POETIC ORIGINS:
REVISITING WILLIAM CARLOS WILLIAMS'S "THE POEM AS A FIELD OF ACTION"
AND MAPPING THE BUILDING BLOCKS OF POETRY

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ABSTRACT: This article begins with a reflection on William Carlos Williams's lecture "The Poem as a Field of Action" in light of recent developments in theoretical physics as a means to uncover fundamental aspects of poetry. Discussing where and how meaning originates, the paper explores quantum mechanics, speculative realism, panpsychism, endosymbiosis, Gaia theory, and biosemiotics. Biosemiotics interprets life as a semiotic process and proposes that biological life at all levels is concerned with meaning-making. The essay concludes by arguing that the basic elements of poetry—such as semiosis, metaphor, and interpretation—are basic aspects of all living, autopoietic beings.

KEYWORDS: Biosemiotics; Information; Interpretation; Meaning; Poetry

In his 1948 lecture "The Poem as a Field of Action," delivered at the University of Washington, William Carlos Williams called for "sweeping changes from top to bottom of the poetic structure."[1] In the lecture, Williams announced the need for a new poetic style, one driven by a new measure that would abandon free verse in favor of the rhythms of speech. Charles Olsen later developed Williams'

[1] William Carlos Williams, "*The Poem as a Field of Action*," Poetry Foundation, poetryfoundation.org (https://www.poetryfoundation.org/articles/69393/the-poem-as-a-field-of-action), p.3.

theory into a more defined mode of "field composition" in his essay "Projective Verse" in 1950. A central aspect of Williams's lecture was the need for a new poetics that would be commiserate with the new physics, at one point asking, "How can we accept Einstein's theory of relativity, affecting our very conception of the heavens about us of which poets write so much, without incorporating its essential fact—the relativity of measurements—into our own category of activity: the poem" (5). Williams's and Olsen's emphasis on breath as a central component of poetic form has impacted generations of writers. Today, the new physics is quantum mechanics, and so we must ask whether Williams's desire to square poetics with science still holds. What have we learned about the essential nature of the universe since 1948, and can these new discoveries lead to revelations about poetry? Specifically, can new advances in the sciences reveal anything about the nature and origin of poetry? I believe so, but any explanation of why poetry exists will require radical reconceptualizations, from how we think about matter and information, to consciousness and interpretation, and the fundamental components of life itself.

To begin, I will follow Williams's lead and start with the new physics of our time: quantum mechanics. Perhaps the most difficult discovery of quantum mechanics to comprehend is that particles are in fact fields. Objects do not exist, quantum mechanics tells us, vibrating waves of probability exit; when these waves interact with something else, then they manifest themselves as particles, though they are also equally still quanta of a field. Fields and particles are the same thing. Physical fields have three primary quantum characteristics: they are granular, probabilistic, and relational. These three characteristics are what theoretical physicist Carlo Rovelli believes are the central aspects of reality that quantum mechanics reveals about the nature of existence.[2] Rovelli notes that granularity is the most quintessential characteristic of quantum mechanics; the theory gets its name from this feature, that there is a minimum scale for all phenomena, the Planck scale, and the smallest, most elementary grains of reality are quanta.[3] Granularity is central to quantum mechanics and tells us that information within a system is finite. The second major discovery of quantum mechanics is

[2] Carlo Rovelli, *Reality Is Not What It Seems: The Journey to Quantum Gravity*, trans. Simon Carnell and Erica Segre, New York, Riverhead Books, 2017, p. 130 (subsequently referred to in text as *R*).

[3] Carlo Rovelli, *The Order of Time*, trans. Simon Carnell and Erica Segre, New York, Riverhead Books, 2018, p. 83 (subsequently referred to in text as *O*).

indeterminacy, the notion that an electron has no precise position but rather exists as a cloud of probability, or in a state of superposition (*O* 87). It is the notion of indeterminacy that reveals to us that particles are fields, and that random change is part of reality. Until its wave function is collapsed by an observation, a particle exists in a superposition of multiple quantum states. Particles are thus more like waves or clouds of probability, what Rovelli describes as "a world of vibrations, a continuous fluctuation, a microscopic swarming of fleeting microevents" (*R* 132). Indeterminacy is not permanent, however; as indicated above, it is resolved when a quantity interacts with something else (*O* 89). But concreteness only occurs in relation to a physical system; an electron is concrete only in relation to some other physical object it interacts with (*O* 89). Reality is thus relational. Quantum mechanics does not describe things as they are but instead how they interact. The theory does not describe where a particle is but how it shows itself to others (*R* 134-5). In light of quantum mechanics, reality is reduced to possible interactions. What is real are interactions, relations, processes, and events.[4]

How might these characteristics of reality that quantum mechanics describes—granularity, indeterminacy, and relationality—apply to poetry? If we return to Williams's lecture, what new insights might we gain? To begin, the title suddenly takes on new meaning. Williams describes "the poem as a field of action" because he envisioned the site of poetic creation as a battlefield where the future of poetry in the West would be fought. While Williams's description is rather metaphorical, we can unpack what it would mean in light of "the new physics" to define the poem as a literal field of action.[5] To say that a poem is a

[4] Rovelli notes, "Quantum mechanics teaches us not to think about the world in terms of 'things' that are in this or that state but in terms of 'processes' instead. A *process* is the passage from one interaction to another. The properties of 'things' manifest themselves in a *granular* manner only in the moment of interaction—that is to say, at the edges of the process—and are such only in *relation* to other things. They cannot be predicted in an unequivocal way, but only in a *probabilistic* one" (emphasis in original, *Reality Is Not What It Seems*, p. 137).

[5] Penelope Eckert does something similar in her essay "Variation and the indexical field," in which she argues that the meaning of linguistic variables "are not precise and fixed but rather constitute a field of potential meaning – an indexical field, or constellation of ideologically related meanings" (emphasis in original, Penelope Eckert, "Variation and the Indexical Field," Journal of Sociolinguistics, vol. 12, no. 4, 2008, pp. 453–476, p. 454). Eckert borrows Michael Silverstein's notion of indexical order to suggest that linguistic variables, which can include phonological, morphological, or even syntactic phenomena, exist as indexical fields without any fixed meaning "because speakers use variables not simply to reflect or reassert

field is to recast poetry in light of the discoveries made by quantum mechanics. To say that a poem is a field is thus to say that it is granular—poetry is granular because it is made up of individual poems. There is no such thing as the Platonic form 'Poetry'. However, we must also conceptualize the poem as a field *of action*, and action entails event. To say that the poem is a field of action is to recognize the performativity of poetry and admit that each poem exists as a process. The creative process is always indeterminate, always a process and act of discovery, as is the reception of the poem created. Most of us do not know how a poem will end when we begin to write it, or how it will be received, just as we might not know either how a poem will end or what our reaction to it will be before we read or hear it. Similar to quantum mechanics, poetry's indeterminacy highlights its relationality. Poetry is always relational—because poetry is a performative art, a poem always places its audience in relation to each other and to its author; performed within a specific space, its own performance arena, a poem always operates in relation to other poems whose traditions occupy similar spaces since, as a metapragmatic symbol, a poem is always in relation to the values of the culture that produced it; and as a textual artifact, a poem is always in relation to its mode of production.

I suppose any poem that is not being read or performed, that remains ink on a page or an unretrieved memory, exists as a field of inaction, a wave of probability waiting to come into being through the observation of an audience. Haun Saussy adapts the work of Petr Bogatyrev and Roman Jakobson to propose a solution to this ephemeral quality that is so overt in oral poetry, writing, "Between performances, the work exists as a relation between performers and audience, as reception and expectation."[6] This of course is true for written poetry as well. Regardless of its composition, a poem is a process, which we experience

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their particular pre-ordained place on the map but to make ideological moves" (464). Thus, the indexical fields of a variable's meaning is always in flux, "at every moment a representation of a continuous process of reinterpretation" (Eckert, 464). While Eckert focuses on linguistic variations, I think her idea of indexical fields can probably be applied to all linguistic forms of meaning, which I would argue always exists as a field of potential meaning in a web of other ideologically related meanings. With respect to poetry, however, we can see that since her discussion of variation can be applied to words, sentences, and syntactic structures, the meaning behind recurring poetic phrases or "bigger words" often employed within poetry can easily be understood as occurring as an indexical field rather than as a source of fixed meaning.

[6] Haun Saussy, The Ethnography of Rhythm: Orality and Its Technologies, New York, Fordham University Press, 2016, p. 51.

as an event. Yet fields manifest themselves in granular form when observed. This is why we usually encounter a poem as a thing, as one grain in a relational system, and that system is what we call poetry. But while we often think of poems as artifacts, we can also reflect on our experience of them as events. Poetry is thus always in flux because poems are always in flux. Understanding what it means today to recognize the poem as a field of action is to accept that the world is a network of events (*O 96*). Reality is not a collection of things but a collection of processes. This is a radical departure from how we normally think of reality, but it is worth taking a moment to contemplate. Rovelli beautifully elucidates the idea:

> reality is this network of relations, of reciprocal information, that weaves the world. We slice up the reality surrounding us into "objects." But reality is not made up of discrete objects. It is a variable flux. Think of an ocean wave. Where does a wave finish? Where does it begin? Think of mountains. Where does a mountain start? Where does it end? How far does it continue beneath the earth's surface? These are questions without much sense, because a wave and a mountain are not objects themselves; they are ways that *we* have of slicing up the world to apprehend it, to speak about it more easily. These limits are arbitrary, conventional, comfortable: they depend on us (as physical systems) more than on the waves or the mountains. They are ways of organizing the information that we have—or better, forms of information that we have. (*R* 254)

The question of identity that has plagued philosophers for centuries is easily explained if we are willing to accept that even we are not individual objects but are instead a collection of processes. This emphasis on relationality was taken up as the foundation of Alfred North Whitehead's process philosophy, which has seen a renewed interest in recent years, particularly among the loose knit group of critical theorists advancing various strands of speculative realism.

In his magnum opus *Process and Reality*, Whitehead asserts, "apart from the experience of subjects there is nothing, nothing, nothing, bare nothingness."[7] Reflecting on Whitehead's strong stance on subjectivity, Didier Debaise notes the centrality of this proposition "in the construction of a speculative scheme whose aim is to give sense to the multiplicity of manners of having an experience, a veritable panexperientialism" (*NE* 42). If nature consists of events, and these

[7] Didier Debaise, *Nature as Event: The Lure of the Possible*, trans. Michael Halewood, North Carolina, Duke University Press, 2017, p. 39 (subsequently referred to in text as *NE*).

events are relational, Whitehead asks who perceives these relations? His answer is that subjects must necessarily perceive the relations of which they are a part; there cannot be events without subjects. This claim leads to what Debaise calls panexperientialism, in which every aspect of reality consists of subjective experience to some degree. Others have referred to Whitehead's view as a form of panpsychism, the belief that all forms of matter are conscious to some degree. I bring up Whitehead because the consequences of his process philosophy may shed light on the nature of poetry. Whitehead's emphasis on subjective experience means that feeling becomes the most fundamental characteristic of nature, and this entails, as Debaise write, that "[t]he aesthetic becomes the site of all ontology; it is the plurality of manners of being, manners of doing, capacities to be affected, in a word, the modes of 'feeling' that are the center of a theory of the subjects of nature" (*NE* 58). If Whitehead is correct, then the very fabric of reality consists of aesthetic experience. Poetry, and all art, could thus be seen as a natural outgrowth of the aesthetic experience that is the basis of all relational processes.

Whitehead is not the only person to propose aesthetics plays a central role in the construction of reality. The two speculative realists perhaps most well-known today for adopting similar position are Steven Shaviro and Graham Harman, who both hold, though for different reasons, that "aesthetics becomes first philosophy."[8-9] A central tenet of the philosophical projects of Harman and

[8] Steven Shaviro, *The Universe of Things: On Speculative Realism*, Minneapolis, MN, University of Minnesota Press, 2014, p. 13 (subsequently referred to in text as *UT*).

[9] Harmon and Shaviro disagree radically, however, on the notion of relationality. Harmon is beset by the individuality of things, and insists on an individuality that cannot be bridged; objects are ultimately unknowable, but because we cannot know objects, we always encounter them aesthetically (Shaviro 32, 53). Shaviro takes the opposite position, arguing instead that relations are ubiquitous and inescapable; encounters entail feelings, and when things encounter one another aesthetically they feel more than they can actually know of the encounter (Shaviro 32, 55). While I tend to side more with Shaviro, I believe that the quantum mechanical notions previously discussed can help bridge the differences and explain how objects can appear unknowable (granular, indeterminate), yet also the way that relations are inescapable (objects only appear determined if they are observed, if they become relationally entwined). Conversely, there is one line of thought from these speculative realists that might be useful to physics; traditionally, physics has dismissed subjectivity, but the relational nature of reality, and the meaning carried by information, suggests that cognition may in fact play a part in quantum mechanics (for a more detailed overview see *Quantum Enigma: Physics Encounters Consciousness* by Bruce Rosenblum and Fred Kuttner, and *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* by Karen Barad). This is perhaps best displayed by the "double-slit experiment" that demonstrates that an electron displays the characteristic of both a wave and a particle until it is observed. John A. Wheeler explains the significance

Shaviro, and many other speculative realists as well, is to undue the anthropocentrism underlying most contemporary thought that they see as misguiding. While Harman and Shaviro's philosophies differ in many respects, they both agree that we must correct our anthropocentric views, and that a central aspect of this project is to acknowledge that any experience of change is aesthetic (*UT* 138). Shaviro notes, "In this way, aesthetics is the key to causality. Rather than explaining aesthetic influence as a diminished and distanced form of physical cause and effect, let alone as a symbolic representation of physical processes, Harman inverts the terms. He seeks to explain causality itself as an offshoot, or an extrapolation, of a more primordial process of aesthetic influence" (*UT* 138). Shaviro accepts Harman's view of causality as aesthetic interaction, but rejects how Harman arrives there. For Shaviro, causality is aesthetic not because objects can only ever interact at a distance and can never affect the inner life of the other object, as Harman believes, but rather, causality is wholly aesthetic precisely because even if an object cannot know the inner life of another (even we cannot wholly know our own inner lives, Shaviro points out), the fact that they remain separate actually allows objects to affect the inner life of other objects (*UT* 144).

This notion, that an object's inner life can be affected by external relations, directly contradicts the operational closure described by systems theory. No system is ever closed, Shaviro seems to indicate. What we have instead are operationally open system, systems that are always open to aesthetic causality, even if they are closed off from their environment (*UT* 144). This notion of closed systems open to aesthetic causality is reminiscent of the semiotic structure proposed by Eduardo Kohn, who suggests we think of signs as "open wholes" and argues that semiosis does not begin with intrinsic likeness but rather with "thought-at-rest—the likeness of not yet noticing those eventual differences that might come to disrupt it."[10] Wholes precede parts, Kohn reminds us, and semiosis

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of the experiment: "Thus one decides whether the photon 'shall have come by one route, or by both routes' after it has '*already done* its travel'" (*Quantum Theory* 183). Wheeler notes that the "strange and inescapable role of observer" is a very old idea, and suggests, "the 'observer' gives the world the power to come into being, through the very act of giving meaning to that world; […] the universe gives birth to consciousness, and consciousness gives meaning to the universe" ("Is Physics" 564).

[10] Eduardo Kohn, *How Forests Think: Toward an Anthropology beyond the Human,* Berkeley, CA, University of California Press, 2013, p. 67 (subsequently referred to in text as *HFT*).

does not begin with difference or similarity but with not noticing either: "It begins with indistinction" (*HFT* 51). What Kohn seems to suggest is that semiotic relations necessarily begin with an aesthetic encounter that operates below the level of conscious thought. This is precisely the kind of relation that Shaviro says underlies all of physical existence. Shaviro asserts, "aesthetic contact happens in the first instance outside knowledge, on a level beneath the threshold of conscious perception" (*UT* 148). For Shaviro, aesthetic interactions have no phenomenological intentionality, no aboutness (*UT* 153). "Beauty impels us to think, but it cannot itself be thought," he contends; "Aesthetic feeling is immanent and uncategorizable *first of all*, but cognition could not happen without it. The primordial form of all experience, and thereby of all action and relation, is an aesthetic one" (emphasis in original, *UT* 154, 156).

Shaviro proposes a form of noncorrelational thought, a kind of aesthetic sentience that begins with feelings rather than conscious interpretations (*UT* 131). Thus, Shaviro asserts, "we would do better to consider perception as a nonrepresentational process of continual feedback, response, and adjustment" (*UT* 118). Shaviro provides his own experience of the moon as an example, suggesting that his perception of the moon affects him, causes a difference within him, but that this difference does not correlate with any property of the moon itself (*UT* 118). Shaviro's point is that while Harman is right that no entity can be fully determined by its relations, he is wrong to insist that any entity can ever be free from a web of relations "that are its very condition of existence" (*UT* 107). This duality of privacy and relationality is the basic condition of all physical reality, Shaviro insists, and is the foundation of his version of panpsychism (*UT* 107).

Shaviro largely bases his panpsychist view on that of Gale Strawson, who writes, "All physical stuff is energy, in one form or another, and all energy, I trow, is an experience-involving phenomena" (*UT* 101). This is not altogether that different from what we have seen that quantum mechanics tells us. All physical stuff, according to physics, is energy, and only comes into a determined state via interaction. Of course, most physicists eschew the idea that relations necessarily entail experience. This, however, is exactly the position that many speculative realists want to put forth. David Ray Griffin, in his own take on panpsychism, writes, "In panexperientialist physicalism, by contrast, the universal stuff

embodied in all individuals is not vacuous energy but experiential creativity."[11] In many respects, these views are similar to Whitehead's panexperientialism that claims experience is essential to all reality. Strawson's emphasis on experience and Shaviro's on aesthetic contact that operates below perception, in particular, are attempts to avoid one of the most common criticisms against panpsychism, which is often ridiculed as being a view that grants consciousness to rocks. Yet there is a long history of panpsychist thought that goes back to the pre-Socratics, as David Skorbina articulates in his book *Panpsychism in the West*. Not only is there a long history of panpsychism, but there are also many different strands of panpsychist thought, many of which David Chalmers outlines in his 2013 Amherst Lecture in Philosophy, "Panpsychism and Panprotopsychism." One of the reasons that panpsychism has seen a renewed interest is that it provides an alternative solution to the mind-body problem other than materialism or dualism. By attributing mind to all existence, panpsychism essentially sidesteps the issue of where mind comes from altogether.

The vulgar critique that panpsychism grants consciousness to rocks is ludicrous. Virtually no one with panpsychist beliefs would grant self-awareness to a rock; however, there are some versions of the theory that might acknowledge that there is still something that it is like to be a rock. I disagree with this idea, though I grant that there is perhaps something that it is like to be an atom held in relation to other atoms that together constitute the processes that we conceive of as a rock. A rock is not living thing, but it is an event—can we point to the moment when the formation of a rock begins, or when it has been broken down and is no longer a rock?—though a process that takes place on a timescale very different from our own. Katherine Hayles provides an elegant solution to how we might think about such events. In her book *Unthought: The Power of the Cognitive Nonconscious*, Hayles explains that a central tenant of her project is the notion that cognition extends beyond consciousness, and in fact, much (or even most) cognition operates at a level below conscious awareness. Hayles's cybernetic project aims to extend cognition to include all biological life as well as many

[11] David Ray Griffin, *Unsnarling the World-Knot: Consciousness, Freedom, and the Mind Body Problem*, Berkeley, CA, University of California Press, 1998, p. 235.

technical systems.[12] For Hayles, cognition is a process of interpretation, one that entails choice (*U* 25). As a result, while Hayles is willing to grant cognition to technical systems that utilize AI and perceptual tools to make choices, she does not go so far as Shaviro and other process philosophers as to grant that cognition is inherent to all of physical reality. Hayles's solution to Shaviro's claim that nonliving things can still behave in causally efficacious ways is to make the distinction between actors and agents. For Hayles, actors are cognizers; all life forms make choices, and as such they perform as ethical actors. Agents, on the other hand, do not make choices; while a severe weather event can have causally efficacious effects, it cannot decide when and where to do so (*U* 31). Meaning is thus a byproduct of cognition, and cognition is a process, the interpretation of information by a cognition within its milieu (*U* 22). Thus, writes Hayles, "cognition is not an attribute, […] but rather a dynamic unfolding within an environment in which its activity makes a difference" (*U* 25). Cognition is therefore an enacted process, one that hinges on interpretation.

Hayles bases much of her thinking on Claude Shannon's theory of information, but unlike Shannon, who severs meaning from information, Hayles reverses Shannon's position and suggest that all information exchange is an exchange of meaning. Like Shaviro, Hayles is interested in challenging the domineering anthropocentric perspective that attributes cognition only to people and situates humans as the special locus of meaning in the universe. However, unlike Shaviro, Hayles is unwilling to adopt a panpsychist approach and attribute cognition all the down to the very fabric of matter. Instead, for Hayles, meaning-making is confined to those beings that can interpret and make choices. While this does not extend below the level of organic life, Hayles is interested in extending cognition to non-human life and to what she calls cognitive assemblages, or technical systems and machines that are able to perceive and make decisions within their design parameters. "By defining cognition as a process emerging from flows of information and from interpretations of those flows, the cognitive assemblage approach invites questions about the nature of

[12] Katherine Hayles, *Unthought: The Power of the Cognitive Nonconscious,* Chicago, IL, The University of Chicago Press, 2017, p.14 (subsequently referred to in text as *U*).

meaning and how it differs for human and technical cognizers," Hayles writes.[13] Cognition for Hayles is thus emergent and enacted.

The reason why Hayles is unwilling to grant that nonliving entities make choices, I believe, has to do with her use of the term information. Remember, Hayles believes that cognition is an embodied, emergent process that interprets information in contexts that connect it with meaning (*U* 25-6). For Hayles, information processing entails cognizing (though this can, and often does, operate on a nonconscious level below awareness). Hayles implicitly differentiates what Terrence Deacon explicitly does in his essay "What Is Missing from Theories of Information?" in which Deacon divides information into two kinds: syntactic information and referential information. Deacon admits, "almost anything can qualify as information in the syntactic sense, because this is only an assessment of the potential to inform."[14] This view of information is the one that is typically employed in physics, in which "information is the measure of the number of possible alternatives for something."[15] This is why, Rovelli notes, that atoms can have information in a technical sense about other atoms, because their arrangement is always correlated in relation to each other, and therefore any description of a physical system is always a description of the information a system has in relation to another system (*R* 242-6). Deacon's point is that if we take a stance similar to Shannon, and say that information is void of meaning, then this is true, but if we acknowledge that information can be meaningful, then if we admit that all information has meaning we are faced with either adopting an eliminative reductive or panpsychic stance. In order to avoid this, Deacon makes the distinction between syntactic information, information that is merely an assessment of potential states and thus need not contain meaning, and referential information, information that follows Gregory Bateson's "difference that makes a difference" and that entails interpretation. Thus, Deacon distinguishes true information, which entails semiosis, from mere physical difference (or syntactic

[13] Katherine Hayles, "Human and Machine Cultures of Reading: A Cognitive Assemblage Approach," *PMLA*, vol. 133, no. 5, 2018, pp. 1225–1242, p. 1240.

[14] Terrence Deacon, "What Is Missing from Theories of Information?" Information and the Nature of Reality: From Physics to Metaphysics, ed. Paul Davies and Niels Henrik Gregersen, UK, Cambridge University Press, 2014, p. 196.

[15] Rovelli, *Reality Is Not What It Seems*, p. 239.

information).[16] In this view, information in its fullest sense is an emergent feature of relations that only arises once evolution leads to semiotic processes.

I am not sure why so many theorists are unwilling to entertain panpsychism. It seems to me that attributing degrees of cognition or experience to a photon is not much stranger than admitting this to a unicellular being. In many respects I think that disagreements over what cognition is and where to draw the line for it stem from the constraints of our own terminology and received knowledge. As we have already seen, the particular theoretical tools we use to advance knowledge and understanding inherently contain their own ontological commitments, and therefore, in many ways, what we perceive is often only what our theories are designed to reveal to us, not some ultimate truth but a truth designed to fit our theoretical framework.[17] Does it make sense to divide information into two types, into information for physics and information for biology? I'm not sure; though I suppose it makes about as much sense to say that there is one type of information that is not open to interpretation and another type that is as it is to say that there are some types of cognition open to awareness and other types that are not and are instead nonconscious.[18] What seems to me to be the case is that as we better understand different levels of systems and how they interact, we utilize the language of older conceptual systems to help us

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[16] In *Incomplete Nature,* Deacon formulates a tripartite nested hierarchy of information, with Shannon information as the most basic, then Boltzmann or referential information, followed by significant or Darwinian information. See Terrence Deacon, *Incomplete Nature: How Mind Emerged from Matter*, New York, W. W. Norton & Company, 2012, pp. 414-415.

[17] As Wendy Wheeler recognizes, the types of questions we ask constrain the answers that we receive, noting, "we are participators in what we call reality" (Wendy Wheeler, Expecting the Earth: Life, Culture, Biosemiotics, London, UK, Lawrence and Wishart Limited, 2016, p.7, subsequently referred to as EE).

[18] I'm reminded of Chalmers's discussion of the differences between panpsychism, in which all physical entities are conscious, and panprotopsychism, in which some entities are proto-conscious, exhibiting properties that are precursors to consciousness and that can combinatorially lead to consciousness when arranged in the right structure. In the panprotopsychic scenario, proto-consciousness marks a potential for consciousness. Similarly, we could reconfigure Hayles and Deacon's classification of information types as proto-information, which has the potential to contain meaning, and information, which is referential. Assigning proto-information to physics and information to biology, along with an understanding of autopoiesis and biosemiotics, could perhaps provide a solution to the combinatorial problem that plagues proponents of panpsychism and panprotopsychism, which is how to account for full, macroexperiences that necessarily derive from micro or proto-experiences. See David Chalmers, "Panpsychism and Panprotopsychism," *Amherst Lecture in Philosophy,* Lecture 8, 2013, pp. 1-35: p. 21, http://www.amherstlecture.org/chalmers2013/.

understand these discoveries. To say that there are different types of information, that some is meaningful and some not, is to impose a conceptual framework, one that sets a simulated or virtual boundary. This is also what theorists such as Deacon and Hayles have done with respect to cognition, establishing a boundary that meets their definition. Why place a limit on cognition or experience? While imposing hierarchical order and categorization can be useful, I think we'd do well to remember that such divisions are cultural productions, not innate realities, and as such are always subject to change.

Many of these issues concerning orders of complexity have been taken up by proponents of panpsychism, yet there seems to be a gap in the discussion between philosophers, many of whom are willing to grant cognition all the way down, and biologists, who place the limit for semiotics at the beginning of life. While it still remains a largely theoretical postulate that interpretation and meaning are part of every interaction down to the level of quantum mechanics, there is good proof that interpretation and meaning can be found at every level of life, from single cells to multicellular creatures.[19] Life, we are beginning to understand, is semiotic. We may indeed all be part of what Yuri Lotman dubbed the semiosphere. Even if meaning is not inherent to all matter, as panpsychism proposes, the ingredients for the emergence of meaning are, and they arise fully functional in life. This is the view of biosemiotics, a relatively new branch of science that studies biology through the lens of semiosis. Biosemiotics attempts to unveil the production and interpretation of signs and codes, the sites of meaning-making, at the biological level. With respect to poetry, then, even if the building blocks of poetry are not matter itself, the universe still contains the ingredients for the emergence of life, semiotics, and meaning. Even if the universe is empty of meaning, life is full of it. And information may be the key to understanding how meaning emerges.

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[19] For an explanation of the origin of consciousness that tries to bridge the divide between quantum mechanis and biology, see Stuart Hameroff and Roger Penrose, "Consciousness in the Universe: A Review of the 'Orch OR' Theory," *Physics of Life Reviews,* vol. 11, no. 1, 2014, pp. 39-78, which focuses on the notion of microtubules, and Tam Hunt and Jonathan Schooler, "The Easy Part of the Hard Problem: A Resonance Theory of Consciousness," *Frontiers in Human Neuroscience,* vol. 13, no. 378, 2019, which looks at the possible role of vibration frequency and synchrony as possible solutions to the combinatorial question posed by the Hard Question of consciousness. Hunt and Schooler take a decidedly panpsychist approach, while Hameroff and Penrose acknowledge that much of their theory falls within a potential panpsychist framework but are less inclined to fully embrace panpsychism.

Wendy Wheeler takes an interesting approach to information. Like Deacon, she situations information squarely within a biological framework, but writes, "the information that quantum physics speaks of is something more like a potential to be and to mean" (*EE* 7). For Wheeler, when we talk about information what we really are talking about is the passing of information, or in other words, the creation of a relation. In this light, information is a relation, not a substance as we commonly describe it. Wheeler contends that a relation can only be noticed by a living thing, and that the result of an established relation, or of the transfer of information, is the production of meaning.[20] Information is actually a relation, and meaning is the result of a relation as it is established.[21] This is similar to Stuart Kauffman's proposition that information is in fact nothing other than constraints that result from a relation.[22-23] Following Bateson, Wheeler attempts to dissolve the nature/culture divide, arguing that both nature and culture are informed by sign relations: "Culture is natural. It repeats, with differences, the patterns found in nature" (*EE* 2). And this is what mind is made of, Wheeler articulates, "*mind is a sign relation*. Environment is natural *and* cultural. Sign relations weave ceaselessly across both. The Cartesian cleaving is false. […] The biosphere and the semiosphere are co-extensive" (emphasis in original, *EE* 2). What I find particularly interesting about Wheeler's analysis is how she

[20] Deacon similarly writes, "Without interpretation, a physical difference is just a physical difference, and calling these ubiquitous differences 'information' furthermore runs the risk of collapsing the distinction between information, matter, and energy, and ultimately eliminating the entire realm of ententional phenomena from consideration" (Incomplete 392-393). Yet quantum mechanics has already collapsed these distinctions—energy is matter, and information is what occurs when matter interacts and forms relations. Furthermore, while eliminativism is one possible consequence of this collapse, as we have seen, panpsychism provides an alternative result since it attributes ententionality all the way down to the fabric of reality. However, Deacon argues, "Information and energy are distinct and in many respects should be treated as though they occupy independent causal realms. Nevertheless, they are in fact warp and weft of a single causal fabric. But unless we can both clearly distinguish them and demonstrate their interdependence, the realms they exemplify will remain isolated" (Incomplete 399). While information and energy may operate on different causal realms, this difference is only apparent depending on our method of observation.

[21] Wheeler, *Expecting the Earth*, pp. 8-9.

[22] Stuart Kauffman, *Reinventing the Sacred: A New View of Science, Reason, and Religion,* New York, Basic Books, 2008, p. 97.

[23] Deacon also adopts a similar position, claiming that information "is a function of constraint and the possibility for work that this embodies" (*Incomplete* 378).

demonstrates how meaning generates new meaning. In her discussion of Jesper Hofmeyer's reading of Terrence Deacon's last chapter in his book *Incomplete Nature: How Mind Emerged from Matter,* Wheeler notes that when we ask how it is that meaning can emerge in the first place, the answer is that meaning is semiotic, emerges from relations, and that these relations create constraints necessary for the production of meaning. The interesting thing to me here is that Wheeler, borrowing from Deacon, has illustrated that relations generate constraints, that these constraints are the basis for meaning, and that this meaning then potentially alters the relation and sets the stage for the production of new meaning. Once a relation is established, the constraints that it generates, and the meaning that it produces, create a feedback loop for the continual production of new meaning.

Semiotics cannot be stagnant then. By its very nature, semiotics requires change. Of course, this should not be surprising, for if semiotics requires life, life too requires change. If a being cannot respond to its environment it will perish. Wheeler writes, "In other words, the structure of the sign is open; it requires a living entity, whether organism or cell, to supply its meaning" (*EE* 59). Living systems are always open, self-organizing forms that interact with their environment. Before going further, however, we need to define life, and see how it might have emerged from non-life. In their book *What Is Life?* Lynn Margulis and Dorion Sagan write that the question is "a linguistic trap. To answer according to the rules of grammar, we must supply a noun, a thing. But life on Earth is more like a verb. It repairs, maintains, re-creates, and outdoes itself."[24] Central to all of this is metabolic homeostasis, the process by which an organism maintains a relatively stable internal state through chemical activity. The biologists Humberto Maturana and Francisco Varela coined the term *autopoiesis* to describe this essential metabolic function. The term autopoiesis comes from the Greek *auto* (self) and *poiein* (making, creation, production), and refers to a self-maintaining system capable of reproducing and maintaining itself. This is the process by which life is able to continually produce itself.

Perhaps most important for the current project concerning the nature of poetry is that autopoietic systems, and thus all of life, are inherently interpretive,

[24] Lynn Margulis and Dorion Sagan, *What Is Life?,* Berkeley, CA, University of California Press, 1995, p. 14.

meaning-making systems. For a cell to maintain itself, it must be able to receive information about its environment, interpret this information, and make a choice about how to interact. Autopoiesis entails a self, and a self entails cognition. It is with this in mind that Maturana writes, "Living systems are cognitive systems, and living as a process is a process of cognition. The statement is valid for all organisms, with and without a nervous system."[25-26] This does not mean that all life is self-aware and possess higher levels of cognition; as we have already seen, much of cognition actually takes place below the level of consciousness. A single cell is thus a self-producing, cognitive being. It should be noted that self-production is not the same as reproduction. Evan Thompson points out, "In reproduction, a cell divides in two; in self-production, a cell continuously produces itself as a spatially bounded system, distinct from its medium or milieu."[27] Self-production, or autopoiesis, is concerned with maintaining a system as separate from its environment, and is the basis of all living systems.

How life arose from non-living chemical compounds remains a mystery, though there is growing evidence that abiogenesis, or the origin of life, occurred when simple organic compounds became trapped together in cell-like lipid membranes, like the bubbles that naturally occur when oil and water are shaken together. Such proto-cellular enclosures, with a suitable source of energy, could grow chemically complex, finally developing self-maintenance.[28] While we are still not certain about the process in which life emerged, we do know how multicellular life emerged from unicellular organisms. Margulis has spent much of her professional career advancing serial endosymbiotic theory, or symbiogenesis, the evolutionary theory that postulates that eukaryotic organisms, or organisms whose cells have a nucleus enclosed within a membrane such as fungi, plants, and animals, originated from prokaryotic organisms, such as bacteria and archaea that consist of only one cell that lacks a membrane-bound nucleus, mitochondria, or other organelle. The central component of the theory

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[25] Fritjof Capra, *The Web of Life: A New Scientific Understanding of Living Systems*, New York, Anchor Books, 1996, p. 97.

[26] As Deacon notes, multicellular organisms are thus selves made up of selves (*Incomplete* 470).

[27] Evan Thompson, *Mind in Life: Biology, Phenomenology, and the Science of Mind*, New York, Belknap Press, 2007, p. 92.

[28] Lynn Margulis, The Symbiotic Planet: A New View of Evolution, New York, Basic Books, 1998, p.71 (subsequently referred to in text as *SP*).

is that eukaryotic cells evolved through symbiosis of prokaryotes that were taken inside one another in endosymbiosis. Margulis provides a general explanation: "Bacteria, long ago, which were partially devoured and trapped inside the bodies of others, became organelles" (*SP* 37). This process, by which prokaryotic creatures took others into themselves to create more complex lifeforms, sounds similar to the cannibalistic process by which poetry perpetuates its own production and evolution, and deserves a more detailed examination.

Margulis's proposition that the proliferation of eukaryotic life is due to incorporation provides a clear description of how multicellular life arose. But there still remains the mystery of how we get from bacterial sex to meiotic sex and the diversity of beings that meiotic sex promulgates. Bacteria reproduce by binary fission, dividing into two identical diploid cells, and receive new genetic material from cell-to-cell contact, from scavenging DNA from dead bacteria, or by transduction from a virus. Meiotic sex, on the other hand, means that for an organism to reproduce, two haploid cells, cells with half the number of chromosomes, as in sperm and egg cells, come together to form a complete set of chromosomes. Meiotic sex is thus much better than binary fission at producing variation. The development of meiotic sex was an essential step in moving from self-production to reproduction. This development is strange, and resulted from protoctist cannibalization (microscopic, single-celled organisms that are neither plants nor animals).

Margulis recounts how Lemuel Roscoe Cleveland solved the problem of meiotic sex while studying protoctists while at Harvard University, and how he realized that fertilization began as abortive cannibalism done as an act of desperation (*SP* 99). While observing dying communities of protoctists, Cleveland saw that in stressed environments, some protoctists would turn to cannibalism and use their neighbors as resources for survival. While some cannibal protoctists would digest every last cell of their victims, others might spare the nucleus and chromosomes of its victim. "The two merged cells would form a new single cell with two nuclei and two sets of chromosomes" Margulis recounts; "He noted that two such closely spaced nuclei fused. This was more than aborted cannibalism. Cleveland recognized it as the formal equivalent of fertilization" (*SP* 99). Meiotic sex in its recognizable form took time. Gaining extra chromosomes via cannibalization was easy, but making the transition to meiotic sex would require

getting rid of cannibalistically acquired extra chromosomes. "The opposite of fertilization, meiosis turns diploids to haploids. The final refinement in the origin of meiotic sex was the perfection of the doubling/halving process so it occurred both on cue and without fail" notes Margulis (*SP* 102). When environments were harsh, protoctists turned to cannibalism to save themselves; when environments became lush, selection favored the fast haploid cell organization. After several lineages, meiotic sex as we know it evolved. "Sex, like symbiosis, is a matter of merger. But it is also a matter of periodic escape from merger" Margulis explains (*SP* 103). It is a form of what she calls "cyclical symbiosis" (*SP* 103). The most significant aspect of this story as it relates to poetry is that it demonstrates that from the smallest cells to the most complex beings, life is semiotic, and we mirror this semiosis in our own production of art.

Autopoietic systems begin with pattern recognition, with distinguishing similarity and difference and developing habits of interpretation. These aspects that are at the core of life are also central to poetry. That incorporation, whether symbiotic or cannibalistic, is central to the development of life parallels the importance of incorporation within art via artistic influence (where one artists absorbs the aesthetics of another artist or artwork). What this reveals about humanity is that people cannot help but imitate the patterns we find in nature, because we are part of nature. The basis of all patterns begins with noticing similarity and difference. These distinctions emerge from the relational constraints between systems as well as between a system and its environment. The interpretation of a distinction enacted by the system constitutes acts of cognition. Thus, cognition is not a representation of the world as it is, but instead is a bringing fourth of the world through the process of living, or as Fritjof Capra writes, "The interactions of a living system with its environment are cognitive integrations, and the process of living itself is a process of cognition."[29] These interactive processes are not reducible to a web of cause and effect; since new constraints emerge as new relations are formed through the cognitive act of a system interacting with its environment, living systems always enable new possible futures of their own becoming.[30]

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[29] Capra, *The Web of Life*, p.267.

[30] Charles H. Lineweaver, Paul C. W. Davies, and Michael Ruse, *Complexity and the Arrow of Time*, UK, Cambridge University Press, 2013, p. 181.

Because living systems are cognitive systems, they do not react to their environment, they respond to it in order to maintain their autopoietic organization. Sometimes these responses occur as structural changes aimed at self-renewal, as in the replacement of cells. Other times these responses are developmental rather than cyclical, and new connections in the autopoietic network are created, such as each time a sense perception changes an organism's nervous system. These interactions in which a living system interacts with its environment involve what Maturana and Varela defined as structural coupling. Structural coupling differentiates living from non-living systems because a system that can couple structurally to its environment not only alters its own future behavior but also constitutes a system that can learn.[31] This indicates that creativity is a fundamental aspect of cognition, and that cognition is fundamental to life. Cognition, signs, interpretation, and creativity, essential aspects of poetry, and art in general, are also essential aspects of live itself, from people down to single cells.[32]

The creativity of the world, however, does not reside only within individual organisms. While speaking of closed systems can be useful for theoretical purposes, no system is completely closed off (the boundary between a system and its environment is necessarily porous;[33] if a system were entirely closed off then it would not be able to interact with its environment).[34] All living systems are necessarily interpretive, cognitive, and thus open systems due to structural coupling even if they are operationally closed, autopoietic organisms. Francisco Varela, Evan Thompson, and Eleanor Rosch elucidate this idea, writing, "the very notion of what an environment is cannot be separated from what organisms are and what they do. […] organism and environment enfold into each other and

[31] Capra, *The Web of Life*, p.219.

[32] Because living systems make choices, and thus affect their own possible futures, life is therefore non ergodic (a system unable to visit all of its possible states). The implication of this, as Kauffman points out, "is that we live in an emergent universe in which ceaseless unforeseeable creativity arises and surrounds us" (*Reinventing the Sacred* 130).

[33]This logic can also be applied to the nature/culture divide. While we can come up with a conceptual framework that separates the two, any sense of total separation and isolation would be ignorant.

[34] Even single cells, the closed system par excellence of biology, have a permeable membrane that allows them to interact with their environments by controlling the movement of substances in and out of the cell and its organelles.

unfold from one another in the fundamental circularity that is life itself."[35] This codetermination of organism and environment contains their congruent histories and evolution, and reveal that cognition is not only embodied and enacted but extended as well.[36] Because systems and environments do not exist separate from one another, we can see that while even the smallest systems, such as single cells, exhibit creativity, so too must their environments, from individual ecosystems to our entire planet.

The idea that Earth functions as a series of interconnected ecosystems is what James Lovelock describes as the Gaia hypothesis. Like panpsychism, the Gaia hypothesis has come under attack by those who misunderstand it and who think that it attributes a vital life force or consciousness to the earth. It does not. Lovelock has even walked back any notions that Gaia is teleological, removing any purpose from the planetary system other than biodiversity. The only purpose, as such, is thus creativity, which does not operate only on the organismic level but also on a planetary scale. Margulis, who along with Lovelock helped develop the Gaia hypothesis, writes, "Gaia, as the interweaving network of all life, is alive, aware, and conscious to various degrees in its cells, bodies, and societies" (*SP* 126). Margulis makes the comparison to proprioception, which evolved long before neural receptors, in which the patterns of life appear to occur in concert, though without a central locus of control. As Lewis Thomas notes, Earth is the only closed system we know of, and in this way its best analogue is a single cell.[37] The central thesis of the Gaia hypothesis is simply this, that Earth is a single ecosystem made up of myriad different beings. While all living beings are cognitive beings, it is important to remember that not all cognition is conscious. Wheeler writes, "semiotic scaffoldings—the influence of environment upon organism, and organism upon environment—is a highly dialogic process. Creative processes, for example, are almost entirely nonconscious; they draw on both personal and cultural archives, and their organization is almost certainly associative and based on metaphor and metonymy rather than on conscious formal logic" (*EE* 85). The

[35] Francisco Varela, Evan Thompson, and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience, Revised Edition,* Cambridge, MA, MIT Press, 2016, pp. 198, 217.
[36] Ibid., p. 199.
[37] See Lewis Thomas, "The Lives of a Cell," *The Lives of a Cell: Notes on a Biology Watcher,* New York, Penguine Books, 1978.

notion that creativity is nonconscious was the basis of surrealism, an avant-garde artistic movement that began in the early 20th century and that was largely influenced by the work of Sigmund Freud, in which artists sought to tap into the subconscious as a means of accessing more powerful and authentic artwork.

An important element that Wheeler picks up on when she notes that semiotic scaffolding is dialogical is the notion that meaning is recursive. Niklas Luhmann makes a similar claim when he asserts that communication necessitates previous communication because communication always already entails a system, in which "communication can be conceived as the *synthesis* of information, utterance, and understanding."[38] Borrowing the formulation of "condensation" from Spencer Brown, Luhmann writes, "meaning contexts are condensed through their repetition" (*IST* 246). Borrowing from Brown again, Luhmann notes that after a meaning has been reduced and marked, omitting almost all aspects of the history of its invention, the meaning must be confirmed, that is, the meaning in its condensed form must be usable in later situations. We can see this with respect to oral poetry where whole poetic phrases are often reduced and marked in this sense so that they can be used in later performances. Recursion is not only found within poetry, however, but all communication systems and thus all social systems, and it arises for the same reason—recursion is a very efficient mode of sharing information. It allows for nested levels of information, which means a system can have nested layers of relations and therefore the emergence and production of more interrelated and complex meanings.[39]

This interrelated complex of nested meanings, in which meaning contexts become recursive as communication systems interact is how social systems form. As Luhmann notes, "A social system emerges when communication develops from communication" (*IST* 53). What I find particularly interesting about Luhmann's theorizing here is that his conception of communication not only allows for but requires multiple social systems (though of course various socials systems may become coupled through communication). This entails the possibility of various ontologies as outlined by Philippe Descola, in which there might exist multiple cultures and a shared nature, if we conceptualize each social

[38] Emphasis in original. Niklas Luhmann, *Introduction to Systems Theory*, trans. Peter Gilgen, Cambridge, UK, Polity Press, 2013, p. 53 (subsequently referred to in text as *IST*).
[39] Recursion thus also explains how we can have systems that operate within other systems.

system as culturally unique and different but biologically similar; or, alternatively, multiple natures within a framework of one culture in which the ontological scaffolding shifts so that communication rather than biology becomes the basis of similarity, and biological form becomes the basis for difference.[40] Perhaps most important is that this ontological relativity reveals what we have seen numerous times: that our world is enacted, and the concepts and theories that we rely on to inform us do not tell us something about the world as it is but rather about our own perception of the world. This, I believe, is similar to the sense in which Luhmann discusses the role of observation, in which observation is an operation performed by an observer, which is to say, by a system, and cannot be outside of the system–environment it observes; the closest to an objective stance, then, is what Luhmann calls second-order observing, which not only observes an observer but also takes in the views that the observer cannot see from their perspective, and is a hallmark of modernity.

Luhmann's systems theory borrows much of its interpretive power from Maturana's theory of autopoietics, but while Maturana and Varela restrict autopoiesis to the biological realm, insisting that systems are always biological systems, Luhmann disagrees. He extends their autopoietic project and recognizes not only biological systems but psychic and social systems as well. Luhmann's systems theory begins with the observation of differences; this is the operation that brings forth and separates a system from its environment (*IST* 83). In an admittedly paradoxical statement, Luhmann writes, "a system *is* difference—the difference between system and environment" (emphasis in original, *IST* 44). This operation of observation, the noticing of difference, is what gives form to a system (*IST* 51). In this sense, the form of a system signifies the difference that separates it from its environment. Yet difference only makes up half of any semiotic scaffolding. Similarity is equally as necessary as difference, as Wheeler points out when she highlights the importance of signal redundancy for the possibility of meaning, writing, "Just as in metaphor in language, it is the difference *within* resemblance that allows the possibility of new information, or meanings" (emphasis in original, *EE* 75).[41] We might say that while difference is required for

[40] See Philippe Descola, *Beyond Nature and Culture*, trans. Janet Lloyd, Chicago, IL, University of Chicago Press, 2013.
[41] This type of repetition marked by difference sounds remarkably like parallelism or like the beginning of recursion before any repeated information that will be unneeded or redundant is condensed and nested.

the formation of a system, similarity is necessary for communication because without similarity difference is just noise.

Once again, the parallels between life and poetry seem stark. All poetry begins with noticing similarity and difference because any systems begins this way, whether biological or social. As Bateson points out, "Metaphor is right at the bottom of being alive" (cited in *EE* 147). The basis of metaphorical meaning, similarity and difference are at the root of all meaning. Although social systems are not reducible to biological systems, the architecture of their scaffolding relies on similar processes. The logic of the earth is thus metaphorical, as Bateson points out, because it is made up of a series of interconnected sign systems. Because our world is semiotic, made out of both similarity and difference, and because the various semiotic systems interact, incongruence and translatability are also an inherent part of the world. These features that we have seen are foundational to literature are also the foundation of all semiotic systems, biological and cultural alike. The possibility for translatability is the possibility for meaning. As Wheeler argues, "In the case of art and the act of interpretation, without translation (i.e. interpretation) there can be neither meaning nor the growth (evolution) of meanings" (*EE* 118). With respect poetry, interactions (influence) and interpretations (translation) are the engines that drive novel semiotic production.[42] Part of this process is recursive, as the past comes to influence future productions of art. Thus, we can see that recursivity is a foundational property of semiosis. Whether biological or social, all systems are historical systems, and this history is recursively embedded in their semiotic relations and the constraints of their production.

A central idea that has hopefully become clear is that meaning is inherently connected to life. As systems interact, they produce meaning. Because this is an emergent process, it is not reducible. As Wheeler points out, "Meaning reside in

[42] One way that we can conceive of this process of artistic influence is through the metaphor of cannibalism, in which a new text cannibalizes older ones as its method of production. Wheeler discusses a similar process to describe the transference, recombination, and production of meaning when she describes the concept of abduction. Abduction, she explains, "(prominent in the use of metaphor, where an iconic sign is abducted, or carried over, to a sufficiently similar iconic sign, and differences between them provide a potential source of knew knowledge) takes the form of seeing the same phenomenon (or semiotic object) from a new perspective" (emphasis in original, EE 126). What Wheeler has essentially described as abduction is the cannibalism or absorption of another's perspective.

the patterned whole, not singly in any part" (*EE* 87). All meaning is whole, but it is an open whole. Systems are not sealed off from each other, as Harmon might propose. We are part of a semiosphere that encompasses all of life, human and nonhuman alike, where meaning is emergent and resides in patterned wholes, where ontology is emergent and relational, structures are not things but webs of relational processes, and where the differences between systems open them up to adjacent possibilities and new potentialities. While it may sound strange, the world is full of meaning because it is a meaning-making machine, and the semiotic scaffolding of life draws upon the same tools of interpretation, translation, metaphor, and recursion for the production of meaning, the same tools that poets have always used in the production of poetry. The fundamental aspects of poetry (and all art) are also fundamental to life and the production of creativity. In a semiotic world, where meaning is currency, "Nature itself is 'poetic'" (*EE* 140).

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