, which are fundamental for living beings who strive to persist in a temporal flow in a dynamic niche replete with challenges.[12] Hoffmeyer suggests that scaffolding "operates by

assuring performance through semiotic interaction with cue elements that are characteristically present in dynamic situations such as the catching of prey, invading host organisms, or mating" (2007, 154).[13] He compares such a biosemiotic understanding of scaffolding to ideas formulated by Vygotsy about the way dynamic scaffolding works in human child development: small children often learn to tie shoe laces by being talked through the steps of learning to make bow knots. An adult's stepwise instruction is a helpful external memory scaffold, triggering the right response; for a while, children may more or less verbally repeat the adult's instructions to master the task, even if the adult instructor is not present (2007, 154).[14] Scaffolding essentially cues and shapes the response of a living embedded agent. The biosemiotic focus on scaffolding has a family resemblance to Polanyi's account of living beings (discussed below), which focuses on the development and deployment of a repertoire of skills. Hoffmeyer emphasizes the proliferation and intricate interconnection—the expansion—of scaffolding mechanisms in evolutionary history. He suggests this expansion produces an expansion of the range of indeterminacy in reactive response (i.e., semiotic freedom).[15] This perspective in some ways resembles Polanyi's suggestion that the range of tacit powers in living beings increases in evolutionary history. The growth of complexity is the growth of a repertoire of tacit skills. The expansion of the repertoire of tacit skills requires, Polanyi argues, increasingly sophisticated critical powers of the biologist. These are needed to evaluate more complex living beings. Polanyi couples his account of an expanding range of tacit powers developed in evolutionary history with his insistence that to speak of life requires acknowledging a center. Expanding powers and deepening centers are aligned. That is, in Polanyi's account, in evolutionary history there arises a more distinct center whose depth is more apparent and resonant to the inquiring biologist. Polanyi calls this resonance "conviviality" in more complex living beings that emerge in evolutionary history.

The need that living beings have to prepare for future events or situations is apparently what led to the development and evolutionary expansion of semiotic causation.[16] Anticipation involves making sense of a sign; that is, a sign's interpretant sets forth a relation between a current occurrence and an expected occurrence. Hoffmeyer distinguishes "genomic scaffolding" and the kind of scaffolding that involves learning in more complex living beings: "Genomic scaffolding necessarily operates through the controlled assembling of protein resources which are then released in sophisticated temporal patterns reflecting the upcoming needs of the organism" (2007, 160). But "large-brained animals" depend not only on

> instinctual reflexes, but the process of *learning*—and while such processes are assisted by genetically assured behavioral preferences, the whole advantage of learning ability must be the inherent element of flexibility inferred [sic, conferred?] on behavior by the

> learning process—and thus the transfer of behavioral control from the genomic level to the cerebral level. This introduces the need for even newer sets of scaffolding mechanisms—and foremost among these are the diversity of the control mechanisms exhibited by the neuro-endochrinological apparatus (2007, 160).

Living beings, viewed as habit takers in a biosemiotic account, are constantly engaged in setting up dispositions to cope with the future. The nature of such dispositions for response, of course, depends on the complexity of particular living beings. Hoffmeyer suggests for most living beings it is "the instinctual reflex system" that makes predictions about the future, but even when learning is involved "the underlying logic is the same: an animal profits from its ability (whether acquired through phylogeny or through ontogeny) to identify trustworthy regularities in the surroundings and to orient its own actions accordingly" (2007, 161).

Regularities that can be relied upon by living creatures are stable (even if incrementally changing) relations and this is the soil in which habits can form. Stable relations in a given context produce what Marjorie Grene, following the Gibsons, called "affordances," the kind of awareness that develops in embedded living beings which is a context-specific discrimination or differentiation based on invariance (Grene 1995, 129-151). A particular bird's habit of providing apparently impaired movement to lure a predator away from a nest—an activity which may or may not succeed—is a semiotic activity, a habit or disposition, put into play when the predator (who is also a habitual creature) is spotted close at hand. Anticipation, Hoffmeyer argues, is "essentially a semiotic activity" in which something is taken as a sign (although it is also something in itself) and "is interpreted as a relation between something occurring now and something expected to occur later" (2007, 161-162). A biological perspective that focuses on semiosis is one that is constitutively at once relational (or interactional) and temporal.

Polanyi on Knowing Life and Being Alive: The Potential Interface with Biosemiotics

Although the recent flowering of biosemiotic inquiry occurred after Michael Polanyi's death, it seems likely that Polanyi would have been quite interested in ideas like those sketched above developed by contemporary biosemioticians.[17] Polanyi was, of course, deeply interested in questions about what life is, how living forms evolve and how creativity in nature is akin to creativity in human endeavors (themselves part of nature) such as scientific discovery. The final section of *PK* treating "Knowing and Being" (*PK*, 327-405) explores these topics as do sections of later Polanyi books, lecture series and several important essays.[18] Although somewhat indirectly, Polanyi's account of tacit knowing articulates an account of living agency, one that might be dubbed an

extended agency account, which I suggest should interest contemporary biosemioticians.[19] But Polanyi's account of living agency is inextricably bound up with his claims about the nature of biological study (and, more generally, human knowing), and this makes his discussion complex and atypical. Polanyi insisted that the scientist does not stand outside of the world being investigated, and this provides a relation of knower and known that is integral to the ontology of life. Below, I sketch Polanyi's criticisms of the mainstream biology in his day and then outline his main ideas about living agency; along the way, I briefly note possible links to some themes in biosemiotics.

Polanyi's Attack on the Modern Synthesis

Even Polanyi's early writing suggests he had a lively interest in questions treated in biology. In the 1941 essay "The Growth of Thought in Society" which focuses primarily on social (rather than natural) order, he notes that the development of embryos and the evolution of species are interesting matters that can be illumined by an adaptation of Gestalt ideas about "spontaneously attained order" to posit "a continued process of internal equilibration in living matter" (1941, 432-433). By the time Polanyi was preparing his Gifford Lectures and then *Personal Knowledge* (roughly 1947-1957), his interest in broad issues treated in theoretical biology had heated up. In 1950, he hired Marjorie Grene to help with his Gifford Lectures and then *PK*; one of her early assignments was to locate for him biological literature critical of the Modern Synthesis (Grene 1995, 91). His writing beginning with the Gifford Lectures articulated sharp criticisms of what he took to be the mainstream approaches and views accepted in biology.[20] Speaking generally, Polanyi accused biologists of too often taking a reductionist approach, a criticism that seems less on target today with developments like biosemiotic inquiry and systems biology (see Nobel 2011, 2012, and 2015). Marjorie Grene, almost fifty years after Polanyi's Gifford Lectures, aptly summarized Polanyi's view as well as her own: biologists should question "the thesis that biological explanation consists in considering least parts" (Grene 2002, 16). More specifically, Polanyi contended mainstream biology tried to provide explanations of life in terms of machinery wrongly assumed to be based on laws of physics and chemistry (*TD*, 38). Polanyi candidly acknowledged that one of the aims of his constructive philosophy's account of life was to "draw a truer image of life and man than the present basic conceptions of biology present" (*KB*, 238).[21]

Polanyi was convinced that the Modern Synthesis, by focusing on random mutation and natural selection, diverted attention from more important questions about the nature of life and the emergence and evolution of life. He contended, "the principal problem of evolution lies in the rise of higher beings from lower ones and, principally, in the rise of man;" evolutionary theory that recognizes only changes due to "the selective advantages of random mutations cannot acknowledge this problem" (1964, 18;

cf. *TD*, 46-48). Polanyi held that the misdirected attention of the Modern Synthesis led midcentury biologists to ignore the agency of living entities and the pattern of deepening agency emerging in evolutionary history. He argued that the way in which natural selection had come to be understood failed to acknowledge—but tacitly presupposed—the steps in evolutionary history (i.e., steps that constitute a creative, ascending evolutionary achievement) leading ultimately to the emergence of complex living beings who are conscious, i.e., are human persons, some of whom accept the calling responsibly to study life as biologists:

> the theory of natural selection by subsuming all evolutionary progress under the heading of adaptation as defined by differential reproductive advantage, necessarily overlooks the fact that the consecutive steps of a long-range evolutionary progress—like the rise of human consciousness—cannot be determined *merely by their adaptive advantages*, since these advantages can form part of such progress only in so far as they prove *adaptive in a peculiar way, namely on the lines of a continuous ascending evolutionary achievement*" (*PK*, 385).

Polanyi called the rise of individuals (some of whom engage in biological inquiry) the "spectacle of anthropogenesis" which "confronts us with a panorama of emergence" (*PK*, 389).

Polanyi's Emphasis on Principles

Polanyi's alternative constructive philosophical account countered what he took to be the narrow and unreflexive focus on mutation and selection in biology by directing attention to the importance of principles in living beings and in evolutionary history. He contended that "a principle not noticeably present in the inanimate must come into operation when the inanimate brings forth living things" (Duke 4, 15). With the emergence of this principle comes success and failure: "Inanimate nature is self-contained, achieving nothing, relying on nothing and, hence unerring. This fact defines the most essential innovation achieved by the emergence of life from the inanimate. A living function has a result which it may achieve or fail to achieve" (*TD*, 44).

Polanyi consistently also focused attention on the action of creative principles that subsequently, after the emergence of life, come into operation in evolutionary history:

> The action of the ordering principle underlying such a persistent creative trend is necessarily overlooked or denied by the theory of natural selection, since it cannot be accounted for in terms of accidental mutation plus natural selection. Its recognition would, indeed, reduce mutation and selection to their proper status of

> merely *releasing and sustaining the action of evolutionary principles* by which all major evolutionary achievements are defined (*PK,* 385).[22]

The emphasis on the action of principles led Polanyi to a hierarchical account of life emphasizing "dual control," which focuses on the relations between two biotic levels. That is, Polanyi argued that living beings and their evolution must be understood in terms of the ways in which higher level principles come to be operative in margins left open by lower level principles. A lower level sets the parameters within which the operation of a higher principle takes root and provides additional complexity and concreteness. The emergence and operation of a new, higher principle gives further shape to life. Hierarchy in Polanyi's model means there is a sequence of lower and higher levels of control in a complex living being as they emerge in evolutionary history. The lower level always imposes restrictions and the higher level provides further shape. Polanyi calls "the control exercised by the organizational principle of a higher level on its particulars forming its lower level, the principle of marginal control" (1964, 13). Polanyi thus discusses "possibility" in terms of marginal control of boundary conditions. The instantiation of one level of control in evolutionary emergence opens new possibilities at the same time it closes other possibilities for the next emergent level.

Polanyi's effort about fifty years ago to focus attention in theoretical biology on matters other than random mutation and natural selection seems to complement some contemporary theoretical biology, including some of the work in biosemiotics. Hoffmeyer, for example, acknowledges that "the Darwinian focus on hereditary mechanisms has tended to distort our understanding of evolution" (2008, 210). He notes that recent work in thermodynamics and complexity theory, has helped biologists better understand "the process of self-organization at work in species;" he acknowledges that something closer to a "Lamarckian scheme," recast in terms of current ideas about self-organization, does "approach the most modern conceptions of the ways of nature" (2008, 210). Hoffmeyer and biosemioticians such as Fernandez appear to be on a path that acknowledges something akin to Polanyi's "spectacle of anthropogenesis" (*PK*, 389) insofar as they "describe the progressive increase in complexity of life forms as driven, in great part, by a continuous expansion of their *semiotic freedom*" (Fernandez, 2015b, 3; cf. Hoffmeyer 2008, 185-188 and 196-197; 2010, and Hoffmeyer and Stjernfelt, forthcoming). Exploring the link between Polanyi's approach through marginal control and its expansion through the instantiation of new principles and the biosemiotic interest in the expansion of semiotic freedom seems a worthy project.

Centers, Achievement, and Tacit Powers

Polanyi's constructive philosophical account of life is grounded in affirmations akin to recent biosemiotic approaches oriented to the striving of living beings which semiotic causation actualizes. Polanyi insists that "we can know living things only by appreciating their achievements" (*PK,* 385).[23] Those who study living things must take a "molar" (*PK,* 327) view of living entities, and this involves recognizing "comprehensive biotic entities" (*PK,* 342)[24] and grasping their responsive actions, however primitive or sophisticated, in a particular dynamic context in which they are embedded.[25] This context is both separate from and connected with a living comprehensive entity; it sustains (or eliminates) and transforms the entity in the temporal flow. Above I have sketched the way in which Polanyi seems to conceive living beings and their evolution in terms of the principle of marginal control, which is concerned with the relation of higher and lower levels of control and the emergence of new higher levels of control. But Polanyi also suggests that living entities need to be thought about in terms of part-whole relationships. A comprehensive living system is more than an aggregate of parts. A comprehensive biotic entity has internal parts that operate in a coordinated fashion and this coordination can extend into the context in which an entity is embedded. In Polanyi's idiom, it is the tacit integration of particulars which produces a functioning whole that is deeply in relation to a local context beyond an entity's boundaries. The "integration" motif in Polanyi is his adaptation of Gestalt discussions of "spontaneous equilibration." This adaptation has both epistemic and ontological aspects. Polanyi regarded a comprehensive biotic entity as relationally constituted, that is, as a temporal and situated being that is (or has) a center which is an integrating system that produces achievements. He argues that in evolutionary history "there is a gradual intensification of the center in living beings" (Duke 5, 22), and this is a "gradual intensification of value" which is "accompanied at every step by an additional liability to miscarry" (Duke 4, 24). Thus there is a "parallel development of capabilities and liabilities" in the evolution of living beings and this accompanies "a consolidation of the center to which these are attributable" (Duke 4, 24).

By drawing attention to the "achievements" of living beings as entities that are or have an integrating center, Polanyi unequivocally adopts a first-person or living-entity perspective (in a way akin to Merleau-Ponty and Jacob von Uexkull) which phenomenological and biosemiotic approaches to life adopt (Harney, 2015, 4-5).[26] Polanyi's analysis of the logical levels of biological study (*PK,* 345-346; cf. notes 31 and 32) is another way to point out, as von Uexkull did, that living things generate, experience and live in terms of a species-specific model or map of the immediate context (one subject to incremental ongoing revision) in which they struggle to flourish. Achievement occurs in a niche, a familiar lived world, an Umwelt, which is an always already significant environment for the centered living entity as an embodied system with a history.

Familiarity is a skillful or habit-constituted orientation; it involves the possession of a second-nature set of responsive skills that can be deployed when the circumstances or timing is right. Achievements interactively unfold through a living entity's complex but tacit integration of particulars, internal and external. Particulars are that which the center dwells in or embodies on a particular occasion, and some particulars lie beyond the literal boundaries of the entity. A Polanyian framework recognizes an internal-external distinction but it attempts to avoid reifying that distinction (i.e., making it an ontological bifurcation) by emphasizing the indwelling capacities of living entities. A tacit integration of particulars is the realization of the tacit powers of a responsive subject, and those powers extend into the context in which a living being is embedded.

"Achievement" for Polanyi points toward the temporal nature of a comprehensive biotic entity, toward its unfolding future in a local context.[27] That future has both near and far horizons in longer term evolutionary history in which creativity blossoms into the emergence of more complex living forms. Polanyi insisted that biologists necessarily recognize the far horizons insofar as biologists can know the evolution of living beings "only by appreciating the development of their achievements in the course of succeeding generations" (*PK,* 385).[28] "Achievement" as that which unfolds or is realized in near horizons of temporal process means that a living entity protends or anticipates, and this anticipation is grounded in memory rooted in past living experience. Protensive elements are not only real elements in an individual entity's living, but such dimensions are real elements in broader terms of living achievements over evolutionary history.[29] For Polanyi, there is always an important reflexive element involved in appreciating the achievements of comprehensive biotic entities. Acts of understanding the achievements of living entities and their evolution are themselves achievements of living human beings, i.e., evolved (and still evolving) bio-cultural human creatures. These human knowledge-achievements reflect commitment and enrich reality. The kind of human "minding" involved in biological study should not be regarded as merely incidental; it is, for Polanyi, a central element to be mindful of in continuing biological inquiry.[30]

In *Personal Knowledge* and later writing, Polanyi presents a case that biological study is both "critical" and "convivial." His case, which seems akin to suppositions of some biosemioticians, effectively offers a particular ontology of life that he saw as required in biology. Polanyi saw in much of the biology in the middle decades of the last century an orientation focused narrowly on efficient causation understood mechanically.[31] If biologists examined more seriously the critical and convivial aspects of knowing life, Polanyi believed, biological thinking would move beyond narrowly mechanical suppositions shaped largely by the one level, non-relational ontology absorbed in the Modern Synthesis.

What Polanyi means by "critical," as an aspect of biology, is that the study of living things usually entails recognizing individuals and evaluating their performance in terms of success and failure.[32] What Polanyi means in suggesting biology is "convivial"

is that study of increasingly complex life forms necessarily is increasingly intertwined with "an increasing enrichment of relations between the critic and his object" (*TD*, 51). It is both the kinship between living beings and the differences among them (emerging in evolutionary history) that interested Polanyi. Biosemiotics opens up to science in a new way the exploration of both this kinship and difference.

Appreciating the critical and convivial aspect of biological study requires a molar view of living entities, which attends to achievements and tacitly acknowledges what Polanyi termed a "center" that is a "logical novelty" found in biology (*PK*, 344).[33] Where there is achievement, there is a center.[34] A center is a focus of comprehension, a focus, Polanyi argued, which is quite vague in simple life but becomes more distinct as life becomes more complex. A focus of comprehension attends to a comprehensive biotic entity that is more or less active since "it grows, produces meaningful shapes, survives by the rational functioning of its organs" and eventually is "something that can behave and acquire knowledge, and at a human level, can even think and affirm its own convictions" (*PK*, 344). Being a center means persisting as a comprehensive biotic entity such that "achievements," which are the means to persist are discernable in a particular dynamic context. As Harney suggests, using the language of Merleau-Ponty, where life persists there are certain reciprocal relations, which articulate a center's attunement to and anticipatory involvement in its niche. Like Merleau-Ponty, Polanyi offers a "relational ontology of the Umwelt" which suggests that a living entity and its environment can be regarded as separate and distinct only on the basis of a prior reciprocity that is constitutive for the living system (Harney 2015, 4).

Clearly, Polanyi's focus on a center and achievement does not imply the presence in most life forms of the conscious intentionality we associate with human beings and higher animals. Nevertheless, comprehensive biotic entities do manifest directedness.[35] This is what phenomenologists sometimes refer to as the "aboutness" (or "intentionality") constitutive of the activity of living forms. Polanyi envisioned this directedness as a focusing of attention and the tacit integration of particulars.[36] Living directedness is an attending from-to. But Polanyi consistently emphasized the tacit execution of most telic functions in living beings, even in higher animals. Polanyi shifted the ground in epistemic discussions to focus on an agent's skillful action, and skillful action is directedness in comprehensive biotic entities. Action is an integration of subsidiaries in which the subject dwells at a particular time, a performance which coordinates tacitly held elements to bear on a focus. This approach emphasizes the skillful living actor's orientation to a context and the ongoing effort to become re-oriented. Ongoing action reshapes the living actor's being, which is an embodied or embedded, niche-shaped being. Polanyi's ontology of life thus emphasizes that tacit powers shape and reshape living entities. Polanyi's reframing of "knowing" in terms of action grounded in particular skills used to address a particular context—a reframing which Grene described

as a 180-degree transformation of contemporary epistemology (Grene 1976, 168)—suggests how Polanyi provides an account of living agency that incorporates the tacit dimension.

Polanyi's discussion of a comprehensive biotic entity in terms of achievement and being (or having) a center is tightly bound up with his appreciation of skills as constitutive of living beings. Skills are that which a living comprehensive entity can make subsidiary in the effort to persist. Skills are akin to what biosemioticians, following Peirce, regard as the fabric of habit and the semiotic scaffolding through which life unfolds.[37] Skills, for Polanyi, are both vertically layered and horizontally linked. Insofar as an embedded comprehensive biotic entity flourishes, it does so by tacitly deploying skills. The tacit powers of living beings are powers mustered for achievement in a particular niche; such powers can be understood in terms of skill development and coordination, but for Polanyi skills reach deeply into the physiology of living forms and are not only or primarily consciously invoked. The from-to movements of efforts for achievement of a centered comprehensive biotic entity range from the somatic to the clearly conscious: "…subsidiary awareness will be found and accepted at all levels of consciousness" (1968c, 39). Although much of Polanyi's discussion of skills is concerned with higher animals, the framework applies to all living entities. Many combined skills developed and coordinated over time are involved in walking, seeing, hearing, and speaking intelligently for human beings. But also the amoeba's ability to "discern" when to propel itself involves a skillful coordination of elements. Skills are peculiar to a particular life form and a particular domain of living in which an entity is engaged. Skills are strategies for responding or coping, for striving. Skills are dispositional possibilities for response of a living entity engaged in the unfolding temporal drama of a particular context.

In sum, Polanyi thinks of living entities as possessing and refining a repertoire of tacit skills which are tacit powers that can be put into play when the proper occasion arises. Some skills are essentially inborn functional strategies but others are capacities clearly acquired in practice and revised in on-going practice in life. Skills can be acquired because of invariances in the broader living context. Not only does the development of one skill open the path for the acquisition of another skill but also the deployment of one skill can trigger the deployment of another skill. Skills are complementary as horizontal and vertical linkages in living beings.

To understand living beings in terms of a center, achievement and tacit powers, biology must, Polanyi argued, appreciate the "logic of achievement" (*PK*, 327-346). The opening chapter with this title in the final section of *PK* both links and distinguishes machines and comprehensive biotic entities which function with "interwoven principles, namely as machines and by 'regulation'" (*PK*, 342). Machine-like principles involve fixed structures and precise rules, "while the rules of rightness of a regulative achievement can be expressed only in gestalt-like terms" which means the appraisal

of regulation is "a connoisseurship" (*PK*, 342). The regulative achievements of biotic entities, Polanyi argues, involve "equipotential integration of all parts in a joint performance" (*PK*, 342). Such integrations are indeterminate (unlike machine-like principles) and sometimes serve as creative processes through which biotic systems under pressure achieve ends.

As I have noted above, Polanyi's most abstract descriptions of life and the transformation of life in evolutionary history focus on the dynamics of "dual control" (*KB*, 227) systems. Polanyi sets forth a hierarchical account of complexity and its emergence in history, but one that focuses attention on the interface of a higher and lower level of control in a comprehensive biotic entity. However, Polanyi argued the dynamics of dual control operate not only in living entities, but also in machines and in DNA, insofar as it functions as a code conveying information (Polanyi 1967a, 291-295). In dual control systems, higher principles operate in margins left open by the boundary conditions set by lower level principles. The higher level control established in the margins left open by the operation of lower level principles gives further shape to an entity, realizing possibilities that lower level principles operating alone do not realize but do not exclude. This Polanyi called the "logic of contriving" (*PK*, 328), and he contended that it must be recognized to understand machines themselves as well as comprehensive biotic entities. Biotic entities combine machine-like principles and regulative principles, and biotic entities (unlike machines created by human beings) change their contours or dynamics, once life emerges, as they evolve in evolutionary history. Living entities change in conjunction with possibilities released by mutation and selection, but Polanyi focuses attention on how new principles are emergent instantiations in margins left open by lower levels of control. Polanyi envisioned more complex biotic entities as a sequence of dual controlled levels; in such a hierarchy of levels, each level "relies for its workings on the principles of the levels below it even while it itself is irreducible to these lower principles" (*KB*, 233).[38] An emergent new principle "harnesses the principles of a lower level" in the service of the "new, higher level, establishing a semantic relation between the two levels," and the higher level "comprehends the workings of the lower and thus forms the meaning of the lower" (*KB*, 236).[39] In Polanyi's broad discussion of evolution, he posits "a progressive intensification of the higher principles of life" (*KB*, 234), and this is the ontological correlative of his epistemic emphasis upon the convivial nature of biological study.

Conclusion

These reflections have sketched important ideas developed by some contemporary figures in the emerging interdisciplinary "biosemiotics" area. I have attempted concisely to convey ways in which Fernandez and Hoffmeyer extend Peirce's triadic account of semiosis to try to address important questions about life in contemporary

philosophical biology. In particular, these figures develop a dispositional account of "semiotic causation" and "semiotic scaffolding," suggesting the fruitfulness of applying a triadic semiotic perspective for understanding life and evolutionary history. I find an affinity between the Peircean-shaped biosemiotic approach and some of the ideas about life that Polanyi tried to articulate almost fifty years ago. I have sketched both Polanyi's criticism of the mainstream theoretical biology of the mid-twentieth century (some criticisms shared with biosemiotics) and his constructive effort to discuss basic questions about the nature and evolution of life. My treatment of Polanyi's constructive account focused on Polanyi's view of embedded comprehensive biotic entities as centered entities deploying tacit powers to persist in the temporal flow. Living beings are "dual controlled" and hierarchical. In Polanyi's account then, evolutionary history is that of the emergence of a complex hierarchy as new "higher" principles become established in margins left open by lower level principles. I outlined Polanyi rich account of seamlessly related skills working as subsidiaries, noting that "achievement" reached through tacit integration is Polanyi's mark of the living. Finally, I have emphasized the reflexive character of Polanyi's discussion of life: understanding life is a calling of committed human persons, living beings with extraordinary tacit powers. The knower and the known are inextricably bound together, and this is a matter, according to Polanyi, about which human beings must always be mindful.

A promising future project might more integrally link ideas sketched here concerning what is central to biosemiotic discussions and ideas Polanyi emphasized about comprehensive biotic entities as centered subjects with tacit powers. Is it possible to illumine the growth of "semiotic freedom" and the increasing complexity of "semiotic scaffoldings" in terms of Polanyi's ideas about deepening centers in evolving living forms whose tacit integrations and achievements become more complex? Can the telic as formal causal elements in ongoing, interconnected semiotic processes in living forms also be understood in terms of skill deployment, which certainly seems to be connected with habit? Can Polanyi's emphasis upon hierarchy and "dual control" be unpacked within a more semiotized framework, a direction that Polanyi's late essay "Sense-Giving and Sense-Reading" already suggests? Can biosemiotics better address issues concerned with a relational ontology by adopting a more reflexive philosophical posture that examines ways in which biologists as living agents attend to life?

Treating questions in theoretical biology is an important domain of Polanyi's thought, first in the final chapters of *PK*, but also in his work in the 60s. Yet this seems a domain rarely touched by Polanyians and almost altogether overlooked by theoretical/philosophical biology. At least to this reader, this is rich territory worth close study since it is seems germane to discussions in more contemporary interdisciplinary approaches to questions about life such as that of biosemiotics.

Endnotes

[1]Polanyi to Grene, January 14, 1963, Box 16, Folder 1, Michael Polanyi Papers (MPP). The MPP are held by the Department of Special Collections in the Regenstein Library of the University of Chicago.

[2]Alicia Juarreo, a philosopher deeply influenced by dynamic systems theory, also interestingly analyzes the nature of causality and the telic in living beings; her discussions parallel some Polanyi discussions and also seem to share ground with biosemiotic discussions. See Juarrero (1999 and 2014), Takaki (2013 and 2014), and Agler (2014) for discussion of connections with Polanyi's ideas. The discussion below of the several aspects of "semiotic causation" and "semiotic scaffolding" (no doubt odd notions to those primarily familiar with Polanyi's terminology) unfolds in stages.

[3]In a later essay, Fernandez points out that "in ordinary physical causation we deal with transfers of energy in which the magnitude of the effect is quantitatively related to the energetic level of the operating causes. The results of an explosion, for instance, are so related to the quantity of the explosive; the loudness of a radio is similarly a function of the amount of electric energy delivered to the speaker" (2012, 10). In the case of semiotic causation, "energy transfers also mediate semiotic causation but, once a minimum energy threshold is reached, the magnitude and nature of the effect is quite independent of those of the cause. The nature of the effect will depend instead on the character of a relational pattern that the causing agent managed to embody into an energetic vehicle. Upon reaching a suitable constituted receptor, this vehicle triggers a specific type of behavior, which constitutes the effect" (2012, 10). This paper and much of Fernandez's writing is available at Linda Hall Library (http://www.lindahall.org/reflibpapers/) and at the Peirce Group's Arisbe (http://www.iupui.edu/~arisbe/menu/library/aboutcsp/fernandez/efpapers.htm).

[4]In an earlier essay, Hoffmeyer provocatively remarks that taking striving seriously "already implies a telos, something of the kind philosophers call 'aboutness' or intentionality, (although *intentionality* in this case does not imply thoughts or consciousness)" (2007, 155). He notes that actions involved in striving are not "explainable through schemes of simple efficient causation, for they all presupposes [sic] some kind of kind of 'orientation' from the system toward the environment and towards the *future*" (2007, 155-156).

[5]"Embracing" a process of interpretation for Hoffmeyer means a sign has an ongoing effect as signs do. This continuing set of effects, the process, is not captured by what Hoffmeyer above calls an account that focuses on a machine-like exchange of information. But biological processes that are interpretative do not necessarily involve a conscious interpreter. See the further discussion below.

[6]In a comment akin to Fernandez' account summarized above (see especially note 3), Hoffmeyer identifies "semiotic causation" as operating through the mechanisms of material efficient causation but as a particular kind of causation "bringing about effects through interpretation...as when, for example, bacterial movements are caused through a process of interpretation based on historically defined needs of a sensitive system" (2007, 152). Later in the same essay, he suggests that living systems maintain themselves by "a very intricate system of dynamic interactions;" living systems are "powered by metabolic energy" but are "controlled by semiotic means" (153).

[7]Not all biosemioticians make use of Peircean triadic semiotics; some who do find the broader cosmological scope of Peirce's semiosis perplexing. Some biosemioticians adapt the dyadic semiotics of Saussure or other approaches to semiotics and communication. Many biosemioticians make use of Jakob von Uexkull's *Umwelt* theory, and combine this approach to the study of living things with

elements of a Peircean account of semiosis. Von Uexkull's biological perspective focused attention on the phenomenal world as apprehended by a living creature in a particular niche. The events of the phenomenal world as apprehended in a particular niche by an inhabitant is an apprehension of engaged "aboutness" or "intentionality." Von Uexkull's approach apparently influenced philosophers like Heidegger and Merleau-Ponty in the phenomenological tradition who work out an account of Being-in-the-world. Von Uexkull's perspective also seems to converge with the "ecological" account of perception developed by James J. and Eleanor Gibson which focuses on "affordances" produced by "invariance." See Hoffmeyer 's discussion of von Uexkull (2008, 171-176) and Grene's summary of the work of the Gibsons, which she links to Merleau-Ponty's embodiment and Polanyi's tacit knowing (1995, 129-151).

[8]"Interpretant" is Peirce's term for the effect of a sign, a term that reflects Peirce's effort to generalize his account of the sign process (see the discussion in Colapietro 1989, 6-7). See De Waal (2001, 67-77) for a succinct, general discussion of Peirce's triadic account of semiosis.

[9]Fernandez ultimately argues that sign processes should not be thought of as something like Aristotelian final causes but as formal causes: "The origin of goal-directed behavior is to be found… in the telic nature of semiosis. The teleos of semiotic action is the generation of an interpretant, not the attainment of a final state. Semiotic causation is a type of formal causation, not a manifestation of physical final causation" (2015, 5).

[10]Hoffmeyer points out that many modern philosophers and natural scientists have trouble with Peircean semiosis in part because of Aristotelian overtones. Most modern philosophical and scientific accounts lack "a concept of purpose that can free itself from its uniquely human connotations" since the nominalistic Cartesian tradition in the background of modernity so steadfastly separates mind and body and nature and culture. But for Peirce there is not just a single concept of purpose delimited to consciously conceived end causes but two concepts, "one specifically human, and the other a general principle of emergent organization," which should not be confounded (2008, 40).

[11]Fernandez defines a "mechanism" as "an arrangement of parts connected as a chain of causes and effects that consistently brings about the production of the same phenomenon under repeated circumstances" (2015, 4).

[12]Hoffmeyer contends an aspect of the evolutionary process is "the building up of a pattern of *semiotic scaffoldings*, a tightly wound web of checks and balances gradually establishing itself through myriads of semiotic interactions…" (2015, 154).

[13]Hoffmeyer is the biosemiotician who early developed and popularized ideas about "semiotic scaffolding." But other biosemioticians have contributed to the effort to richly articulate how scaffolds work as an instantiation of concatenated sign processes. Fernandez (2015, 3) quotes recent efforts of Favareau and Kull to pull together a comprehensive but concise statement. Favareau says "Semiotic Scaffolding consists in biologically instantiated sign relations interlocking with and reinforcing one another, and by so doing, providing directionality towards and away from other sign relations in the network, through the dynamic emergence and canalization of semiotic pathway biases and constraints. Such ongoing semiodynamic re-adjustment enables new scaffolds and new pathways within and between scaffolds to arise, increasing semiosic capacity exponentially." Kull suggests that "Semiosis as an active meaning-seeking-making process results often with the building of some relatively static or even quite solid structures that somehow embed in themselves the findings of that active searching-event of semiosis. The resulting structure is scaffolding. It canalizes further behavior. It is the frame for habits."

[14]Hoffmeyer's discussion helpfully alludes also to the way in which the recent "extended mind" discussion in philosophy has emerged in robotics research, where ideas about a central planner/"brain" in robots is being rejected in favor of ideas about information that is available anywhere in the system. Autonomous activities interacting with each other and the environment produce emergent behavior of the system and thus there is no need for a centralized decision-making center in which goals are represented (2007, 154-155). Long before recent philosophical discussions of "extended mind," Polanyi insisted on focusing on "minding" (Grene's apt phrase, although she uses it a little differently than here—see 1966, 242) in terms of a living creature's indwelling, its efforts to extend its bodyliness.

[15]The growth of semiotic freedom in evolutionary history is a central idea in biosemiotics: "By semiotic freedom we mean the capacity of species organisms to derive useful information by help of semiosis or, in other words, by processes of interpretation in the widest (Peircean) sense of this term... The evolution of a richer semiotic capacity is of course only one among many strategies available in the evolutionary game. Yet this particular strategy potentially ignites a self-perpetuating evolutionary dynamics, since each step taken by a species along this route potentially opens new agendas for further change: the more capable some species are of anticipating and interpreting complex and fast-changing situations or events, the more will evolution favor the development in other species of a well-adjusted set of semiotic tools. Note that tools for anticipation, semiotic tool sets, are categorically different from tools for exerting a direct material interaction" (Hoffmeyer 2015, 153).

[16]Hoffmeyer notes "history thus not only matters to the cell, but literally operates inside the cell through the structural couplings—or semiotic scaffolds—that it has served to build into the system. And this is exactly what distinguishes living systems from non-living systems: the presence in the former of historically created semiotic interaction mechanisms which have no counterpart in the latter" (2007, 152).

[17]There are striking historical connections between Polanyi, Marjorie Grene and some early figures contemporary biosemioticians often reference. Helmut Plessner and Erwin W. Straus, both figures treated in Grene's *Approaches to a Philosophical Biology* (1965) gave papers at the Ford Foundation-funded 1965 Bowdoin College conference on reductionism organized by Polanyi, Grene and Edward Pols; these are included in Grene's monograph (1969) of selected conference materials. The follow-up 1966 Bowdoin College conference featured a paper by F.S. Rothschild, a neurophysiologist and phenomenologically-oriented philosopher of biology, often cited as one of the first figures to use the term "biosemiotics." Polanyi cites and praises Rothschild in "The Structure of Consciousness" (1965, also included in *KB*, 211-225 [see *KB*, note 13, 223-224]) and "Logic and Psychology" (Polanyi, 1968c). Hans Jonas, an important philosopher of biology, was also a participant in this 1966 Bowdoin conference. Francisco Ayala and Ilya Prigogine were involved in a 1968 follow-up conference on questions about reduction in biology. Polanyi corresponded with C. H. Waddington and seems to regard ideas about "epigenetic landscapes" as akin to his own views about the way a field can guide morphogenesis (*KB*, 232). Howard Pattee, a biophysicist and biosemiotician whose main work Umerez describes as "the elaboration of an *internal epistemic stance* to better understand life, evolution and complexity" (2001, 159), interacted with Marjorie Grene and Harry Prosch in the sixties and seventies (and may have had contact with Polanyi in the sixties). Umerez says the idea that best represents Pattee's approach is the "need to introduce a generalized epistemological stance to address the study of natural phenomena once life is originated" (2001, 160). This certainly sounds like Polanyi. Pattee publications very frequently cite an important late Polanyi article, "Life's Irreducible Structure" (1968b). What Pattee suggests about hierarchy and the operation of

codes seems in part to draw on Polanyi's arguments. Pattee does not seem, however, to have grasped the broader context in which Polanyi's arguments for hierarchy are embedded, i.e., Polanyi's broader philosophical discussion of knowing in science and life. But his reference to the 1968 Polanyi article apparently has led many later biosemioticians also to cite this Polanyi article. Nevertheless, Polanyi's thought has not been carefully studied as a resource for biosemiotics in the way that Peirce and some phenomenologists have.

[18]See *TD*, 29-52; Polanyi, 1967 [also in *SEP*, 283-297], Polanyi, 1968a [also in *KB*, 225-239]; Polanyi 1968b [also in *SEP*, 299-303], and Duke Lectures, 4 (available at www.polanyisociety.org). See also Harry Prosch's careful account of Polanyi's views in "Biology and Behaviorism in Polanyi" (Prosch 1977, 178-191).

[19]See Mullins (2004 and 2009) for earlier discussions of Polanyi's account of living agency. "Extended agency" is Kendig's term (Kendig, 2015), although she uses it a little differently than I do. She links discussions of "extended mind" with "extended agency," which I also wish to do, although I suggest using Polanyi's account of agency as constituted by indwelling and integration.

[20]Polanyi contended Neo-Darwinism had a "fundamental vagueness" that concealed its lack of "any acceptable conception of the way in which genic changes modify ontogenesis" and this is a deficiency "due in its turn to the fact that we can have no clear conception of living beings as long as we insist on defining life in terms of physics and chemistry." He counters Neo-Darwinism with "a different conception of life" which regards "living beings as instances of morphological types and of operational principles subordinated to a centre of individuality." He insists "no types, no operational principles and no individualities can ever be defined in terms of physics and chemistry" (*PK*, 383).

[21]Polanyi argues that in science and other human affairs, "explanation must be understood as a particular form of insight" (Polanyi, 1968c, 37).

[22]Much of Polanyi's alternative account focuses on how life emerged and developed in stages by the action of principles; the action of a first principle arises from inanimate matter but subsequent principles Polanyi seems to view as points in evolutionary history at which arise "novel modes of operation" (*PK,* 383). Polanyi is always careful to distinguish the conditions that give rise to and sustain a principle from the action of the principle: "…I shall acknowledge that the *ordering principle* which *originated* life is the potentiality of a stable open system; while the inanimate matter on which life feeds is merely a *condition* which sustains life, and the accidental configuration of matter from which life had started had merely *released* the operations of life. And evolution, like life itself, will then be said to have been *originated* by the *action* of an ordering principle, an action released by random fluctuations and *sustained* by fortunate *environmental conditions*" (*PK,* 383-384). See Haught and Yeager's summary (1997, 557-561) of Polanyi's major claims, including his five stages in evolutionary history in which novel modes of operation emerge. It is interesting to compare Polanyi's five stages and more recent theoretical accounts of stages or transitions in Hoffmeyer and Stjernfelt, in Smith and Szathmary, and in Mark Lane, succinctly summarized by Fernandez (2016 forthcoming, 3-9).

[23]Haught and Yeager (1997, 546-547) suggest Polanyi's "robust metaphysics" (547) centers on "the reality of living organisms" (546); this metaphysics focuses on two principles, participation and achievement which "can be gathered together as forms of action. Being is acting. Knowing (or at least knowing life) is acting-by-participating so as to understand acting-as-achievement" (546). My discussion emphasizes how Polanyi always intertwines his discussion of participation which is concerned with the active, skillful character of understanding and his discussion of achievement

which is concerned with the organization and skillful operation of a living system. The knower and the known are inextricably bound together in Polanyi's "ontology of commitment" (*PK*, 379). Polanyi argues that "calling; personal judgment involving responsibility; self-compulsion and independence of conscience; universal standards ...exist only in their relation to each other within a commitment." But he further contends "this ontology can be expanded by acknowledging the achievements of other living beings. This is biology. It is the participation of the biologist in various levels of commitment of other organisms…" (*PK*, 379).

[24]"Comprehensive biotic entity" is the careful terminology Polanyi sometimes uses in *PK* to clarify that he is discussing living forms. But "comprehensive entity" is also a term used occasionally in *PK* (e.g., 64); especially after *PK*, Polanyi uses "comprehensive entity" very broadly to refers not just to living entities but to specify any focal performance or distal awareness arrived at by an integration of particulars in which the subject dwells. See the discussion of the history of Polanyi's terminology in Mullins, 2007.

[25]"Grasping" or "understanding" is "sense-reading," in Polanyi's later terminology developed in his essay "Sense-Giving and Sense-Reading" (1967a, also *KB* 181-207) that interestingly opens in some but not all versions by comparing his triadic account of tacit knowing with Peirce's semiotic triad (see Mullins 2012 and *PK*, 181-210).

[26]Harney provides an illuminating recent discussion connecting the late views of Merleau-Ponty and the ethnologist Jacob von Uexkull (2015, 4). She also sets forth Merleau-Ponty's relational "ontology of nature" (2015, 5-7) and attempts to link this to Peirce's contention that life and the cosmos can best be understood in terms of semiosis (2015, 7-9). Some of what she says about Merleau-Ponty's account converges with what Polanyi suggests about living entities and knowing life. From about 1960, Marjorie Grene began to put together Polanyi's tacit knowing and Merleau-Ponty's philosophical approach: "Cartesian extended nature was suited to a geometrizing Cartesian mind. A new nature will become intelligible to us only when we have assimilated a new concept of our own activity in knowing. Such a concept we have found in Polanyi's theory of personal knowledge, with its unit of tacit knowing, and its distinction between focal and subsidiary awareness. Very close to the same theory is Merleau-Ponty's account of the phenomenology of perception with its distinction between 'positing' and 'non-positing' consciousness." (Grene, 1966, 224; cf. 14, 23-24, 90, 224, 244) Grene argues Merleau-Ponty shows perception is primordial and pervasive; however, "as there is no sharp cut between belief and knowledge [as Polanyi argues], so there is no sharp cut between perception and belief" (Grene 1995, 25).

[27]Grene argues for taking "one step more" (1966, 244) beyond the recognition of tacit knowing and the parallel structure of comprehensive entities, and that step involves recognition of the temporal nature of knowing as a "reaching out from past to future" (244). She notes the appropriateness of Husserl's term "protensions" as focusing attention on the tension-filled "ways in which the future pulls us toward it" (245). She succinctly summarizes the temporal nature of achievement: "achievement...is a pervasive character of life; and achievement, that is success or its contrary, are temporal categories, categories constituted by the *future*, by their eventual result. For living things, therefore, past and present depend on the future as primary...time itself, as lived time, is telic in structure (245).

[28]Polanyi noted that he does not "disregard the occurrence of accidental mutations which may prove adaptive." But he assumes "these can be distinguished from changes of the type achieving new levels of existence." He acknowledged this is a difficult distinction but if accepted it "allowed for the autonomous thrust of evolutionary ascent" (*TD*, 48).

[29]Evolutionary history, in its broadest dimensions, Polanyi tends to view cosmically in terms of the "awakening" of the cosmos. These broader implications are often sketchily discussed in the final sections of Polanyi books and lecture series (e.g., *PK*, *TD*, and the Duke Lectures). Such a cosmic turn makes many biologists uncomfortable in just the way in which cosmic dimensions of Peirce's semiosis does.

[30]Marjorie Grene succinctly notes what is philosophically at stake in acknowledging that the starting point for biological inquiry is the recognition of a living individual entity embedded in a niche and capable of achievements: "To know life is to comprehend comprehensive entities; to know knowing is to comprehend those particular achievements of living things which consist in their acts of comprehension. Mind is once more a natural reality, and nature once more both the medium and the object of mind's activity" (1966, 224). "Minding" (1966, 242) is Grene's provocative term for the active kinds of richly real achievements of living, thinking human beings, achievements which include generating the body of knowledge biologists have produced. Her 1966 discussion draws on the *PK* project and the 1964 Duke Lectures, and, perhaps most importantly, is written after Grene begins seriously to work on integrating of the ideas of Polanyi and those of existential phenomenology, especially Merleau-Ponty.

[31]Most biologists share the view that insofar "as life can be represented as a mechanism, it is explained by the laws of inanimate nature" (Polanyi 1967, 284) but this account, Polanyi argues, fundamentally misunderstands machines (Duke 4, 10; Polanyi 1967, 286-288, and also discussed briefly below). Further, as I discuss below, Polanyi holds that not only mechanism (properly understood) but also regulation must be used to represent life. As noted above, one stated aim of Polanyi's constructive philosophical account of life is to present "a truer image of life and man than the present basic conceptions of biology present" (*KB*, 238).

[32]Although he carefully qualifies this in his comments on tissue cultures, viruses, and fragments of plants and lower animals, Polanyi claims "the bulk of living matter is found embodied in a finite set of individuals, circumscribed in space and of limited duration in time. Each has come into existence at a definite moment, to remain alive for a certain period, after which it will die" (*PK,* 343). Recognition is a molar feature which is bound up with evaluation of a living comprehensive entity, an evaluation that attends to the operation of "rules of rightness" (i.e., principles that account for success—see *PK,* 328-332) and the causes of failure which are manifest in performance. Polanyi suggests there are hints of evaluation (i.e., critical aspects) in terms of success and failure in some inanimate studies (e.g., crystallography), but it is at the level of life where the knower's appreciation of function is imperative.

[33]There is, to be sure, continuity between Polanyi's discussion of simple biotic entities as centers making achievements and his discussion of persons (human beings) acquiring personal knowledge. Polanyi emphasized not only the "logical novelty" of a center in a living entity but, more generally, the logical levels involved in the study of living beings: "Biology…is three-storied in so far as the individual under observation is doing or knowing something, and two-storied when it observes an individual existing…without bearing on things outside it" (*PK,* 345). But "there is no discontinuity in the transition from the two-storied biology of plants and the lowest animals, to the three-storied biology of the more active and more knowledgeable animals" (*PK*, 345-346). If an observed living entity is centered and active, this means it has a peculiar systemic or organizational integrity, which implies temporal continuity as an embedded, interacting being. Polanyi's notion of a centered living entity in striking ways parallels descriptions found in the autopoiesis theory of cellular life, whose

contours Manturana and Varela began to work out in the seventies after *PK*'s publication and during the last years Polanyi was writing about life (Luisi, 2003).

[34]Haught and Yeager (1997, 546-547) suggest that Polanyi worked to reinstate notions about "active centres—as opposed to the receptive mirrors or isolated ghosts that critical thought" (546) gave us about living subjects: "correlative to the objectivist ideal of knowing, scientific thought, in its representation of living and thinking phenomena, has purged them of all personal or centered initiative"(546). Polanyi seeks to "reanimate nonhuman creation, rehabilitating our intuition that the living systems that chemistry and physics treat as inert extended stuff are, in fact, complex centered systems of initiative and striving, ontologically distinct from the inanimate processes upon which they rely" (547).

[35]Grene notes "this directedness, from proximal to the distal pole of tacit knowing, is a reaching out from ourselves to the world—and by the same token a reaching out from past to future, a reaching drawn by the focal point of attention, which is future" (1966, 244).

[36]In the case of the human animal, we are bio-cultural and our agency is a broadly extended or distributed kind agency since we are complex tool-using cultural animals. We can dwell in this vast array of tools (including language, which is perhaps our most powerful tool) as we more or less consciously direct our attention in order to make sense of what is of interest (see Gulick, 2012). In the popular idiom of contemporary philosophy, human minds seem to be extended and potentially very broadly extendable and human agency is a broadly extended species of agency. But even simple living forms have a center and tacit powers and this means their agency is somewhat distributed or extended. It is worth noting that Polanyi is very careful to emphasize that having an extendable human mind and the broadly extendable form of human agency means human beings can and should aspire to responsible action. In this respect, Polanyi's perspective is akin to Peirce's broader outlook on living agency in human beings: human agency, Peirce emphasizes, is a very complex and sophisticated dispositional matter (including our dispositions for thinking) but we humans ought to aspire to self-control.

[37]Polanyi focuses on skills in connection with living beings and, as I suggest below, skills within a Polanyian account of agency framed with the theory of tacit knowing may be regarded as tacit powers. Peirce focuses on habit-taking not only in living beings, but in the larger cosmos which living beings inhabit. Polanyi thinks of skills as both deeply instinctual and social but the development of skills reflects the larger emerging order that skill-taking living beings inhabit.

[38]In an interesting criticism of phenomenology connected with his claims for "dual control," Polanyi notes that phenomenology has taught us "how to save higher, less tangible levels of experience by not trying to interpret them in terms of more tangible things in which their existence is rooted." However, Polanyi contends "phenomenology left the ideal of exact science untouched and thus failed to secure the exclusion of its claims." Phenomenological studies of life thus "are suspended over an abyss of reductionism" and the "relation of the higher principles to the workings of the lower levels in which they are rooted was lost from sight altogether." Polanyi contends his "principle of stratified relations does offer at least a rational framework for an inquiry into living things and the products of human thought" (*KB*, 236-237).

[39]Polanyi suggests "the fact that the effect of a higher principle over a system under dual control can have any value down to zero may allow us to conceive of the continuous emergence of irreducible principles with the origin of life" (*KB*, 231). See also Roth's discussion (2014, 282-290) of Polanyi's

"dual control" as applied to the operation of DNA, and, more generally, the implications of "dual control" for molecular biology plus parallels between Polanyi and Kant on life.

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THE SHAPE OF BIOLOGY TO COME? THE ACCOUNT OF FORM AND FORM OF ACCOUNT IN HOFFMEYER'S BIOSEMIOTICS

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Keywords: biosemiotics, Jesper Hoffmeyer, Michael Polanyi, multi-layered ontology, emergence, anti-reductionism, the Modern Synthesis, punctuated equilibrium

ABSTRACT

The essay discusses congruency issues in the biosemiotic approach of the Danish biochemist, Jesper Hoffmeyer. The authors understand Hoffmeyer's anti-reductionistic approach to be similar to Michael Polanyi's multi-layered ontology, but suggest that the Polanyian approach has fewer handicaps as a model-building enterprise. We offer a historical review of Hoffmeyer's polarized narrative of 20th century biology and investigate his central thesis that life and semiosis are coextensive. We argue that Hoffmeyer conflates temporal and spatial features of semiotic systems, his account of emergentism is unclear and the relationship between semiotic evolution and punctuated equilibrium is vague, possibly entailing incongruent metaphysical views.

Introduction: Two Biosemiotics Approaches

In this essay, we point to some congruency issues in the biosemiotic approach to life, as is exemplified in the work of the Danish biochemist, Jesper Hoffmeyer. Our starting point is his evaluation of the understanding of life and meaning inspired by the biologist Jakob von Uexküll plus the semiotic approaches of Charles S. Peirce and Thomas Sebeok (Gulick 2012, 23). We understand Hoffmeyer's approach to be similar to Michael Polanyi's, as recently discussed in Gulick (2012). Both are anti-reductionist

enterprises (Goldstein 2012, Hoffmeyer 2008), but our comparison suggests that the Polanyian approach has fewer handicaps as a model-building enterprise conducive to supporting research programs. As Gulick notes:

> a Polanyian biosemiotics avoids the tendency found in many epistemological schemes to atomize moments of knowing. The tendency toward epistemological atomism is exhibited to some degree in Whitehead's great stress on a concrescing occasion or in Peirce's emphasis on signs rather than bodies, communities, etc. If one overstresses the subsidiary-focal, tacit-explicit or from-to relations in Polanyi's epistemology, one can be guilty of this sort of atomism… The "from" dimension can be analyzed in terms of many levels. The biologist can unpack the physiological functions and anatomical structures that make cognition possible; the psychologist can speak of the roles of memory, desire, fear, and such factors in behavior; and the sociologist can root the "from" at a transpersonal level in social mores, status-seeking, ideological beliefs, and the like to make generalizations about group behavior (Gulick 2012, 29).

It is important to note that the approaches of Polanyi and Hoffmeyer diverge on how they address the domain of the living, "the vastly extended scale of increasing complexity and enhanced ability to respond to their niches from single-celled bacteria to the mammals" (Gulick 2012, 22).

Polanyi builds his multi-layered account from form, structure, and boundary conditions (Polanyi 1968; see also Margitay 2010 and 2012). For Polanyi, active centers play a key role in the identification of entities and levels of description, where it makes sense to talk about "originality as a performance, the procedure of which we cannot specify" (*PK,* 336). Polanyi builds on practices of inquiry, where individuality is a "personal fact, and to that extent unspecifiable" (*PK,* 343). For Polanyi, the dynamo-physical world is the substrate of second order emergence, which produces self-centered functioning (Gulick 2012, 21) of life and living systems, and eventually, a third order of emergence which accounts for humans evolving from signal awareness to symbol-produced conception (for both Polanyi and Gulick).[1] Studying a living thing, we learn about the second emergent level, and to study how a living thing studies a living thing clearly belongs to the third, reflexive level.

Hoffmeyer's biosemiotics focuses on meaning and semiosis and has to negotiate between a constrained thermodynamic system-framing organic evolution and a "spectrum of signs," or messages, where "a principal and distinctive characteristic of semiotic biology lies in the understanding that in living, entities do not interact like mechanical bodies, but rather as messages, the pieces of text" (Kull 1999, 385). By relying on

some of the old obstacles of a text-based (Saussurian) representative culture in a semi-Peircean packaging, the following question seems natural: can the primarily exegetical approach of Hoffmeyer provide a unifying account of life in its myriad shapes and forms and meanings? Does it provide an answer to the Big Question of life's nature?

The Hoffmeyerian strand of biosemiotics appears to claim the prize, but before we discuss some of the basic tenets offered by this "new synthesis," we first investigate the question from a historiographical perspective, as Hoffmeyer often portrays his enterprise as radically different from so-called traditional ("reductionistic") biology. Hoffmeyer's offer to replace the "old synthesis" comes with historical partisanship, and the often monumentally present precursors, commonly depicted in a markedly "whig" historical narrative suggests that the focus is more on attacking some metaphysical views, than offering a theoretically meaningful alternative synthetic theory.

In the first part of this article, we give a historical review of Hoffmeyer's narrative of the New Synthesis (Sections 2-4), then we will discuss some examples of entangled ontological commitments as we investigate the coextension of life and semiosis (Section 5), the gradation of the Great Semiotic Chain (Section 6), and the analogy drawn between biosemiotics and the "punctuated equilibrium" model by Gould and Eldredge (Section 7).

Precursors to Biosemiotics: Notes on Hoffmeyer's Approach to the Past

Hoffmeyer claims that twentieth century biological sciences were dominated by two major trends. A negative trend is the "molecular and genetic" reductionism that tries to offer a quantitative analysis of various phenomena, whereas a less noticed but in his view positive trend is the "semiotization of nature." The former is stigmatized as being dogmatic, because "semiotic creativity of biological systems at all levels of complexity is systematically excluded from the explanatory universe of the synthesis" (Hoffmeyer 1997a). The need to polarize the discussion and divide groups is a sign of dichotomization, where important aspects of contemporary debates can easily be lost. Otto Neurath, the Vienna Circle positivist, noted that "dichotomies…are not only crude intellectually, but also mostly the product of scientific pugnacity" (Neurath 1983, 15), and the militant debate-seeking rhetoric might even be detrimental to knowledge-production and can hardly be considered as beneficial epistemically. This reductionist or "extrapolationist" interpretation is quite common amongst the opponents of the Neo-Darwinian program (e.g., Gould & Lewontin 1979; Noble 2011 and 2015), but this popular depiction of the synthetic theory is strongly oversimplified (Somocovitis 1996 and Lennox 2008).[2]

For Hoffmeyer, the modern Neo-Darwinian theory of evolution was never a "real synthesis" (Hoffmeyer 1997a), because it was "lacking in the way that significantly

reflects remnants of ontological ideas that by and large are characteristic of twentieth-century natural science" (Hoffmeyer 2008, 7). This reconstruction of the developments of twentieth century biology is characterized by the retrospective heraldization and deification of certain figures. With "whiggish" overtones, it offers a polemical attack on some straw-man "ultradarwinism" (Grene 1997). It is noteworthy how the supposedly cornered opponent is demonized in an elliptical and distorted narrative.

In this historical sketch, the other modern trend is "less noticed but in the long run is just as important" (Hoffmeyer 1997a), namely, the semiotization of nature. Emmeche uses the term "spontaneous semiotics" (Emmeche 1999, 274) to describe these varied practices within modern biology. According to Hoffmeyer's historical analysis, "the earliest manifestation of this trend [i.e., a proto-biosemiotic approach] is probably in the work of the German biologist Jakob von Uexküll, who in the first part of this century developed his Umweltsforschung" (Hoffmeyer 1997a), a "line of thought which is, at heart, semiotic, or biosemiotic, though he himself never used these terms" (Hoffmeyer 1997b, 56). Framing von Uexküll's approach as proto-biosemiotic downplays the relevance of intellectual lineage connecting Johannes Müller's specific sensory energies and the intense development in the physiology of perception. Von Uexküll's work is generally connected to later developments in the narratives, like the phenomenological tradition (Harney 2015), and not to the rich soil of early twentieth century scientific model-building conventions studying life and the living, which, among other achievements, gave birth to the New Synthesis. The historical lacunae (e.g., forgetting that one of the fathers of Neo-Darwinism, Sewall Wright, subscribed to some form of panpsychic organicism) helps Hoffmeyer to portray the biosemiotic enterprise as an underdog with integrative potential, as semioticizing approaches are "already tacitly permitted in the disciplines," but "it simply remains to become developed as a new integrated paradigm" (Hoffmeyer 2008, 15).

In Sebeok's thesis, semiosis is what distinguishes all that is animate from what is life-less; it is "at the heart of life" (Sebeok 1991a, 85), is "the criterial attribute of life" (Sebeok 1991b, 124), and it presupposed life (Sebeok 2001 as cited in Hoffmeyer 1997a). According to Hoffmeyer's co-extension thesis, semiosis has been essential to life from the very beginning (Hoffmeyer & Stjernfelt, forthcoming, 3). It is an emergent property, "appearing with the first life forms nearly 4 billion years ago," leading to a modern unification of biology, based on the fundamentally semiotic nature of life (Hoffmeyer 1997a). This emergent process started with the very first life forms, reaching its provisional peak in the rich creativity of human thought and language (Hoffmeyer & Stjernfelt forthcoming, 21): "Cultural sign processes must be regarded as special instances of a more general and extensive biosemiosis" (Hoffmeyer 2008, 4) that is co-extensive with life itself (Kull et al. 2009, 168).[3]

The Telic Aspect of Living

Although biosemiotics portrays itself as a biological enterprise, it is not the self-autonomous, metabolizing life form, but the sign-process that is individuated, and this increases indeterminacy of description. Hoffmeyerian biosemiotics in principle assumes the usual, one-level structure of explanation. We think that it is here that Polanyi's inquiry-based multi-layered account fares better than an approach utilizing a universal semiotic formula (agnostic with respect to the ontology of "habits"). Polanyi transposes a conceptual framework fit to study artistic creativity to animal and life-form creativity (*PK,* 336), and builds his multi-layered ontological order from form, structure, and boundary conditions.

It is instructive to investigate the different utilization of one of the common denominators in Polanyi's and Hoffmeyer's account, that of the neo-vitalist von Driesch. Polanyi was taking up a teleological point of view of life which he had first encountered in his studies of the vitalist von Driesch, who is also one of the favourite "early pioneers" of biosemiotics. One of the most disconcerting hiatuses in Hoffmeyer's approach is the limited acknowledgement of the traditions leading up to von Driesch (Lenoir 1982). While Polanyi utilizes the neo-vitalist author together with Roux and Spemann (*PK* 355-357) to develop requirements for the telic interpretation of behavior and his concept of equipotential systems, Hoffmeyer laments that "It was perhaps unfortunate that thermodynamics in Driesch's time was not yet ready to function as the foundation for such a nonvitalistic solution," and that the theory "became for many biologists the quintessential example of how badly it can go when philosophical considerations are given credence in connection with internal controversies in the biological disciplines" (Hoffmeyer 2008, 11). Nevertheless, his approach "in a radical sense transcends" some "molecular genetics," more broadly some "hardcore reductionism. . .all the way back to Descartes's time" (ibid.).

Even Descartes clearly saw that a machine model cannot be the model of life, only a possible hypothesis concerning the functioning of a living being. Life, this hard-to-eradicate fire in living things, is more mysterious. As he wrote in a letter to Regius,

> A simple alteration is a process which does not change the form of a subject, such as the heating of wood; whereas generation is a process which changes the form, such as setting fire to the wood. Although both kinds of processes come about in the same way, there is a great difference in the way of conceiving them and also in reality. For forms, at least the more perfect ones, are collections of a number of qualities with a power of mutual preservation. In wood there is only moderate heat, to which it returns of its own accord after being heated; but in fire there is strong heat, which it always preserves as

long as it is fire (see Adam and Tanner 1996, 461; Cottingham, et al 1991, 200-201; and Kékedi 2015, 145).

Biosemiotics claims that life is a "causally efficacious matrix of biological interaction, the utterly natural product of organisms' interaction" (Hoffmeyer 2008, 8). But this either boils down to reductionism, as in physical causation, or to incongruity, as in semiotic causation, some aspects of which will be discussed below. It anyway fails to give a "meaningful" boundary to the living form and the entity-level description. As opposed to materialistic accounts, it is information-driven and is located in a universe of theoretical kinds, downplaying the relevance of forms of life.

Dreisch's *entelechy* has a longer and more exciting history than Hoffmeyer's simple polarization of opinions that non-experts in the history of biology might accept. The philosophical roots from Leibniz to Kant are just as relevant to this story as the historical empirical and experimental programs that relied upon the perceived inadequacies of mechanistic and reductive explanations. By the early 20th century, cytology in general has left behind the simplifying mechanistic cell concept (Hoppe 1997, 38). Driesch was connected to a major nineteenth century trend in conceiving of the biological, most clearly articulated in Kant, Blumenbach, and Goethe.[4] But this teleomechanical strand also influenced Owen, Darwin, and evolutionary theory, just as it did anti-Darwinists, such as D'Arcy W. Thompson in his "On Growth and Form," leading up to Polanyi and beyond, even Gould in some of his many brilliant moods. The teleomechanical tradition connected the study of form, function, *telos*, and the modelling practices with explanatory frameworks that had proved to be useful for the study of the non-living. It attempted to *integrate* the telic aspects of life with the mechanistic accounts of living functional forms. Although strongest in Germany, British natural history was also clearly informed about the stakes.

Classification and Adaptation

Darwin, for example, was not trying to propose a theory which explained fully the nature of life (i.e., answer the Big Question), but was merely trying to find an entry point addressing, to a small extent, change in life forms. In support of the remark that he did not destroy teleology, but rather put it on a scientific footing, note what Darwin wrote to Asa Gray in 1874: "What you say about Teleology pleases me especially and I do not think anyone else has ever noted that" (quoted in Gotthelf 1999, 23). Natural selection since then became accepted to be a part of the Big Answer, but Darwinism never tried to extend it to look like the Big Answer. Neither did von Uexküll or von Driesch. That is, adaptive explanations are teleological, but teleological explanations are not only adaptive. Polanyi's inquiry-approach in principle allows for many answers to gradually and partially map domains of creativity, including Life. Polanyi is a thinker

like others who distinguishes between a) the realm of physics and chemistry, b) the emergent realm of living things, and c) the emergence of humanity. "While the first rise of living individuals overcame the meaninglessness of the universe by establishing in it centres of subjective interests, the rise of human thought in its turn overcame these subjective interests by its universal intent" (*PK,* 389).

Biosemiotics, in contrast, seems to opt for some vaguely explicated co-extensivity-thesis, and every theoretician who carved out more carefully the territory of the *explanandum* becomes a proto-theoretician, a precursor. Militant Darwinists, in the last epoch most notoriously Dawkins, sometimes are guilty of asserting some form of the co-extensivity-thesis by trying to eliminate teleology, and Hoffmeyerian biosemiotics in its focus on signs comes dangerously close to doing this as well, supposing that life can be a *product* of interactions and sign processes.

At stake is our insight into the Big Question: how can a framework grasp Life? With Linnaeus, hierarchical sets entered the Garden of Eden, and a grip was found on ever-changing Life. As the saying went: "*Deus creavit, Linnaeus disposuit*." God created, the "Second Adam," Linnaeus, organized (Lindroth 1994, 22). This attempt at classification was nothing new to the biological tradition that has for millenia been struggling with ever-changing Life. Hierarchical classification does not have much in common with Life, and putting items in boxes or tying them to things can only partially constrain the Living. Darwin focused on one of the most established and seemingly stable aspects of the living, the categorizability of the morphing/morphed forms into genera and species. His theory targeted the "existence of stable, autonomous, and self-reproducing entities" (Keller 2009, 8). The target idea of stable species was duly destroyed, as from the strict ranked hierarchy of family, order, class—in other terms, classification—evolved the age of redefinable "clades," the groups of organisms classified together on the basis of evolution from a common ancestor.

In a footnote added to "An Historical Sketch," appended to later editions of *The Origin of Species*, Darwin acknowledged his debt to Goethe, who was named a worthy forerunner, an "extreme partisan" with his morphology, an approach to studying living forms and their formation. Goethe was eager to follow up on the Big Question, and he started a dialogue with the mystery that stands in the way of systematization: "Natural system—a contradiction in terms. Nature has no system; she has, she is life and its progress from an unknown centre toward an unknowable goal. Scientific research is therefore endless" (quoted in Müller 1989, 116). Goethe cautioned the practitioner in his article, "Problem":

> The concept of metamorphosis is a highly estimable gift from above, but at the same time a highly dangerous one…It leads to formlessness, destroys knowledge, disintegrates it. It is like centrifugal force and would lose itself in the infinite if a counterweight were not provided.

> I am referring to the specification force [*Spezifikationstrieb*], that tenacious capacity for persistence inherent in whatever has attained existence, a centripetal force (Müller 1989, 116).

Darwinian evolution grew on the rich soil of this morphological tradition, where plasticity always had to be allowed for to account for evolvability. The journal *Nature* started its first issue (4 November 1869) with Goethe's orphic aphorisms on nature, the influence of which Thomas Henry Huxley took care to admit. In this tradition, failures and irregularities with respect to our norms and standards, informative "exemplars" were considered epistemically valuable, in fact superior to the examples of the regular, the schematic, the propositional textbook-knowledge that helps one to interactional, but not contributory expertise.

One of the strange exemplars of Goethe's morphology is the perfoliate rose, a deviant form, which nevertheless testifies to some lawfulness, and helps a "higher order" understanding of organization. The entelechy can only be pursued and not grasped, and the search for the lawful has to be alert to the seemingly unlawful, but in Hoffmeyer's biosemiotics there is little space carved out for "error-handling," ways of making use of going amiss. Let us not forget that Polanyi is extensively using this technique of so many progressive research programs (including Darwin's), utilizing deviations and teratology in his account, from Lashley's mutilated rats to the crippled Renoir to establish the domains of emergence (*PK,* 337).

Since Polanyi's time, modelling relations and explanatory structures have received much attention, and the issue of emergence has become a hot topic in the contemporary philosophy of mind and philosophy of science (e.g. Butterfield 2011, Crane 2001, Cunningham 2001, Harré 2006, Kistler 2006). There are several different concepts of emergence (for possible taxonomies see Bedau 1997 and 2010, along with Chalmers 2008), but Hoffmeyer's notions of emergence and emergent properties are very unsubstantiated and vague. His unusual and little-developed emergentism suggests that living systems should be studied as semiotic systems on their own right (Hoffmeyer 2010, 189). The vague ontology includes only a thermodynamic constraint, ignoring the venerable tradition that, to account for life, one needs to account for the organism's self-drive to live, not just the chemistry of the inner machinery, population genetics, evolutionary history, and semiotic relationships.

It is claimed that semiosis is an emergent property in our universe appearing with the first life forms nearly 4 billion years ago (Hoffmeyer 1997), but we take this more as an underspecified claim of co-extension than a bold and original assumption. To locate the spatial coordinates of the first semiotic system, we run into difficulties, as semiosis transcends the boundaries of the living form to include aspects of the environment, and temporal delineation has congruency-problems.

Life, Semiosis, Coextension

For Hoffmeyer, the terms semiotic freedom, semiosphere, and semiotic niche represent real features of the world. Semiotic evolution through the history of life enhances *semiotic freedom*, the increasing complexity and sophistication of types of semiotic causality and influence within individuals and between species. The growth of semiotic freedom has a far-reaching historical dimension:

> The historical nature of the world has profound consequences for the study of life, because it confronts us with the problem of organization in a new way. If the complex forms of organization exhibited by living systems—from the cell to the ecosystem—are not the inescapable result of predictable lawfulness, they must instead have emerged through processes that are still in need of discovery (Hoffmeyer 2010, 191-192).

The degree of semiotic complexity increases from the first steps of molecular recognition to the highest-level forms of semiosis. This affects "the depth of meaning that an individual or species is capable of communicating" (Hoffmeyer 2008, 186). However, the growth of semiotic freedom brings increasing indeterminacy in Hoffmeyer's biosemiotic account—or rather his account of accounts, a theory-driven aggregate of explanations, with little consideration for individual, deviant forms. For example, the perfoliate rose (Image 1), an example of irregular metamorphosis once seen by Goethe, must have had a semiotic niche in the semiosphere, its organism-centered Umwelt. It must also have become part of our semiotic niche, thanks to our increased intellectual semiotic freedom and the notion of co-extensivity. This long gone organism was once part of the semiosphere, and, although no longer living, retains a ghost-like existence in the semiosphere. Is the semiosphere therefore an abstract collection of past and present forms and perhaps future possibilities?

Image 1: The perfoliate Rose (Hans Wahl, Anton Kippenberg: Goethe und seine Welt, Insel-Verlag, Leipzig 1932 S.143)

The semiosphere emerged when meaning or significance in the realm of matter and energy was born in itself and by itself. The semiosphere, created by biosemiosis, is likened to some *natural* phenomena; it is "a sphere just like the atmosphere, the hydrosphere, and the biosphere." It confronts life in a continuously unfolding present, as it "penetrates to every corner of these other spheres, incorporating all forms of communication: sounds, smells, movements, colors, shapes, electrical fields, thermal

radiation, waves of all kinds, chemical signals, touching, and so on. In short, signs of life" (Hoffmeyer 1997b, vii).

And, to make a radical enough alternative to reductionism, biosemiotics also incorporates elements from the future. "Peirce was of the opinion that it is untenable doctrine to say that the future does not influence the present" (Deely 2015, 355). With the increase of semiotic freedom in the semiosphere, anticipatory functions model the possible future of the organism in acts of semiosis, thus freedom incorporates more and more of the temporal dimension into the organism.[5] But couldn't future development be non-semiotically produced or controlled by past habits? The present moment of the biosphere is just as it is, while the present moment of co-occurring biosemiotic spheres is entangled with the future, and, as it is also an evolutionary theory, it encompasses the past. Control develops as anticipation improves, thus with growth of freedom in the semiosphere, in contrast to deterministic constraint, comes increasing indeterminacy and entanglement of matter with time, as it will have more and more closed loops of entailment (models of anticipatory systems, Rosen 1999, 95). Much of modern theorizing in biology is strongly connected with rejecting the co-extensivity assumption.

The self-sustaining living thing is a non-transparently functioning but teleological system, historically shaped by elements of its surroundings, a compound corporeal system. Its development is somehow closely connected to coming to grips with its preformed and evolved mereology. This thing that is alive is also informed by countless earlier living forms constituting its ancestry, and, higher up the biosemiotic ladder of freedom, it anticipates more and more of the future, and starts to transform it, as it is in constant fusion with its environment. Such a multi-faceted account of the organismic cannot be limited to just the biosemiotic facet of the teleologically informed aspects of the mystery.

The Great Chain of Semiosis

In a forthcoming article, Hoffmeyer and Stjernfelt claim there is a progressive trend in the history of life, the Great Chain of Biosemiosis, where the progression in semiotic freedom gives rise to discrete steps or levels, into a "scaling [which] immediately catches the eye" (1). Let us see how they understand the biosemiotic framework to separate these discrete steps (indicated by capital letters).

A rather primitive form of semiosis is the Division of Labor in Multicellular Organism (Endosemiosis), a crucial evolutionary step from uni- to multicellular organism involving "the differentiation between different, collaborating cell types and hence the semiotic coordination of different behaviors of those cells" (8). Occupying a slightly higher position at the semiotic scale is From Irritability to Phenotypic Plasticity in Plants, a system's physiological response to a stimulus. "'Irritability' is semiotically more developed than 'molecular recognition' since it occurs at the level of the organ

or whole organism and typically implies the simultaneous activation of several parallel and/or consecutive recognition processes" (8).

Description of the lower level utilizes a behavioristic account, while a "slightly" more advanced level already talks of recognition, and even proto-cognitive capacities with respect to the phenotypic plasticity of plants.

> Here, a primitive division of labor anticipates the distinction between germ cells and soma cells, as the lower cells in the stalk so to speak sacrifice themselves for the survival of the group. Such large-scale coordination between cells presupposes the recognition of conspecifics and a sophisticated chemical-espatial communication between them (8).

Discrete levels of biosemiosis seem questionable as is the assumed discreteness of the entity that we characterize in an act of biosemiosis. First, consider the redwood forest, Sequoia sempervirens, where each tree responds physiologically via sophisticated machinery, adapting to the ever-changing environment. Now, consider the same forest as a clonal entity, as some are, where the forest is a single organism (gamet) and "response" includes the demise of some gamets, along with the generation of some new shoots. At least some research suggests that the extent of clones and their spatial structure may have important evolutionary implications (Douhovnikoff & Dodd 2004). As most plants with plasma-bridges connecting their intercellular matrices cannot really be called bounded on the cellular level, the forest has, at the same time, the semiotic capabilities of only a unicellular organism, and at least the proto-cognitive capability of a plant. And isn't then the redwood tree in a similar state of self-organizing chaos as social insects, exhibiting a form of swarm intelligence (Hoffmeyer 1997b, 113)? As a myriad of ants build an ant-hill, a divided cell builds a myriad of trees, the clonal redwood-forest. Can different types of semiosis operate simultaneously on one level, and the same type on different ones (cell, tree, forest)?

Thanks to the epigenetic wisdom of plants, seeds of the same species grown on different soils produce seeds that *reflect* the challenges posed by the particularities of the environment. Higher up on the Great Biosemiotic Chain, just as the peak of Sentience is reached, the Learning and Social Intelligence attributable to fish would also seemingly be characteristic of self-fertilizing plants. "If learning is something like *a capacity for modifying one's responsive predispositions and [aligning] them to the challenges posed by the particularities of one's environment*, . . .then advanced learning skills have been a part of life on Earth for more than 400 million years" (15).

When we look at the amorphously bounded and permeable steps that stand for the structure of the theoretical Great Chain of Semiosis, we see how difficulties are encountered once organizational constraints get fused with the "sphere of sign processes and

elements of meaning that constitute a frame of understanding within which biology must work" (Hoffmeyer 2008, 5).

Punctuated Semiotic Evolution

The vague positioning of the enterprise with respect to delineability and discreteness of individuals and types also affects the "structure-thesis" of biosemiotics, a recurring portrayal in terms of current evolutionary theory that is connected to Stephen Jay Gould and Niles Eldredge, and their famous punctuated equilibrium model. Gould and Eldredge introduced their model as a consequence of apparent bursts of speciation after mass extinctions, i.e., the emergence of new species challenging the traditional thinking about the tempo and mode of evolutionary change (Eldredge & Gould 1972, Gould & Eldredge 1977). While speciation and the process of evolution according to Darwin involves slow, gradualistic change, Gould and Eldredge state that most evolutionary changes happen—geologically speaking—very quickly during speciation events. How does biosemiotics relate to the issue of rapid versus gradual evolutionary change? Biosemiotic thought appears to be modeled on punctuated equilibrium as understood by Gould and Eldridge: "If we accept punctuated equilibrium as a basic structure in biological evolution, we should expect the semiotic evolution to follow the same structure, hence displaying a ladder of increasingly complex sign types" (Stjernfelt 2002, 338).

Biological evolution and semiotic evolution, as co-extensive, conditionally instantiate isomorphic structures.[6] Hoffmeyer holds that semiotic evolution can in principle provide an explanation of sympatric species generation (that is, separate species developing from a common ancestor in the same geographical area).

> Recognition not only of mates, but also of a multitude of other cues in the environment, might influence the reproductive pattern in such a way as to create isolation. Thus sympatric speciation—which for many reasons seems to be the more attractive model, if only one could find a plausible mechanism—might be obtained by a number of purely semiotic barriers. So semiotics might even hold the clue to this most central of Darwinian events: the origin of new species (Hoffmeyer 1997b).

While speciation and the process of evolution, according to Darwin, happens gradually within the species' geographical range, Gould and Eldredge claim that much of the phenotypic change is quick during allopatric (geographically separate) speciation events. The theorists of punctuated equilibrium see allopatric speciation as the dominant form of speciation, while sympatric speciation is mostly viewed as irrelevant to our understanding of large-scale evolutionary patterns. However, it seems odd that in

the case of the Hoffmeyerian version of biosemiotics, which on the basis of co-extension should parallel punctuated equilibrium theory, it is sympatric speciation that is stressed, as it can warrant semiotic freedom.

Biosemiotics reaches for a non-gradualist narrative of organic evolution without clearly explicating the structure or the landscape of the "Great Chain;" they merely point to the Semiosphere:

> In this sphere the dynamics of history (evolution) changed and began to become individualised, so that each little section of history became unique and henceforward no big formulas could be erected covering the whole process…if quantification is wanted, it should be searched not at the level of genetics, but at the level of the constrained thermodynamic system framing organic evolution (Hoffmeyer, 1997a).

This in our view comes close to forgetting the actual developing shape of a particular living being when trying to account for biological processes. Hoffmeyer holds that "the most pronounced feature of organic evolution was…not the creation of a multiplicity of amazing morphological structures, but the general expansion of "semiotic freedom'" (Hoffmeyer 2008, 188).[7]

Hoffmeyer is more of a selectionist than Gould and Eldredge, whose theory assumes that something other is more formative in speciation than semiosis, "sign action, i.e., a process whereby a sign induces a receptive system to make an interpretation" (Hoffmeyer & Stjernfelt, forthcoming, 2). When we look for the implied structure of the approach of biosemiotics, just as in the steps in evolution, we see that only a loose mapping is offered, as the recent programmatic article talks of chains, scales, and a "provisional peak in the rich combination possibilities of human thought and language" (Hoffmeyer & Stjernfelt forthcoming, 22). The result is a framework where seemingly increasing levels of complexity are ascribed stages in the growth of biosemiotic freedom, yet the levels get entangled and cannot be clearly distinguished.

Biosemiotics can only partially illuminate life, as functional sign-relations cannot constitute entities, nor can they delineate meaningful levels of organismic complexity. As the sign processes are quantitized, the implications of this co-extensivity thesis assuming the same spatial or temporal scope of biosemiosis and life appears odd as no semiotic map of any phenomenal domain is coextensive with its territory, having the same spatial or temporal scope with what it is the mapping of.[8]

Some popular accounts of current biosemiotics focus so much on meaning and semiosis that non-functional signs of life become "dead weight," best discarded, left behind. In an illuminating example, Hoffmeyer states that a "moth's sonic universe… can pick up only one particular note…emitted…by a bat. This note enables the moth to determine how far off its enemy may be and in what direction" (Hoffmeyer 1997b,

53). The moth's sonic universe has functional, semiotic meaning. The functional vibrations from the bat enter the moth's semiotic universe, the noise that humans hear as the moth flies by does not. It has been discovered that some moths rub their genitals to jam bat echolocation and startle or deceive bats (Barber & Kawahara 2013), but only once the discovery is made, does the moth's own sound enter the semiotic universe. Non-functional forms and signs of life are mostly up for grabs in the semiotic tradition, where meanings are first and foremost ascribed to readable or decodable signs, but not to the puzzling and mysterious forms, shapes, and morphings of Life.

Concluding Remarks

We started out with a comparison between Polanyi's multi-layered ontology and Hoffmeyer's biosemiotic enterprise. We highlighted some of the benefits of the former while pointing to deficits of Hoffmeyer's overtly polarized, whiggish narrative, according to which, there are "two major trends in twentieth century biology." One is the molecular and genetic reductionism (basically interpreted as the modern Neo-Darwinian synthesis) and other is the so-called semiotization of nature. Polemic narrative-constructions re-appearing in various loci of this strand of the biosemiotic corpus were suggested to obscure the systematic theory-construction required for a comprehensive, synthetic theory. The lacunae mask the continuity of the inventive struggle to incorporate the teleology of living things in our understanding of nature from Aristotle to Schrödinger, and stand in the way of integrating the modern biosemiotic tradition (providing many key insights) within the broader history of biological theorizing.

We investigated some elements of this innovative approach to trace how forms of life are handled by Hoffmeyerian biosemiotics. Hoffmeyer offers some basic notions to analyze this question: semiotic freedom, semiotic niche, semiosphere and the co-extensivity thesis. Semiosis is called an emergent trait, co-extensive with life, thus appearing with the first life forms. This co-extension gave rise to the semiosphere, incorporating every sign of life and aspects of the past, the present, and the future. According to Hoffmeyer, the degree of semiotic complexity in the semiosphere increases from the very beginning of life on Earth. But the conflation of temporal and spatial features of semiotic systems is problematic and possibly implies incongruent metaphysical views.

Hoffmeyer's emergentism is another source of entangled ontological commitments. The progressive trend in evolution constitutes the Great Chain of Semiosis, but the approach maneuvers between meaningfully discrete layers or levels, on the one hand, and a loose gradualist mapping conforming to some unspecified topography of the domain, on the other hand. We argued that it is not clear what the relationship is between this pattern of increasing semiotic freedom in the course of life and the model

of punctuated equilibrium. What is the exact structure of this non-gradualist narrative? Does it really have one?

Endnotes

[1]"There are then two principles at work in animals: namely, (1) the use of machine-like contrivances and (2) the inventive powers of animal life" (*PK,* 337).

[2]Hoffmeyer's concept of reduction and reductionism is not informed by recent debates surrounding the philosophy of biology (Rosenberg 2006, Brigandt & Love 2015). In the citation above from Hoffmeyer 1997a, he uses "molecular" and "genetic." If "genetic" is understood as molecular, it is superfluous, and if "genertic" is understood as evolutionary, the statement is false. For a more informed historical overview, see Müller-Wille and Rheinberger (2009) for the philosophical stakes, Kitcher (1984) Morrison (2000).

[3]Making no clear distinctions between the "phases" of the semiosphere allows the enterprise to remain mostly non-reflexive, thus questionably able to account for metacognition and "second-order-survival" (Oeser 1997, 87).

[4]This connection is acknowledged in some historical accounts, see Fernandez (forthcoming).

[5]For these reasons of dubious temporality, we do not clearly understand how the semiotic niche concept is analogous to the ecological one. In order to occupy a semiotic niche, an organism or species "has to master a set of signs of a visual, acoustic, olfactory, tactile, and chemical nature, by means of which it can control its survival in the semiosphere" (Hoffmeyer 2008, 185). Expansion of semiotic freedom involves the union of all semiotic niches, each definable in an n-dimensional hypervolume.

[6]See the difference between similarity and isomorphy in Suarez (2010)

[7]"The semiotic ordering (through spans of evolutionary history) of chemistry holds the key to the function of this chemistry. In this sense, and only in this sense, is life an irreducible phenomenon" (Hoffmeyer, 1997a). A living organism is both a unity in multiplicity, and a multiplicity in unity, posing a mereological problem that cannot be solved via thermodynamics only (Bortoft 1996, 343).

[8]Causal complexity generally requires reconstitution of phenomena (Kronfeldner 2015), but biosemiotics tends to present the partial structure as the whole picture.

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MEDIATION AND MEANING

Walter Gulick

Keywords: Dreyfus and Taylor, *Retrieving Realism*; Michael Polanyi; mediation, inner/outer distinction; biosemiotics; meaning; emergence; purpose

ABSTRACT

In their co-authored work, Retrieving Realism*, Hubert Dreyfus and Charles Taylor argue that an unfortunate epistemological picture holds us captive. Thinkers enmeshed in this picture focus on what mediates our knowledge when an inner self is distinguished from the outer world. This stance, they say, encourages doubt about whether we really know what we perceive. In this essay I argue that mediation, properly understood, and the inner/outer distinction are crucial for understanding how we know. The stratified ontology of Michael Polanyi and the emphasis on interpretation in biosemiotics provide an approach, set in an evolutionary framework, for illuminating the richness of reality. This richer view examines how and what we can know, the unfolding nature of consciousness, and the embodied depth of existential meaning.*

Introduction: Mediation Critiqued

In their important co-authored book, *Retrieving Realism*, Hubert Dreyfus and Charles Taylor begin by stating that they will develop an epistemology and ontology that counters "a picture [that] held us captive" (a phrase they borrow from Wittgenstein). We are, they claim, subject to a fundamental background framework mistake that has distorted the way we understand the world and thus act within it. This mistake is "a kind of operative (mis)understanding of what it is to know, which has had dire effects on both theory and practice in a host of domains. To sum it up in a pithy formula, we might say that we (mis)understand knowledge as 'mediational.'"[1]

That Dreyfus and Taylor (henceforth D & T) choose the term "mediational" for the framework mistake they seek to correct strikes me as highly unfortunate. For, as I will seek to show in this essay, *all* significant actions of living beings, including thinking, are mediational in some sense. Mapping the various biochemical processes and pathways of signal transduction, for instance, is currently one of the most active areas of biological research, with new experimental results reported weekly in such on-line journals as *Science Signaling*.

So what do D & T mean to reject when they emphasize the unfortunate nature of "mediational" epistemology? They intend to replace a number of views originating in the Cartesian mind-matter dichotomy, a dualism in which reality is "outside," while our knowledge of that reality is "inside." They indicate that in this "problematic" view, "I have knowledge of things *only through*…these inner states, which we call 'ideas.' We want to call this picture 'mediational' because of the force of the claim which emerges in the crucial phrase 'only through'" (D & T, 2, my emphasis).

D & T believe that accepting an inner/outer structure is the first step toward ontological disaster. The disaster D & T foresee is rooted in skepticism: how are we "in our mind" really sure that we know what is "out there?" How do we know mediation grants us a true picture? When the inner/outer structure is unthinkingly presupposed, they say, the "mediating elements here are 'ideas,' inner representations; and so the picture in this variant could be called 'representational.' But this, as we shall see, is not the only variant. This particular version has been challenged, but what has often escaped attention is the deeper topology…" (D & T, 3). In the empiricist tradition exemplified by Locke, after a person passively receives impressions from outside, "the idea is the first effect that this process of impinging makes on the mind, prior to any combinations or connections which the mind itself sets up" (D & T, 9). This view is what Wilfrid Sellars called "The Myth of the Given." Kant shifted the epistemological framework to distinguish inner from outer sense, but D & T state that nevertheless the problematic mediational picture still remains unchallenged. The "linguistic turn" within analytical philosophy also retains the topology that is problematic for D & T. The mediating elements here are not ideas and images, but rather sentences held true. These can be seen as a collection of "beliefs." Finally, Quine in his approach of naturalized epistemology also assumes knowledge of reality is mediated, the mediating element he emphasizes being our receptors.

How do D & T suggest we escape the mediational picture so as to gain clearer purchase on the nature of reality? They claim a phenomenological understanding of human existence ought to take interpretive precedence over traditional epistemological approaches. This phenomenological approach allows them to speak of our experienced *contact* with the real. Hence they are suggesting that it is best to bypass epistemology and substitute experienced ontology as the most adequate way to understand reality.[2]

The authors turn to the thought of Heidegger, Merleau-Ponty, and Gadamer as redemptive resources for their phenomenological approach. Human engagement in the world, not the abstract categories of epistemology, illuminates the real, they claim. Engagement requires coping. Experience provides us with our needed coping skills based on a background of understanding which is holistic and non-propositional (D & T, 83). I have no problem with this way of stating things so far as it goes. But what I object to is the implied claim that this is a sufficient way of understanding reality. Moreover, what D & T claim to have accomplished by moving from mediation to contact is deeply problematic: "So far we have argued that, once freed from the mediational picture, we can see that we are in *unmediated touch* with everyday reality" (D & T, 131, my emphasis).

Rethinking Mediation

It makes no sense to say that unmediated contact with reality must replace a mediational view. To have any awareness that our embodied self is in contact with the material surroundings in which we cope, a mediational process must take place. For instance, in visual perception, light waves (already a mediating phenomenon connecting object with eye) enter our eyes and their embedded imagery is focused by the cornea and lens so that it strikes the rods and cones of our retina in an order that corresponds to the spatial order imbued by the objects seen from the viewer's particular perspective. In the retina a transductive process takes place whereby the impacting light is transformed into neuronal signals that travel to the brain. There a further form of transduction occurs. Networks of neurons transpose the input from the eye into vision. We are able to see and interpret the objects from which the light originally reflected.[3] So then, when perceiving an object are we in direct, "unmediated touch with everyday reality?" Hardly. Have we escaped an inner/outer relationship? Hardly.

Now I do not think D & T are oblivious to the above scientific understanding of how perception arises. Indeed, after we establish our primordial contact with the real, they think a scientific understanding of the world has a culturally ordained spot in Western ontology (D & T, 149). My concern is that they make a vocabulary mistake in labeling the view they reject as "mediational." In contrast to their approach, I believe recognizing the many sorts of mediated perspectives we can indwell is the royal path to comprehending the multi-dimensional richness of the real.

To be sure, both the Lockean empiricist and D & T make valid phenomenological observations as well as employ misleading language. In stating that ideas organize phenomenal impressions directly given to us in conscious form, Locke correctly recognizes that we are generally unaware of any mediating processes that deliver these impressions. The problem with Locke is that he seems unaware of or at least ignores the shaping impact of the many environmental, biological, and cultural factors influencing

what we see and what we think. In dismissing the Myth of the Given, D & T correctly recognize that there are many tacit processes that do in fact shape how we select and assess what we perceive. The problem with D & T is that their expulsion of "mediation" as an explanatory term suggests, counter to their intentions, that the mediating influences of environmental, cultural, and psychological factors are unimportant or even non-existent. Their intended exclusion of the term "representation" from epistemological discussion is also, as we shall see, unfortunate.

Michael Polanyi's theory of epistemology, which claims that often unidentifiable subsidiary factors must be integrated to form focal knowledge, in effect supports the view that knowing always requires an "only through" process. C. S. Peirce's theory of signs, so important for biosemiotics, is in its triadic form thoroughly mediational in its epistemology. If D & T had relied on Polanyi's or Peirce's epistemology, rather than depending so much on Heidegger, their misuse of "mediation" would not have been so likely.

Three reasons for seeing the importance of mediational epistemology may be all too briefly given. First, the inner/outer view, or comparable dualities, the subject-object or mind-matter distinctions, are only a problem when subject and object, etc. are regarded as Cartesian substances, entities which by definition are ultimate realities that depend on nothing else. There is thus a problem of seeing how such ultimate entities are related when no greater ground exists that can be referred to in order to explain their connection (unless it be God, as Descartes argued). But since, beginning with Hume, the idea that mind and matter are substances has been strongly called into question, thinking in terms of substances has died out. This leads to the second point, basic within biology: subjects (the "inner") must have some reliable knowledge of the "external" world or else they would not have survived. And, thirdly, biological research has successfully described and explained many of the mediating processes that allow for that reliability.

Agreed, there is a phenomenological aspect of knowing that the language of mediation may tend to obscure. In our experience we *seem* to be connected directly with the object known. To facilitate survival, we (or any animal) must deal directly with objects at our level of perception in order to find sources of nutrition or avoid dangers. No doubt D & T understand this, but it is Dale Cannon who illuminates how properly to accommodate the reality of both the underlying reality and phenomenal experience. After describing how Polanyi makes use of the idea that with a probe we can experience the shape of a cavity which we cannot directly perceive, Cannon notes that "we have incorporated the probe into our embodied being and are there at the tip of the probe, inside the cavity; the probe has become an extension of our perceiving fingers, an extension of our embodied self."[4] Cannon then makes the crucial point:

> In this case it is in an important respect misleading to speak of our knowing of the cavity as *mediated by* the probe (or by the impact of the probe upon our hand and fingers) in the sense that there is something (a mediating *object*) coming between us and the cavity, separating us from it. So also, on Polanyi's account, anything serving in the same capacity as a probe, extending the reach of our body's perceptual acquaintance, should not be conceived to *mediate* that acquaintance—at least not in the sense that we would be directly acquainted only with the "mediating" probe and not the thing itself.[5]

The problem with much talk of our *representation of reality* in imagery or language is that these mediating representations when focused upon do exactly what Cannon warns against: they come between the knower and what is known and undermine performance success, create unwarranted division between reality and appearance, or when put into metaphysical terms, sunder realism from idealism. This, of course, relates to the pianist in Polanyi's account who thinks about her finger placement while playing a sonata. Concentration upon a component part or mediating process dissolves the whole performance.[6] When we attend to what mediates in ontological theory, reality is divided up into perceptual object, mediating process, and subjective knower. If in relation to this triad one emphasizes the ontological priority of the real object, one becomes a realist of some sort. If one emphasizes that it seems meaningless to speak of an object apart from our cognitive grasp of it, one becomes an idealist of some sort. So an important aspect of the great twentieth century obsession with overcoming dualisms has been to stake out a mediating position between but also inclusive of subject and object. Peircean semiotics, Deweyan experience, Husserlian phenomenology and Heideggerian Dasein are representative illustrations of approaches that emphasize mediational middle ground in some sense.

How then does one adjudicate between the various candidates for mediational superiority? That very question seems to presuppose that the candidates occupy the same ontological level so that one might choose between them like one might pick out the beauty queen from a lineup of aspirants or observe which horse wins a derby race. Here, however, Polanyi's notion of stratified reality offers a better alternative. Object, complexly stratified mediational process, and subject are each real, but are perspectively known at different levels and consequently with different contextual relationships influencing each. That is, rather than seeking some interstitial common ground (a subtle new form of foundationalism?) like "Dasein" to interpret human experience, better it is to see how subject, mediational process, and object all have merit as perspectival interpretations of one aspect of many-layered reality. No one of these approaches is appropriately designated as primary: "There is no privileged level in biological systems

that 'dictates' the rest."[7] This systemic view that has emerged in biology applies also to ontology in its interface with epistemology.

Grounding Epistemology in Biology

To better formulate a biologically informed, philosophically apt theory of knowing and the nature of reality that is not subject to the flaws of D & T's model, I will seek to further embed mediation and the inner/outer distinction in a system that draws upon the insights of biosemiotics and thinkers such as Polanyi and Langer. In addition to "knowing," the notions of interpretation, emergence, understanding and meaning will be shown to be essential to the comprehensive vision I shall sketch.

Let us begin with a metaphysical claim that provides an ontological framework for the ensuing discussion. Kant's much debated distinction between phenomena and noumena (and the related distinction between inside and outside) still seems to me to be not only useful but essential. In ordinary experience, noumena, or things as they are in themselves, cannot be identical with (reduced to) phenomena, things as we perceive them. Things as we know them are known through the mediation of the physiological processes of perceiving and through language. These allow a person to transcend the physical boundaries of the self and gain a perspective upon the many forms of independent otherness. To think that we can know all there is to know about the many layered complex things of the world is a form of megalomania. Polanyi is on track in noting that reality manifests itself inexhaustibly and often surprisingly. This awareness of our inability to completely grasp the "otherness" of reality and define it is what is indicated by the term "noumenon." Heisenberg's uncertainty principle showing that we cannot know simultaneously the position and momentum of a particle is a physical expression of the limits of knowing at a quantum level. But surely it is intuitively obvious that there is a meaningful distinction between what we can know about a thing or process, even using advanced technology, and how it is or behaves at each of its many complex levels of being, including its potential interactions with other things in differing environments.

We have seen that D & T feel that the distinction between inside and outside leads to harmful skepticism about what we can know: "In whatever form, mediational theories posit something which can be defined as inner, as our contribution to knowing, and which can be distinguished from what is out there" (D & T, 46). In opposition to such a view, D & T argue for an enactional view of knowing based on Merleau-Ponty's discussion of the embodied agency of a person coping with the demands of everyday life. But doesn't knowing how to cope in everyday activity exist on a different level than theoretical knowledge that explores the nature of things? Of course, one kicking a football or choosing what to wear for a party or trying to figure out which bus line to take is not concerned with inner/outer or phenomenal-noumenal distinctions. The latter

is theoretical, the former practical, and both have their uses. But wholly to substitute the practical for the theoretical is analogous to substituting the moral for the scientific. One blurs a difference in kind to the detriment of each.

When we take the type of reflective, exploratory stance found in science, in contrast to a coping stance, the inner/outer distinction and mediation seem imperative. Polanyi would insist that both stances make use of personal judgments, but the committed, reflective stance of science is oriented toward determining truth, expressed with universal intent, whereas in the coping stance one seeks to get by as best one can. Such an approach, it seems to me, may encourage a relaxed attitude toward observing moral, aesthetic, epistemological, religious, and even practical standards if such do not help one cope. That would lead to a world in which painful striving and sacrifice have no standing. D & T need to articulate a richer model of coping to show how and why their model does not facilitate such consequences they surely do not support.

What makes the inner/outer distinction so important for epistemology—for life? To answer this question, I advert not only to my notion of the three orders of emergence,[8] but also to biosemiotics, especially as interpreted by Jesper Hoffmeyer,[9] the emphasis on structure and morphology found in the article by Bárdos and Zemplén in this issue of *Tradition & Discovery*, and the evolutionary account in Part IV of Polanyi's *Personal Knowledge*. I claim that the biological world (second-order emergence) arises from the dynamo-physical world (first-order emergence) precisely because it ushers in an inner/outer relationship between a living being and its environment. The dynamo-physical world has no center, no meaning-laden inner/outer distinction, and no purpose; it is governed by the indifferent laws of physics and chemistry. With the emergence of life, however, individual centers with purposes conducive to survival come into being. Living organisms are examples of autopoietic (self-organizing rather than externally controlled) systems.[10]

> According to the biologist-philosopher Gail Fleischaker, all autopoietic systems share three traits: they are self-bounded, self-generating and self-perpetuating. They are self-bounded in that autopoietic systems are surrounded by a cell membrane, skin or shell that simultaneously encloses the system while allowing it continuity with energy and materials from the outside world. They are self-generating, such that the entire system, including the boundary, is produced by the system itself.[11]

Because living beings have purposes, their ontology cannot be completely or adequately understood through the purposeless deterministic laws of physics and chemistry, even though these laws are never violated. The inert objects of the dynamo-physical world *react* to impinging forces, whereas living beings can also *act*. The

difference between "incoming" forces and "outgoing" actions presupposes the inner/outer distinction, as does the existence of enclosing membranes or skins. Action is ultimately powered by metabolism: "Metabolism can very well be considered as the defining quality of life: every living being has it, no nonliving being has it."[12] And the actions funded by metabolism are telic in nature; they are intimately bound up with life's many-faceted meanings.

Mediation in biology takes place within the boundaries of living beings (sign processes which Hoffmeyer, following Sebeok, calls "endosemiotics")[13] but also in relation to that which exists outside those boundaries. Yet this description may not fully reveal the extent and importance of mediation in biology and indeed in all the orders of emergence. For example, skin should not be thought of simply as a barrier limiting mediation, although it is indeed a constraint. Hoffmeyer gets at how skin is involved in rich layers of information exchange, sign processing, and meaning creation in these comments:

> *The skin keeps the world away in a physical sense but present in a psychological sense.* It is the skin that gives us the experience of belonging—it allows us to feel the world. But the very fact that the world can be felt is already a complex phenomenon that doesn't just presuppose that there are receptors (sensory cells) in the skin that register touch, pressure, pain, cold, warmth, pH, and various chemical influences, but also that biological *meanings* are assigned to these sensations. It is not enough to sense; organisms must also create functional interpretations of the myriad of sensory stimulations so that these do not become isolated incoming impulses but are integrated into a form that the body understands and can act upon appropriately.[14]

This passage from Hoffmeyer gets directly or indirectly at a number of the keys concepts needed for understanding mediation and meaning in biology. The living entity can be regarded as a systemic whole (a centered being) responsive via receptors to environmental inputs (sensory stimulations) and able to integrate these stimuli into functional interpretations that have *biological* meaning issuing in purposeful behavior. Michael Polanyi uses the terms "achievement" and "rules of rightness" to describe the purposeful processes and goals of biological meaning.

To be somewhat less abstract, let us examine a particular animal to see what overall characteristics must be accounted for in any relatively comprehensive biological description. Take a dog. Fido exhibits the same basic structure over many years. This is so even though Fido undergoes a continual process of cell death and replacement and constant movement of fluids within its body. The structure of cells, organs, bones, nerves, arteries, ligaments, etc. functions to constrain and control processes so that

the energy provided by food is distributed in a way that maintains Fido's health. The importance of Fido's bodily structure must not be forgotten in haste to examine the biosemiotic processes going on within that structure. The fact that basically a duplicate structure, a junior Fido, is produced through Fido's reproductive activity reminds us that some quite specific rules must guide the morphogenesis and maintenance of Fido's species-specific structure.

Polanyi on Biotic Emergence

In relatively simple terms, Polanyi identifies the basic functions of biological performance to be carried out according to *operational principles* and *regulative actions*.

> Machine-like functions operate ideally by fixed structures; the ideal case of regulation is an equipotential integration of all parts in a joint performance. Both kinds of performances are defined by rules of rightness and these refer in either case to a comprehensive biotic entity. But there is this difference. Machine-like functions are ideally defined by precise operational principles, while the rightness of a regulative achievement can be expressed only in gestalt-like terms. One's comprehension of a machine is, accordingly, analytical, while one's appraisal of regulation is a purely skillful knowing, a connoisseurship. Yet both kinds of performances have it in common that their rightness cannot be specified in the more impersonal terms of physics and chemistry (*PK*, 342-343).

In this selection from Part IV of *Personal Knowledge*, Polanyi applies to anatomy and physiology the two types of order (corporate and dynamic) he articulated in his 1941 article, "The Growth of Thought in Society." In his above analysis of biology, genetic influence (or in more current terms, genetic-environmental integrated influence) would supply operational principles to the body regarded as a machine (for instance, in morphogenesis) in a way that is analogous to the corporate order that a CEO imposes on subordinates. Whereas in stating that biotic regulation involves an equipotential integration of all relevant internal and external factors, Polanyi makes use of the notion of dynamic order, such as is found in economic activity. He illustrates the forming of such spontaneous order by speaking of water settling down in a jug: "In this type of order no constraint is applied specifically to the individual particles; the forces from outside, like the resistance of the vessels and the forces of gravitation, take effect in an entirely indiscriminate fashion."[15] Animals and plants likewise regulate their activity as they seek to be in equilibrium with environmental forces. Even Polanyi's biological notions of achievement and rules of rightness have an equivalent in his description

of dynamic order in society: The elected "influentials" in religion, law, science, art, and other cultural circles act as referees, "assessing values according to the standards accepted and publicly acknowledged as the basis of all activity in their own field."[16] These judgments of influentials, ideally acting in accordance with the highest values of their tradition, are comparable to the genetically embedded (e.g., traditional) rules of rightness functioning to maintain the health of the biotic being. Polanyi's biological rules of rightness grant form and structure a status that is not reducible to the laws of physics and chemistry, as the article by Bárdos and Zemplén emphasizes.

Polanyi's notion that rules of rightness—types of *value* requiring *interpretation*—are inherent in biological processes may seem inappropriate within scientific discourse. But hear what Daniel Kahneman has to say about this point. "When something does not fit into the current context of activated ideas cement, the system detects an abnormality, as you just experienced. You had no idea of what was coming after *ideas*, but you knew when the word *cement* came that it was abnormal in that sentence. Studies of brain responses have shown that violations of normality are detected with astonishing speed and subtlety."[17] Grammatical rules of rightness are illustrated in this example, but note that studies have shown that brains are sensitive to what is right and normal in many domains.

Presumably operational principles with their rules of rightness occur at many levels of a biotic being—wherever machine-like operations can produce beneficial outcomes. Polanyi is less clear about how regulative functions are carried out other than saying they are the inventive powers "of an active centre operating unspecifiably in all animals" (*PK*, 336). Regulation is a self-directed assessment of the overall welfare of the animal. "I believe that the unformalizable regulative functions, linked to an animal's mental processes, are the predominant, comprehensive agency of animal life" (*PK*, 401).[18]

Polanyi does not extend his discussion of rules of rightness beyond their inherence in biological operational principles. However, it is intriguing to speculate on the extent to which rules of rightness play a serious role in human social and cultural thought and behavior, as suggested by Kahneman's grammatical example. "What is the proper thing to wear for this special dinner?" "Does the PET scan reveal coronary artery disease?" "How ought I to live?" The rules of rightness illustrated are not simply individualistic, although they may be expressed in individual choice and evaluation. They are contextual, responsive to different "levels" of existence: social pressure, medical knowledge of health, existential ideal respectively. The notions of rightness extend from the trivial to the summit of meaning. Even at the level of the bacterium, there is a responsiveness to what is nourishing in contrast to what is not; what is nourishing therefore has value for the bacterium. Thus selection between alternatives, which requires interpretation according to value sought, is present throughout the whole panoply of life. Values to strive for imply purposes imply many types of meaning.

Some Biosemiotic Claims

Can biosemiotics augment Polanyi's "unformalizable" understanding of regulation? Eliseo Fernández argues that the most basic form of semiotic action is in fact found in the phenomenon of regulation, by which he means an action that compels an energetic process to follow a semiotic rule.

> Biosemiotics is especially concerned with the interrelation of physical (energetic) causation and semiotic causation. These different forms of causation interlock in the regulation process. The most general form of regulation is modulation, in which two dynamical, temporally extended processes are so related that one continuously regulates the other. *Instances of modulation are ubiquitous in organisms…*[19]

Fernández refers to Nancy Cartwright's notion of a "nomological machine" to provide a framework for his notion of modulation. The nomological machine turns out to behave very much like Polanyi's notion of machine-like functions with the slight modification that the components of the nomological machine are said to exhibit dispositional causality (like the disposition of a match to light when struck in a certain way). More consequentially, Fernández in effect seeks to give greater clarity to Polanyi's vague notion of regulation by elucidating how in regulation "physical and semiotic causation cooperate in an orchestrated fashion, giving rise to an ever-expanding profusion of scaffolding structures and processes."[20] Scaffolding canalizes energy flow in "a process that extracts a dispositional form from its object and conveys it through a suitable vehicle to a receptive structure capable of enacting its interpretation."[21] This language suggests what is the essential point of biosemiotics: that the regulation of organisms requires an interpretive process that operates at a higher level than efficient causation. Polanyi knew as much, but did not develop the language of signaling that biosemiotics uses, a language based on the semiotics of C. S. Peirce. Phil Mullins's fine article in this issue of *Tradition & Discovery* describes biosemiotics and its relation to Polanyi's thought in some detail, and consequently I do not feel the need to make more than occasional reference to how it is helpful.

At this point I must make a confession. While in theory I find Peirce's semiotic vision of the world "profused in signs" to be a brilliant accomplishment, in practice I find myself frequently unsure how to interpret the phenomena about me in semiotic language. Moreover, biosemiotic language, such as the notion of scaffolding structures, can still be vague; the biological details of the various proteins involved in cascades of signal transduction and similar biochemical explanations seem to be where specificity is properly located.[22] Yet further, it sometimes seems forced to reduce all events, in their complexity, to the triadic form that semiotics takes. Some examples of efficient

causality in physics seem simply dualistic, and as I shall show shortly, some basic forms of human thought and action seem best analyzed through four or five coterminous components. I want to affirm the vision of biosemiotics that the processes of living instantiate—require—some type or degree of interpretation and meaning, but I find I need to augment biosemiotics with the insights of the philosophical tradition to gain a clearer grasp of life in its broader context, dependent upon but extending beyond biology, the kind of understanding of the real world that D & T seek.

Five Emergent Levels of Meaning

Let me therefore turn to an exploration of *meaning* insofar as it arises in evolutionary history and comes to expression in human consciousness. I will begin by suggesting a schematic way of understanding meaning in living organisms. Meaning first occurs wherever some function arises that is related to the ongoing welfare of a living being. At the simplest level, one may speak of *proto-meanings* that occur within or between a cell and its surroundings. The bacterium ingesting food or a protein in a cellular wall admitting to the interior of the cell properly shaped messengers would be examples of actions having proto-meaning. Insofar as one looks simply at the relation between a receptor and an accepted message transgressing a membrane, one may observe a meaningless biochemical reaction. But when one observes this reaction from the perspective of the centered (in this case one-celled) being, the action becomes a proto-meaning. It has a function: it is to be understood in terms of the welfare of its centered self. From this perspective the action represents an interpretation, a choice between the received message and rejected other possible messages in the environment. It is this difference between a chemical event and an interpreted event that biosemiotics stresses and that justifies seeing life as an emergent order beyond the parameters of the dynamo-physical world.

When one moves from a one-celled prokaryotic or eukaryotic cell to a many-celled form of life, one moves to a slightly more encompassing form of meaning than is indicated by the term proto-meaning. The presence of organs or other specialized biological features requires several higher levels of integration to ensure these parts serve the centered being. I will group both the machine-like aspects of organs and their regulation under the same term: they exhibit *biological meaning*.[23] Much biological meaning is innate; it is physiological in nature. As I am using the term, biological meaning is roughly equivalent to what Aristotle means in speaking of the accomplishments of the vegetative soul. Biological meaning has not yet become conscious.

More complex yet is the meaning accomplished through an animal's pre-linguistic learning. Polanyi speaks of this level of inarticulate understanding as coming to expression in three modes: trick, sign, and latent learning (*PK*, 71-77). The first two of these types of learning "are more primitive and are rooted respectively in the *motility* and the

sentience of the animal, while the third handles both of these functions of animal life in an *implicit operation of intelligence*" (*PK*, 71). Trick learning occurs when physical means are developed to accomplish useful ends. It involves skill-based contriving. Sign learning is based on perception; it is "primarily the achievement of strained *attention*" (*PK*, 73) that presumably grasps the recurring forms and patterns encountered in the world. Latent learning occurs when an animal's experience is consolidated in a mental network or map of the animal's world. The animal achieves a "true understanding of a situation" (*PK*, 74), an interpretive framework. Taken together, the character of an animal's internalized trick, sign, and latent learning establish its competence in the world, the base for its coping skills.

If I were to label the meaning evident in this sort of competence "inarticulate meaning," the crucial significance of this level of intelligence might well be missed. Instead I will refer to the meaning resident in this unself-conscious, prereflective form of awareness as *understanding*. I recognize that in ordinary parlance "understanding" frequently also refers to focally conscious comprehension. When the difference between pre-linguistic and linguistic understanding is significant, context should indicate which meaning of "understanding" is implied.

Together, Polanyi's three forms of learning comprise a large component of what D & T label "the background," the unexpressed understanding and skills that allow humans to cope with life's challenges successfully. The understanding embedded in long-term memory serves as the baseline in terms of which the adequacy of our linguistic expression is often judged. When a person says, "I know what I want to say, but I can't quite put it into words," that person is indicating the gap that exists between the inarticulate and articulate levels of meaning. The important point is this: the animal's inarticulate learned meaning is also of crucial importance to the human animal, even though the most developed level of meaning, linguistic meaning, is much more prominently observable in consciousness.

The human world of self-consciousness, of language usage, constitutes what I term the third *order* of emergence. The *discursive meaning* made possible by language is all too often taken to be the definitive form of meaning. To be sure, humans, the sole possessors of language, have an almost insatiable need to cloak experience and the world as a whole with networks of words.[24] Even in sleep, words (and images) visit us in our dreams. To communicate clearly with one another, we do need to employ language. It is useful to distinguish between the way language operates in inner thought and how it may be used publicly in linguistic behavior. Besides being descriptive, language may be used to generate jokes, underwrite irony, utilize metaphor, etc.[25]

In addition to such language-based forms of meaning, there is another dimension of meaning, which I term existential meaning, that is primarily felt and arises out of our basic concerns, interests, and purposes.[26] It is in terms of this dimension of meaning

that our acts as agents must be understood, not in such overly rationalistic terms as consistency or implication. It is in terms of this dimension that we can properly analyze meaning in life or even for some "the meaning of life." Existential meaning is the most comprehensive form of meaning, for as felt it is embodied, as tacitly connecting our various concerns, it exists at the level of understanding, and as expressible in language and the various arts, it gets articulated in our words and actions.

Some thinkers, perhaps obsessed with the need for clarity of communication, but also seemingly oblivious to their bodies, their feelings, and the physical impact of the world, suggest that we are trapped within language. For them, the limits of language become the limits of the world. To any description of the evolutionary development of human meaning from non-language speaking ancestors, as I have attempted, the panlinguist could easily retort that the very language I am using to convince him refutes the ability to escape language. It is as if to him words do not denote a world beyond themselves, as if a person does not have a body that feels things, as if one cannot respond to the world reflexively, as if, one cannot read body language, as if, as if…

I have described five levels of meaning: proto-meaning, biological meaning, understanding, discursive (or linguistic) meaning, and existential meaning. The functioning of each subsequent "higher" level of meaning depends upon the meaning achieved at the previously developed "lower" types in the evolutionary development of increasingly complex forms of life. Humans rely upon all five types. However, the nature and importance of meaning in human existence is not fully disclosed by thinking of meaning only in terms of this fivefold hierarchy.

Signals and Symbols

Susanne Langer helpfully adds a functional dimension to my fivefold hierarchy of meanings. Her notion of *signals*, while closely aligned with Polanyi's sign learning and Peirce's indices, can functionally be seen to be involved in all four levels of meaning. Signals announce a past, present or future state of affairs.[27] Sometimes signals act like Claude Shannon's notion of information: they indicate an abrupt change from the status quo.[28] A sudden clap of thunder is an example. Sometimes, however, they are present in the environment as Gibsonian affordances and only function as signals when noticed in relation to a personal interest.[29] I may suddenly notice the dark clouds that have been rolling in for a while, and the clouds only then serve as signals that rain may be expected.

As my examples suggest, Langer emphasizes the role of signals in human responses to their environments: "A signal is comprehended if it serves to make us notice the object or situation it bespeaks."[30] A subject comprehends both the signal and the state of affairs it indicates. What makes a perceived object a signal rather than just another unnoticed or background range of objects or events has to do with a subject's range

of interests that bear on potential action. Thus the sound of thunder or sight of black clouds may be a signal that one should wear a jacket. Signals may be internal (e.g., a stomach ache), or external. They may be either natural or culturally created. They are functional in nature, not simply a type of object. The lessons learned from a person's signal-laden experiences are internalized in latent learning and constitute our understanding of the world. Further experiences of signals make use of that internalized knowledge—that background that D & T refer to. The interpretation of natural signs is "the most elementary and most tangible sort of intellection; the kind of knowledge that we share with animals, that we acquire entirely by experience, that has obvious biological uses, and equally obvious criteria of truth and falsehood."[31]

While signals have the function of announcing objects to awareness, symbols have the function of constituting objects of thought. For Langer, symbols come in two forms, presentational and discursive, both of which are expressed in conceptions. I will first deal with presentational symbols. Their "primary function, that of conceptualizing the flux of sensations, and giving us concrete *things* in place of kaleidoscopic colors or noises, is itself an office that no language-born thought can replace."[32] While the discursive symbolism of language has a general interpersonal intelligibility, presentational symbolism's fundamental meaning is contextual. It *presents* one object to vision, hearing, and the senses in general. Thus the move from subjective sensation, as reported by receptors, to the conscious objectivity of perception traverses territory Polanyi covers in the from-to relation of indication (see *M*, 70). Frequently the intelligible forms that are identified in perception have a kind of common law marriage to particular words, a form-word bonding maintained by habit. Whenever words contribute to experience, I find it important to move from Polanyi's from-to formula to a from-via-to formulation. In the case of thoughtfully recognizing objects in perception, one moves *from* sensation *via* words *to* focal meaning. Mediation again.

What is valuable in Langer's notion of presentational symbols, and what seems lacking or problematic? It would appear that presentational symbols make up the bulk of an animal's understanding, the third layer of meaning. Some presentational symbols take on the function of signaling, highlighting aspects of perception that reveal information relevant to the animal's interests. The theory of presentational symbolism thus contributes to the view that animals have a kind of conception that can allow for intention and the possibility of choosing between alternative *images*, which is different from human reflective choosing through linguistically based alternatives. Presentational symbols also play an important role in the workings of imagination. In humans, images working together with language in imagination and dreams. However, perceptual objects can take on additional, evocative meanings beyond their presentational aspect. A picture is said to be "the most familiar sort of non-discursive symbol."[33] Pictures can denote objects in the world. They can evoke emotional reactions. They have lines,

patterns, rhythms and other contributing parts. Some of these elements are suggested by Langer, but not put into systematic form.

This brings us back again to the strictly human realm of discursive or linguistic symbols. Here Langer contrasts them with presentational symbols:

> Language in the strict sense is essentially discursive; it has permanent units of meaning which are combinable into larger units; it has fixed equivalences that make definition and translation possible; its connotations are general, so that it requires non-verbal acts, like pointing, looking, or emphatic voice-inflections, to assign specific denotations to its terms. In all these salient characters it differs from wordless symbolism, which is non-discursive and untranslatable, does not allow of definitions within its own system, and cannot directly convey generalities.[34]

Linguistic symbols are bearers of two further types of meaning: connotation and denotation. All words and sentences have connotations, mental conceptions evoked by the words and sentences used. These may be looked at as conventionally delimited, for instance by referring to a dictionary. But in practice each person grants the use of language a meaning reflective of that person's experience. One's connotations may also be applied to specific objects, an act of denotation. Four components are simultaneously present in denotational meaning: subject, symbol, conception, and denoted object.[35] This is a common situation in which the Peircean triad does not comfortably fit: either the subject or the conception gets left out. For that matter, the contexts (personal and environmental) influencing the connotation and denotation are also missing from the Peircean triad.[36]

To this point I have described five levels of increasingly rich meaning as one ascends the evolutionary path of life. In animal life we have seen how at the third level presentational symbols anchor an experientially based comprehension of reality within which signals indicate things and events of interest. For human consciousness (the fourth level), language provides connotational and denotational meanings that fund rational choice and immerse us in a cultural sea. Polanyi and Prosch in *Meaning* suggest how we may further shape meanings into metaphors and works of art depending on how we arrange our interests. Yet it is existential meaning, deeply rooted in the body and presumably incorporating yet transcending all four lower levels of meaning, that is what most deeply motivates human behavior, most deeply reveals what aspects of reality matter.

Conclusion

It is time to take stock. Has the forgoing discussion provided a better basis for retrieving an understanding of reality than Dreyfus and Taylor present? It would be presumptuous to think that in the short compass of an essay a very thorough or compelling alternative vision has been or even can be presented. But I do think a good foundation has been provided to demonstrate that both mediation and the inner/outer distinction have a significant place in the way we can both comprehend and celebrate what is real. That foundation has a scientific base. It relies upon biosemiotics and philosophical psychology to thematize the interpretive activity that is originates in biology but can culminate in existential feelings of consummation and joy in life.

I want to conclude by addressing two important implications of this evolutionary-based study of interpretive mediation. I believe the foregoing study lends support to an interesting interpretation of consciousness and to a better understanding of existential meaning.

Recall that the receptors of one-celled organisms are selective. They allow specific beneficial substances to pass through their gates, but deny entry to most things. This process could be seen as a primitive kind of interpretation bearing proto-meaning. In its selective apprehension of outer entities, it could also be seen as involving the simplest sort of consciousness. The receptors at this most basic level of centered being are in any case foundational for ensuring that the newly formed inner has life-giving relation to the outer. In other words, the receptors seed the subsequent development of more robust forms of interpretation, consciousness, and meaning at higher levels of development.

Biological meaning, the next more complicated form of meaning, arises with the advent of many-celled organisms. Principles of coordination (operational principles with instantiated rules of rightness) are needed both to ensure that organs function properly (a mini-level) and that the ensemble of cells and organs carry out functions that can thrive in some available environmental niche (a higher mini-level). Such principles of physiology are, in effect, interpretations of interpretations. That is, their regulative activity, largely autonomic at this level, can turn on and off internal responses to the opportunities and threats of the external environment. A primitive form of judgment has arisen. Perhaps the quality of centered alertness to environmental signals is akin to what humans experience as feeling.

In order for signal responsiveness to become adaptable to changing circumstances—so that what we call learning might occur—a centralized brain with the capacity to remember significant spatial and temporal patterns is needed. At some point in animal development, memory of action-guiding intentions, recent experience, and alternative possible actions must have emerged. Presentational symbols would be needed for the generation of imagined alternatives and perhaps for intention as well.

The indwelt learning grants animals a flexible understanding of the world that is in effect an interpretation of second-level interpretation with an interpretation of first level interpretation.

Up to this point, the three *levels* of emergence just discussed arise within the one *order* of emergence, the biological world. Beyond the consciousness inherent in understanding, fully human consciousness emerges under the guidance of language and its discursive meaning, a new order of emergence. With language one's self can be named and retained in memory even as one thinks about other things. Self-consciousness is one of the (sometimes dubious) gifts of language. While use of presentational symbols allows non-human animals some ability to transcend the power of signals to imprison them in the material present, with the advent of language, thought can soar away into the past and future, the possible and impossible, the true and the false. The human mind is home to what Terrence Deacon calls "ententional" phenomena, i.e., thought about what is not present in the dynamo-physical world, things like meaning and purpose.[37] The power and scope of communication and technological construction is vastly increased through language. What was formerly implicit in animal life can be made explicit through from-via-to mediation, language being the mediational factor leading humans into the third order of emergence. The third level of meaning, understanding, can function as a *resource* in human consciousness for coping—yes—but also for scientific comprehension, technological invention, artistic creation, and meaningful flourishing that seem peripheral or missing in Dreyfus and Taylor's account of reality.

Some far-reaching implications concerning consciousness and existential meaning are derivative from our study. The evolutionary account of the increasing scope and subtlety of consciousness as new epistemological layers have unfolded is a process intimately joined to the emergence of greater depth of purpose and meaning in living beings. This diachronic analysis stands in contrast to the usual synchronic attempts to explain consciousness. The synchronic attempt is mired in what has been called the "hard problem of consciousness," which boils down to how do the neurons of the brain function so as to create the phenomenal reality of consciousness? The diachronic vision articulated in this essay does not answer the hard problem in its own analytical form. Rather it appreciates how each level of new purpose and meaning takes on new and unexpected characteristics. Hence thinking about consciousness in a diachronic way offers an approach to consciousness that does not "deny its existence, or ...redefine the phenomena in need of explanation as something it is not."[38] Nor is it crucified on the cross of analytic philosophy. The difference between the level of awareness of the world we share with other animals and the unique language-infused consciousness of humans is not so profound as to be utterly mysterious. For we can see *in our own experience* the various sorts of consciousness that have emerged during our evolutionary trajectory:

feelings, the awareness of subsidiary contributors to focal perception, and language-based focal awareness itself.

The focal level of human thought is driven by the "via" of language, but we dwell in a tacit background of feeling and subsidiary awareness that, as an understanding shaped by empirical signals of the real, external world, has the power to serve as the standard by which our accounts of physical reality must be judged. And yet language opens up new levels of reality. Through language we necessarily dwell in an axiological world. We can be aware of the rules of rightness inherent in aesthetics and morality, and which in logic guide our processes of inquiry. Thus in addition to learning how to cope, we can be aware of many dimensions of meaning and purpose. All are real. And that gives us a clue to what it means to experience existential meaning in life. It is to experience the many sorts of satisfaction that an embodied immersion in purpose at its many levels of reality can grace us with.[39]

Endnotes

[1]Hubert Dreyfus and Charles Taylor, *Retrieving Realism* (Cambridge, MA: Harvard University Press, 2015), 2. Hereafter this work will be cited in the text as D & T.

[2]This view was set forth in much the same terms in Charles Taylor's article, "Overcoming Epistemology" published in Kenneth Baynes, et al., eds. *After Philosophy: End or Transformation?* (Cambridge, MA: MIT Press, 1987), 464-488. I deeply appreciate Taylor as a philosopher who is widely read in the history of philosophy and who reflects upon the several different approaches to philosophy now current. Thus it is somewhat ironic that my major complaint about the book under question is that Taylor (and Dreyfus) need to include more in their analysis of reality. They need to deal with the biological and biosemiotic issues that influence the embodied processes whose significance they acknowledge. They need to acknowledge the rich (and sometimes painful) reality of human experience beyond coping.

[3]See Jesper Hoffmeyer, *Signs of Meaning in the Universe* (Bloomington: Indiana University Press, 1996), 71, for a more detailed description of the complex neural processes involved in seeing, a procedure he shows to be "heavily processed."

[4]Dale Cannon, "Construing Polanyi's Tacit Knowing as Knowing by Acquaintance Rather than Knowing by Representation: Some Implications." *Tradition & Discovery* 29/2 (2002-2003):39.

[5]Ibid.

[6]Michael Polanyi, *The Tacit Dimension* with a new foreward by Amartya Sen (1966; reprint, Chicago: University of Chicago Press, 2009), 18.

[7]Denis Nobel, *The Music of Life: Biology Beyond Genes* (New York: Oxford University Press, 2006), 80 (see also xii).

[8]Walter Gulick, "Polanyian Biosemiotics and the From-Via-To Dimensions of Meaning" *Tradition & Discovery* 39/1, (2012-2013):20-23 in particular.

[9]"Life is a surface activity…Life is fundamentally about insides and outsides." See Jesper Hoffmeyer, "The Biology of Signification." *Perspectives in Biology and Medicine* 43 (2), quoted in

Claus Emmeche, Kalevi Kull, and Frederik Stjernfelt, *Reading Hoffmeyer, Rethinking Biology* (Tartu, Estonia: Tartu University Press, 2002), 17.

[10]Alicia Juarrero, *Dynamics in Action: Intentional Behavior as a Complex System* (Cambridge, MA: MIT Press, 2002), 112.

[11]Lynn Margulis & Dorion Sagan, *What is Sex?* (New York: Simon & Schuster, 1997), 22.

[12]This quotation is from Hans Jonas, *Organismus und Freiheit: Ansätze zu einer philosophischen Biologie* (Göttingen: Vandenhoeck and Ruprecht, 1973), 83, quoted in Andreas Weber & Francisco J. Varela, "Life after Kant: Natural Purposes and the Autopoietic Foundations of Biological Individuality," *Phenomenology and the Cognitive Sciences* 1 (2002):112.

[13]Jesper Hoffmeyer, *Biosemiotics: An Examination into the Signs of Life and the Life of Signs* (Scranton: University of Scranton Press), 213.

[14]Hoffmeyer, *Biosemiotics*, 18-19.

[15]Michael Polanyi, "The Growth of Thought in Society," *Economica* 8 (November 1941), 431. The constraint of the water in this illustration was later described by Polanyi as a test-tube type of boundary condition—see his *Knowing and Being* (Chicago: University of Chicago Press, 1969), 226.

[16]"Growth of Thought," 441.

[17]Daniel Kahneman, *Thinking Fast and Slow* (New York: Farrar, Straus and Giroux, 2011), 74.

[18]Current research in signal transduction mechanisms that regulate biological systems is sharply reducing the "indeterminate" nature of regulation.

[19]Eliseo Fernández, "Evolution of Signs, Organisms and Artifacts as Phases of Concrete Generalization," *Biosemiotics* 8/1 (2015):101. On this point, Hoffmeyer paraphrases Kant in a pithy way: "*Semiotic causation without efficient causation is helpless, but efficient causation without semiotic causation is blind.*" See his "Semiotic Scaffolding of Living Systems" in Marcel Barbieri, ed., *Introduction to Biosemiotics* (Dordrecht, Netherlands: Springer, 2007), 153.

[20]Eliseo Fernández, "Nomological Machines and Semiotic Scaffolding," unpublished paper delivered at the Fifteenth Annual Gathering in Biosemiotics, Copenhagen, 2015, 1.

[21]Ibid., 6.

[22]Here is one sweeping definition of biosemiotic scaffolding: "an entity or process which supports another, primary process and thus enhances the stability, functioning, or space of possibilities of the latter; especially relevant is semiotic scaffolding by means of signs; genes may be seen as a scaffolding in relation to heredity; membranes in relation to the autocatalytic cycles of metabolites, language in relation to thought, written language to spoken." In Claus Emmeche, Kalevi Kull, and Frederik Stjernfelt, *Reading Hoffmeyer, Rethinking Biology* (Tartu, Estonia: Tartu University Press, 2002), 29.

[23]"Biological meaning" is the term Hoffmeyer uses in the passage cited by endnote 12.

[24]That humans are the sole possessors of language is still a somewhat debatable claim, but I take it that the experiments with primates, dolphins, etc. indicate that animals learn and respond to words as signals rather than as symbols that allow for discursive meaning construction. For support of the claim that primates and other animals lack human linguistic skills, see Dorothy L. Cheney and Robert M. Seyfarth, *Baboon Metaphysics: The Evolution of a Social Mind* (Chicago: University of

Chicago Press, 2007), 264-265. For a view that is more questioning of my claim, see Frans de Waal, *Our Inner Ape* (New York: Riverhead Books [Penguin], 2005), 188-189.

[25]Charles Taylor has just published *The Language Animal* at the time this article was completed. The promotional blurbs suggest that he will attend in some detail to the various sorts of insights, beyond description, that language can facilitate.

[26]Interestingly, it is Charles Taylor, more completely than any other thinker I know, who carefully describes existential meaning (which he calls experiential meaning) and distinguishes it from linguistic meaning. See his "Interpretation and the Sciences of Man," *Review of Metaphysics* 25/1 (September 1971):10-14.

[27]Chapters III and IV of Susanne Langer's *Philosophy in a New Key*, 3rd ed. (Cambridge, MA: Harvard University Press, 1957) inform my discussion of signals and symbols.

[28]James Gleick offers a helpful description of Shannon's understanding of information, so influential in the development of computers, at various points in his *The Information: A History, A Theory, A Flood* (New York: Vintage Book, 2012).

[29]"The *affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes*, either for good or ill." See James J. Gibson, *The Ecological Approach to Visual Perception* (Hillsdale, NJ: Lawrence Erlbaum Associates, 1986), 127.

[30]Langer, *Feeling and Form* (New York: Charles Scribner's Sons, 1953), 26.

[31]Langer, *Philosophy in a New Key*, 59-60.

[32]Ibid., 93.

[33]Ibid., 94.

[34]Ibid., 96-97.

[35]Ibid., 64.

[36]It would seem like this critique of Peirce's thought could be extended to a criticism of my from-via-to formula. Strictly speaking, however, my formula, like Polanyi's from-to version, applies only to the structure of consciousness. Subject and context must be assumed in cognitive processes at all levels.

[37]Terrence Deacon, *Incomplete Nature: How Mind Emerged from Matter* (New York: Norton, 2012), 27.

[38]David Chalmers, *The Conscious Mind: In Search of a Fundamental Theory* (New York: Oxford University Press, 1996), xii.

[39]This essay has benefitted from the helpful critiques of Dale Cannon and Phil Mullins. Deep thanks to both.

BOOK REVIEWS

Wendy Wheeler, *The Whole Creature: Complexity, Biosemiotics and the Evolution of Culture*. London: Lawrence & Wishart, 2006. Pp. 172. ISBN-10: 1-905007-30-2. $29.50 pb.

It is rare indeed to find a book that seeks to articulate and integrate some of our intellectual culture's latest insights by making use of Polanyi's thought, which plays a leading—perhaps the leading—role in the book's complex set of arguments. Such a book has been written by Wendy Wheeler. I just recently ran across *The Whole Creature* even though it was published some ten years ago, and I found she states clearly and quite fully some of the insights I have been groping towards in recent years (see my article in *TAD* 39:1 especially).

In brief, Wheeler argues that complexity theory and biosemiotics are disciplines that display most thoroughly the inadequacies of modernism's dualisms and offer an integrated alternative vision. These disciplines illuminate processes operating in Polanyi's tacit dimension—not, of course, making tacit operations fully explicit, but indicating how semiotic messaging operates in life-sustaining ways at all of life's many levels, including all human biological and cultural levels. Her vision is holistic. Thus, for instance, Wheeler shows how the nature-culture dichotomy is overcome by seeing culture as nature's path of evolution in human existence. She was originally influenced to think in such terms through the writings of Raymond Williams, especially as articulated in his *The Long Revolution.* Wheeler states, "the world we sense is not there in any positivist 'objective' sense, but is made by evolution in the conjunction of creature and environment. For humans, environment includes, of course, culture..." (15). Further, "the living world is a vast interconnected, interdependent web of relations—a complex whole in which emergence produces different strata of beings with generative fields which are complexly interwoven" (73).

Surely the ideas introduced in the previous two quotations, referencing problems with positivistic objectivity, affirmation of emergence, and proclaiming a stratified world, indicate the affinity of her vision with Polanyi's. The overlap of ideas is deep and mostly made explicit. She cites his reliance upon tacit intimations of coherence in reality as key to scientific discovery and emphasizes his claim that scientific progress occurs through "the discovery of rationality in nature" (*PK,* 64). In her third chapter, she supports his understanding that creative thought in science, religion, and the

arts unfold in largely parallel ways. The development of culture is our species' expression of the forward directedness of life, unfolding in terms of feedback systems evident throughout nature. But Wheeler is especially taken by the dynamics of tacit knowing, making multiple references to Polanyi's notion of how, in consciousness, humans disattend from one idea in order to attend to a new focus. She sees from-to relations to be existent throughout nature.

At the center of Wheeler's interest is replacing Western individualism and rationalistic instrumentalism with a holistic social vision that more truly envisions human excellence. In this pursuit, three authors in addition to Polanyi upon whom Wheeler relies heavily are Brian Goodwin (author of *How the Leopard Changed its Spots: The Evolution of Complexity*), Margaret Boden (author of *The Creative Mind: Myths and Mechanisms*, 2nd ed.), and Jesper Hoffmeyer (author of *Signs of Meaning in the Universe*).

The following quotation, which contains the phrase found in the book's title, gets at the core of Wheeler's thought: "It is the *whole* creature (mind-body-environment) and the *whole* system (minds-bodies-cultural-social-and-natural-environments) which must be taken into account by anyone interested in human flourishing and creative living" (33). We humans are embedded in what von Uexküll termed an *Umwelt*, a rich world-creating environment that is species- and even individual-specific, an environment perfused with signs (see 126). Interestingly, Wheeler's vision suggests that Poteat's emphasis on our mindbody, important though that is, is incomplete. A more adequate expression for human reality would be mindbodyUmwelt, or in more idiomatic terms, mind-body-environment.

The paradigm shift to a new scientific worldview Wheeler is urging has much in common with Polanyi's post-critical philosophy. She uses Robert Laughlin's description of the new stance as moving from the Age of Reductionism to the Age of Emergence (see pp. 20, 25, 28, 62, 145 and 155).

> The current time, of Laughlin's Age of Emergence, is a particularly propitious time for such a re-engagement between 'the two cultures' because what complexity science, and its identification of phase-shifts and emergent levels, shows us quite clearly are the ways in which evolution, from the basic laws of physics all the way up through chemistry, biology and the emergence of language, culture and society in *Homo sapiens*, is a continually evolving story of the fundamental *physical* relatedness of space, matter and life (28).

Wheeler's emphasis above on physical relatedness and what she calls her "good materialist argument about the nature of human sociality" (12) would benefit, it seems to me, from different terminology.

Such emergent levels as cultural meanings and human consciousness, although based on material reality, transcend the strictly physical. Indeed, semiosis itself, so crucial to her account, is a mediating relation rather than a physical object. It seems best to call her ecological, evolutionary, emergent account neither physical nor mental, neither materialistic nor idealistic. It transcends such dualistic categories.

The comprehensive social nature of Wheeler's thought, although perhaps centered in epistemology, has ramifications that extend far beyond cognition. In this respect, too, her thought is like Polanyi's. Among the common theoretical positions that her semiotic worldview challenges are those that stress the crucial nature of genetic inheritance while ignoring environmental factors (22). She also rejects philosophies that overemphasize the importance of language, especially "the 'postmodern' idea that 'reality is constructed in language'" (26). Closely related is her dismissal of overly rationalistic thought. "A complex totality and tacit skills understanding of human societies should also make us sharply reject any account of human behavior which depends (as does utilitarianism, for instance) on the assertion that conscious reasoning is the prime motivator of human action" (55). Rather she appreciates with Damasio and Polanyi the way that "feelings (which are the form in which intimations arise in us) are an essential part of rational behavior" (82). Humans share tacit, embodied relationships in social settings that deny what she calls "the gospel of liberal individualism" (153). Her evolutionary perspective makes her suspicious of political or economic quick fixes: "The short-termism which dogs capitalism's search for quick profits is radical in all the wrong ways: it is continually upsetting and destabilizing of the longer time-scales involved in really creative exploratory and transformational innovation" (156).

Does a positive account of human flourishing also emerge from Wheeler's writing? It does indeed. Among the eclectic influences she brings to bear on her topic are Romantic literature (reacting on behalf of the body and its emotions against sterile Christian asceticism and Enlightenment rationalism [18, 44]), Buddhism (understanding the interrelated co-arising of all life [97]), Marx (his socialist thinking [45]), and the psychoanalytic tradition (understanding how reasoning is always informed by unconscious factors [55]). But most telling in her modeling of human excellence are ideas she takes from epidemiology and psychoneuroimmunology. Michael Marmot, her guide in the former discipline, shows that a person's social connectedness, ability to affect others, and degree of control in a situation determines the degree of that person's flourishing (110-115). Similarly, Paul Marin's psychoneuroimmunological research strongly suggests that "not only environmental control, but human sociality itself, is a significant aspect of healthiness. We do better (very literally, in terms of health, recovery from illness when ill, susceptibility to accidents and

death) when we are richly socially integrated and supported" (118). One net effect of these various influences is that Wheeler believes the social worldview she advocates has ethical power lacking in traditional moral nostrums.

> If I am mindful of the processual self that I am, and mindful of the subtlety of my co-arising, co-dependent processual existence among other creatures, and mindful that this means that *all* my doings reach out into all life, my reaching out will be spontaneously directed in right ways which are not primarily motivated by narrow self-interest. This is not a matter of some mystical fantasy of being 'good', or 'spiritually pure', by renouncing self-interest and consciously going about 'caring for others, or the Other': it is about recognizing the processual nature of self (as constituted) in community, and pursuing the furtherance of, and real experience of joy in, that (98).

Some persons, especially students, might be put off by Wheeler's writing style. But despite the rather Teutonic length and complexity of some of her sentences—evident in the foregoing quotations—her thought is clear and compelling. There are redundancies in her writing, but these merely underscore what she thinks is important. In sum, this is a rich and impressive work on its own. It can also inspire those who are eager to see Polanyi's thought making important contributions to contemporary thought.

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Silver Rattasepp and Tyler Bennett (eds.), *Gatherings in Biosemiotics*, Tartu Semiiotics Library 11. Tartu, Estonia. University of Tartu Press 2012. Pp. 244. (http://www.ut.ee/SOSE/tsl.html) ISSN 1406-4278; ISBN 978-9949-32-048-6.

This collection in the Tartu Semiotics Library (an international series on semiotics) packages interesting material which can serve to introduce the relatively new area of interdisciplinary inquiry called "biosemiotics." If one googles "biosemiotics," Wikipedia points out the etymological roots of the term in "life" and "sign" and that there is now a growing field of semiotic biology that studies the production and interpretation of signs and codes in living nature. To dig deeper, look at essays in the opening section, "Approaches to Biosemiotics," which discusses the importance of semiotics for biology and the issues currently facing this new field. The brief essays in the second section provide a more historically-oriented overview of the development of biosemiotics and the series of international conferences, the Gatherings in Biosemiotics (hereafter Gatherings) that have been held since 2001. This volume pulls together material that commemorates the first

twelve of these conferences (in years after 2012, Gatherings have also been held and they continue to grow). Almost all of these meetings have been held in Europe and have involved an international set of scholars from many disciplines. Here I will focus on a few of the essays in the "Approaches to Biosemiotics" section, which presents perspectives of several important figures commenting on the nature of/functionality of and emerging issues in biosemiotics. But I begin with brief comments on historical essays and documents in the second section of the collection. I altogether omit any consideration of the third section of the volume, which is a collection of the abstracts for papers presented at the 2012 Gatherings meeting. But these abstracts clearly show the broad interests, scientific and philosophical, that fall under the rubric "biosemiotics."

Jesper Hoffmeyer's "A Short History of Gatherings in Biosemiotics" recounts how he, Claus Emmeche and Kalevi Kull came to organize the first Gatherings conference in 2001. Hoffmeyer is a Danish biochemist whose illuminating writings predate the first Gatherings meeting. His work masterfully draws on the philosophical ideas of Peirce and the Estonian-born German biologist Jakob von Uexküll (1864-1944) to frame his biosemiotic perspective. His 1993 Danish book, *Signs of Meaning in the Universe* (published in English in 1996 by Indiana University Press) articulately makes a case for the "semiosphere." In the nineties, Hoffmeyer and others already were doing presentations at academic conferences and some of these scientists found support for such work in semioticians like Thomas Sebeok and John Deely. Hoffmeyer and other early figures worked in scientific circles interested in evolutionary biology to question the prevailing genocentric paradigm. Biosemiotics was also on the agenda in medical conferences. It was a natural next step to move to an interdisciplinary conference like the Gatherings dedicated to the study of the semiotics of living systems. Hoffmeyer emphasizes the very eclectic and egalitarian openness of the first and subsequent meetings; in his narrative in this volume, he mentions many important contributors to biosemiotics, early and more recent figures, and bibliographic information about most can be found in references in his and other essays in the collection.

Don Favareau's "Twelve Years with the Gatherings in Biosemiotics" complements Hoffmeyer's essay and is a very personal walk through the first twelve Gatherings. Along the way (and in his references), what he provides is a concise and interesting introduction to many of the figures who have joined the biosemiotics movement. Favareau (whose interests focus on the neurobiology of language and philosophy) seems to have become the de facto historian of biosemiotics (see his "The Evolutionary History of Biosemiotics," in *Introduction to Biosemiotics: The New Biological Synthesis*, edited by M. Barbieri, 1-67 [Berlin: Springer, 2006] as well as Kalevi Kull's shorter "Biosemiotics in the

Twentieth Century: A View from Biology" in *Semiotica* 127 [1/4]:385-414).

Rounding out this section with historical reflections on the Gatherings, are a dozen brief statements by persons who coordinated the first twelve conferences. These statements provide insight into the focus and ambience of each meeting; attached to each is a set of references and a schematic of the program, listing session topics, presenters and papers.

In the opening "Approaches to Semiotics" section, there are five essays by articulate and widely-recognized figures who have contributed to discussion about biosemiotics, Kalevi Kull (a botanist), Terence W. Deacon (a neuroscientist and bioanthropologist), Howard H. Pattee (a biophysicist), Stuart Kauffman (a physician, theoretical biologist and complexity researcher) and Myrdene Anderson (an anthropologist). In this brief review, I can do no more than reference some of these discussions.

Kalevi Kull's "Advancements in Biosemotics: Where We Are Now in Discovering the Basic Mechanism of Meaning-Making" is a review of twenty years of achievements of biosemiotic explorations and an assessment of problems embedded in these achievements. Although his discussion of the range of biosemiotic inquiry is brief, Kull identifies major thinkers and ideas they have introduced to the field. He notes, for example, that Hoffmeyer extended the usage of the concept of "intentionality" in biology and Deacon "introduced the concept of ententionality that covers the phenomenon upwards from the first processes of life" (12). Kull argues biosemioticians must do "further modelling of minimal semiosis in operational terms, i.e., in the way that would make it possible to apply semiotic models on the cellular level and to test these empirically" (13). Running through biosemiotic literature is both an appreciation for and an ambivalence toward Peircean semiotics; Kull suggests the field needs to be eclectic enough to move beyond some elements of the Peircean account of semiosis. Clearly, Kull is put off by Peirce's speculation about cosmic semiosis. He suggests that in the future biosemiotics needs to draw more extensively on ideas about the *umwelt* developed by Jakob von Uexküll, since such a framework allows a stricter division of territory that promotes a more empirical orientation: "Biophysics studies the physic-chemical structure of organisms, biosemiotics studies what the organisms may know, what are the types and ways of knowing, and what it does with the world" (17). Kull argues that biosemiotics must do further work to unravel the relationship between codes and semiosis. Codes are built by semiosis and serve as "a frozen pragmatic, a frozen habit" (18) but semiosis carries and rebuilds codes and apparently cannot exist without codes. The major limitation today in biosemiotics is "the insufficient development of models of semiosis" (21) Kull favors natural language as a better tool than formal languages for modeling semiosis, but contends most natural language models need to be updated so

they also can explicate lower levels of semiosis.

Terence Deacon's two-page comment (see Donald Crosby's review of Deacon's lengthy *Incomplete Nature* in *TAD* 38:3) is akin to views touched in Kull's longer discussion: he contends that mechanistic and computational conceptions of life and mind have revealed not much about basic living systems but neither have models drawn from human phenomenal and communicational experience. Deacon thinks biosemiotics currently has only "an un-grounded theory of semiotic processes at the molecular, cellular, and organism level"—we are no closer today to knowing how "mentality emerged from and grew out of organisms during their evolution" (26). Howard Pattee's equally short contribution bluntly warns that calling physicists "reductionists" and "mechanists" and presenting a biosemiotic perspective as a "liberation" from such views (as he contends Hoffmeyer suggests) succeeds only in annoying physicists. Pattee recommends that biosemioticians should "engage more physicists and biologists in direct conversation" (28). Myrdene Anderson describes biosemiotics as a "centripetal swirl" (47), a dizzying array of interdisciplinarity. He regards the plurality of perspectives as reflecting the fusion that is "linguiculture" (47).

Stuart Kauffman's "From Physics to Semiotics" is an intricately complex, broadly philosophical essay that attempts to "take us from our deeply received scientific world view. . . spawned by Newton and modern physics, to an entirely different, newly vibrant, surprising, unknowable world of becoming" (30), which is the world that biosemiotics seeks to represent. In a mathematical sketch, he argues that "in the lifetime of our universe, only a tiny fraction of all [presently existing] proteins can have been created" (33) and this means such things as a bacterial cells dividing must be regarded as "Kantian self-recreating wholes," that is, complex entities in which "the function of a part is its causal role in sustaining the existence of the Kantian whole" (34). Functions are thus "real in the universe":

> …unlike physics and its law entailed trajectories, the evolution of the biosphere cannot be entailed by laws of motion and their integration. No laws entail the evolution of the biosphere, a first and major step beyond physics at the "watershed of life" (34).

How does Kauffman think the "watershed of life" arose in the universe and how does the biosphere evolve? He contends the simplest Kantian wholes are "collectively autocatalytic sets" that statistically could be expected to emerge from "sufficiently diverse 'chemical soups'" (35). The evolution of the biosphere itself occurs as adaptations in living forms occur and find a new use in a new niche (i.e., Darwin's "preadaptations" and Gould's "exaptations"). Exaptations cannot be named in advance but only after they have come to exist; they are what Kauffman calls the coming to be of a

"new adjacent possible empty niche" (39) and "the adjacent possible" (40). We do not know ahead of time the new variables that will become relevant in the evolution of the biosphere and therefore we cannot develop probability measures for evolution. We cannot reason about life as we have most often reasoned about physics: "…evolving life is not only a web of cause and effect, but of empty niche opportunities, that enable new evolutionary radical emergence." (41).

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Barry Allen, *Vanishing into Things: Knowledge in Chinese Tradition*. Cambridge: Harvard University Press, 2015. Pp. 304. ISBN-13: 978-0674335912, $36.45 (hb).

Although technology and globalization are continually making the world more connected, different philosophical traditions can still seem worlds apart. Graduate programs specializing in non-Western philosophy remain rare in the English-speaking world. Among the twenty highest-ranked programs evaluated on the 2015 Philosophical Gourmet Report, the most widely-cited ranking system for philosophy graduate programs, only University of California, Berkeley boasts a program in Asian philosophy.

The neglect may be due in part to the unfamiliarity of the subject matter. A deep study of Asian philosophy requires philosophers in the English-speaking world to become familiar with a second set of basic concepts and foundational texts—to say nothing about foreign languages. The supposed impropriety of judging another culture has probably not made matters easier for scholars interested in critically engaging other traditions. Attaining academic competence is challenging enough without these added hurdles.

Those few philosophers who are educated in multiple traditions are well-situated to point out paths not taken—and paths too readily taken—by the rest of us. Few books exemplify this better than Barry Allen's *Vanishing into Things: Knowledge in Chinese Tradition*. Allen is the author of three previous books dealing with comparative philosophy. Here he synthesizes two millennia of Chinese thinking about knowledge, and contrasts it—favorably—with the dominant trends in Western thought.

Vanishing may be of particular interest to students of Michael Polanyi. Throughout his philosophical career and in his magnum opus, *Personal Knowledge*, Polanyi challenged assumptions that Western philosophers, especially post-Descartes, almost invariably take for granted. Chief among them are: that paradigmatic knowledge lacks a tacit dimension, that knowledge can be acquired by the implementation of some mechanical procedure, and that there is no voluntary or subjective component to knowledge.

Allen shares many of Polanyi's complaints. Modern Anglophone philosophers, he alleges, remain "curiously

incurious" about certain assumptions about knowledge (219). For instance, it has been assumed as early as Plato that knowledge must be explicit and capable of being expressed in statement form; hence, Socrates insisted that knowledge of virtue, courage and piety presupposes an ability to state the definitions of these things. But, as Plato's dialogues and subsequent attempts at conceptual analysis show, satisfactory analyses of philosophically interesting concepts are elusive. Moreover, the emphasis on propositional knowledge sidelines technological knowledge, which "resists logical analysis into simpler concepts, seldom climaxes in demonstrable truth, and does not stand to pure theory as mere application or derivative 'how-to' knowledge," Allen writes (4).

Allen characterizes the Chinese tradition as unfolding outside of the tangled web of Western assumptions:

> The problem of knowledge is not how to get beyond perspective, a view from nowhere. The problem is to see deeper into the world, to know it more intimately than concepts and language allow—not to know what is in the world, but what the world is becoming. The Chinese worry is not access, but getting stuck…Instead of transcending perspectives we become skilled at never getting stuck in one, vanishing into things (10-11).

Remarkably, groups as disparate as Confucians, Daoists, Chan Buddhists, and Neo-Confucians concur with this characterization, as does Sunzi and like-minded military strategists. Within this unity there is a great deal of diversity, so Allen dedicates a chapter to each of these schools. Here I will focus only on the two chapters dealing with Confucianism and Daoism.

Allen appropriately begins with the school of Kongzi, Latinized as Confucius, who is the veritable father of Chinese philosophy. According to Confucian myth, humanity once lived in an age of harmony, known as the Grand Unity, which ended when people became selfish. No messiah figure arrives to redeem humanity's fallen state. However, wise ancestors ameliorated the situation by devising rituals to restore some semblance of harmony. Sincere performance of ritual is essential for the development of *ren*, or humane goodness, the cardinal virtue at the core of Confucian ethics.

This kind of apt behavior takes a lifetime of cultivation, but it comes as second nature to the perfected person (*junzi*), who alone can attain the highest summit of knowledge. Here the distinction between morality and epistemology is obliterated: "The Confucian ideal of knowledge, what gives knowledge its point and value, is ceremonial virtuosity, knowing how to conduct life in a way that is at once spontaneous and completely in accord with Heaven's norm, tranquil among turmoil, maintaining perfect balance" (23). Polanyi likewise assimilates the epistemic to the moral, seeing science even at its most abstract as morally

pregnant. Science, Polanyi writes, "must claim that certain emotions are right; and if it can make good on such a claim, it will not only save itself but sustain by its example the whole system of cultural life of which it forms part" (*PK*, 134).

Not everyone is happy with this moralized epistemology, either now or in ancient China. In the generation after Kongzi's death (about 479 BC), Confucianism would face a serious rival in Mohism, which among the schools of thought in ancient China bore the greatest resemblance to Western rationalism. The Confucian obsession with ritual did not impress the school's founder, Mozi, who instead advocated a moral system that would today be classified as a kind of consequentialism. Like Socrates, his Greek contemporary, Mozi believed that knowledge was the source of morality—the inverse of the Confucian model.

Mozi's critique of Confucianism was as comprehensive as it was scathing, but it did not win the day—indeed, Mohism would soon be forgotten even in China. Confucianism, meanwhile, continued to develop. In the century after Mozi, Mengzi (Latinized as Mencius), became the first Confucian to develop a theory of human nature (he famously thought it was good). In an anticipation of later Neo-Confucian developments, Mengzi took Confucianism in a metaphysical direction. It was he who introduced to Chinese ethical thought the notion of *qi*. The mundane meaning of *qi* is "gaseous substances," but in Mengzi's writings it refers to an effective force, accumulated through righteous action, by which the sage influences, and even morally transforms, those around him.

The only indigenous Chinese school of thought to rival Confucianism's influence in the long term is Daoism, whose name derives from the word for "way." Whereas the morally perceptive sayings of Master Kongzi in the *Analects* seem meant to be understood by the mature reader, many of the brief, riddle-like chapters of the *Daodejing* seem to elude our feeble attempts to understand them. "The Dao that can be known is not the eternal Dao," the *Daodejing* begins. "The name that can be named is not the eternal name." Adding to the mystery, we do not know whether the *Daodejing*'s author, Laozi, was a real person, or whether "Laozi," which means "old master," is an honorary title conferred on many collaborating authors.

Without knowing the eternal Dao, we can observe that Daoism delights in turning binaries on their heads. The author of the *Daodejing*, whoever it is, extols qualities ordinarily shunned, and shuns qualities ordinarily extolled: Weakness is to be preferred over strength, emptiness over fullness, submissiveness over domination. Metaphysically, the world is not a collection of discrete substances, but rather an ongoing process in constant flux. And this has ethical implications: the wise person doesn't resist change; he is flexible to the point of merging with the environment, vanishing into things.

Laozi's most significant successor is Zhuangzi, a contemporary of Mengzi.

His book, *Zhuangzi*, is probably the most significant Daoist writing outside of the *Daodejing*. There, with vivid imagery, Zhuangzi articulates the contours of a Daoist epistemology, central to which is a distinction between little knowledge and great knowledge. Little knowledge is perspective-bound: "Mount Tai is large" is true for human beings, but would not be true from the perspective of an enormous creature. By contrast, "Great knowledge is an art of evading capture by a perspective altogether," Allen explains (87). Note that the transcendence of perspective Zhuangzi urges is not ascension to some impartial "master perspective," but rather the artful evasion of capture by any perspective.

Among Western philosophies, Daoism may have the most in common with Stoicism. The Stoics admonish us to renounce attachment to external things in order to attain a state of divine indifference to the vicissitudes of life. Daoism's demand for renunciation is even more extensive, Allen explains: "It is not attachment to externals that is the problem; it is attachment plain and simple, including especially fondness for a 'true self,' something substantial which sets you apart from everyone else" (96). The epistemic upshot is that we should not remain attached to particular perspectives because doing so obstructs the acquisition of great knowledge.

Polanyi may beg to differ about how far this non-attachment should go. Polanyi approvingly quotes Augustine that "Unless ye believe, ye shall not understand" and suggests that a return to some kind of "orthodoxy" may be the best remedy for modern scientism (*PK*, 264-268). Supposing that there is a true orthodoxy, being captured by *that* perspective hardly seems like something to be avoided. If Polanyi and Zhuangzi agree on one significant thing, it is that both reject the idea that a radically impartial "view from nowhere" represents some kind of epistemic ideal.

Allen goes on to provide thoughtful analyses of "The Art of War," Chan Buddhism, and Neo-Confucianism. No mention is made of Han Fei or the influential legalist school, but those omissions probably help bring into relief the differences between Western and Chinese philosophies of knowledge. I have little to offer in the way of criticism, except this: in the book's final chapter, Allen suggests that the problems that haunt Western epistemology are implicated in certain political problems. Thinking that knowledge is inherently good, we plunge headlong into the creation of dangerous technologies, like the atom bomb, which we do not have the wisdom to control.

This is a problem, to be sure, but does it originate with the philosophical problems that haunt Western epistemology? Perhaps not. After all, the Chinese invented gunpowder, whose destructive power is obvious, without any ability to predict the consequences of that invention. And China's history, whose calamities include the An Lushan rebellion, the Taiping rebellion, and Mao Zedong's forced collectivization, is no less

catastrophe-laden than that of Europe. Allen provides us with no evidence that the Chinese philosophy of knowledge has made the Chinese any less subject to this kind of instrumentalism than Western philosophy of knowledge has made Westerners.

That quibble notwithstanding, this book is impressive. Allen's deft writing makes *Vanishing into Things* an accessible read, as well as an enlightening one. It comes highly recommended to anyone with interests in either Chinese philosophy or epistemology.

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