THE SPIRALING PROPENSITIES OF MIND: TOWARDS AN ECOLOGICAL THEORY OF HUMAN MEANING SYSTEMS WITHIN A PANARCHY OF ADAPTIVE CYCLES OF HUMAN CONSCIOUSNESS

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ABSTRACT

The initial conceptualization of the adaptive cycle of complex ecosystems (Holling, 1986) has led to the theory and analysis of adaptive cycles within social, cultural, political, and economic dimensions, beginning with the original panarchic considerations of these human dimensions (Holling & Gunderson, 2002; Berkes & Folke, 2002; Westley, Carpenter, Brock, Holling & Gunderson, 2002; Scheffer, Westley, Brock & Holmgren, 2002; Gunderson, Holling & Peterson, 2002). A decade later, however, the difficult inquiry into the complex systemics of human thought itself and of thought's ostensible purpose – meaning – is still largely absent from the work done within panarchic frameworks. The need to include an ecological theory of meaning has begun to be understood as critical to the progression of socio-ecological systems theory (Varey, 2010).

This paper proposes a truly ecological (i.e., non-metaphorical) definition of meaning and outlines a panarchic theory of human meaning systems (HMS) that includes a consideration of the original sources of *difference* in the universe, then obeys Jørgensen's "Fundamental Laws in Ecology" (Jørgensen, 2009) as HMS emerge, develop, and collapse, and demonstrate rigidity, resilience, and unpredictability in complete relation to the identification, acquisition, and degradation (i.e., the processing) of exergy. The present theory of HMS proposes three "energetic orders" – i) local, ii) medial, and iii) permeative – that emerge as irreducible propensities for human life and encompassing human ecologies. These orders span the entire spectrum of human life, from the first necessity of maintaining thermal disequilibrium in the local order; to manifesting ecosystemic dynamics of optimization in the medial order, variously described as the degradation of exergy gradients (Schneider & Kay, 1994), self-organization for maximum *emergy* use (Odum, 1988), the maintenance and optimization of exergy (Jørgensen, 1992; Nielsen, 1995), and "centripetality" (Ulanowicz, 1997); to that ineluctable aspect of the human experience that is not only to aspire beyond what we understand but indeed to be constantly drawn to the unknown/unknowable in the permeative order, described variously as "uncertainty" (Gunderson, Holling & Light, 2005), the "adjacent possible" (Kauffman, 2000) and "the absential" (Deacon, 2012).

Some conclusions of this paper are: i) the individual's or collective's bias among the three energetic orders depends upon the *perceptions* of threat to survival (local), ecosystemic integrity (medial), or the need for greater interconnectivity beyond its perceptions (permeative); ii) natural language emerges from a constant and fluid negotiation among the binary (local), communal/recurrent (medial), and the unknown/unknowable (permeative) orders that occurs simultaneously at multiple scales and in relation to other "organism-niches" (Maturana & Mpodosiz, 2000) and the larger, nested adaptive cycles, such that iii) "meaning" phenomena – from individual and collective narratives, histories, and identities to the whole of natural language itself – are *emergetic* (Odum, 1983) products and recursive tools to enable further

emergetic processes within human ecologies. Thus, language is merely a catalytic system that accelerates the processing of matter-energy for the human organism-niche. Because there is usually a "bias" toward one of the three orders at any given moment and scale – depending on the perceived position vis-à-vis the larger-scale adaptive cycle – what would otherwise seem to be a "linear" negotiation between the three "energetic orders" becomes cyclical and adaptive within the encompassing adaptive cycles. Holling's adaptive cycle is partially renamed as "Adaptive Cycle of Human Consciousness" in order to emphasize the need for this new line of panarchic thinking that could unite "what we do" with "what we are," as meaning-creating, meaning-acquiring, meaning-destroying homoiothermal organisms on Earth. Efforts have been made to ground individual aspects of the present theory in recent advances of systems ecology research. As with any such theoretical proposal, gaps and inconsistencies are anticipated, and possible solutions to these are invited and welcome.

Keywords: theory of meaning, meaning systems, ecology of meaning, centripetality, emergy, panarchy

> "We have inherited from our forefathers the keen longing for unified, all-embracing knowledge. […] But the spread, both in width and depth, of the multifarious branches of knowledge during the last hundred odd years has confronted us with a queer dilemma. We feel clearly that we are only now beginning to acquire reliable material for welding together the sum-total of what is known into a whole; but, on the other hand, it has become next to impossible for a single mind fully to command more than a small specialized portion of it. I can see no other escape from this dilemma (lest our true aim be lost forever) than that some of us should venture to embark on a synthesis of facts and theories, albeit with second-hand and incomplete knowledge of some of them, and at the risk of making fools of themselves."
>
> –*What is Life? The Physical Aspect of the Living Cell*, Erwin Schrodinger, 1944

Introduction

While a great deal of work has been done in developing the theory and analysis of adaptive cycles within social, cultural, political, and economic dimensions (beginning with Holling & Gunderson, 2002; Berkes & Folke, 2002; Westley, Carpenter, Brock, Holling & Gunderson, 2002; Scheffer, Westley, Brock & Holmgren, 2002; Holling, Gunderson & Peterson, 2002), the difficult inquiry into the complex systemics of human thought itself and of thought's ostensible purpose – meaning – has been largely absent from the work done within the frameworks of panarchy and adaptive cycles. The need to reconcile an ecological theory of meaning with the

research done in panarchic and resilient modeling has only recently begun to be understood as critical to the progression of socio-ecological systems theory (Varey, 2010).

In this paper I aim to sketch some of the key components of a theory of human meaning systems (HMS) at the broadest scale. This theory attempts to describe a continuum between: 1) the known causes of difference in the universe (i.e., the fundamental interactions, which are understood here as conditions to life); 2) the processing of matter-energy by the homiotherm that is the human within a triad of local, medial, and permeative energetic orders; 3) the dynamic development of human language and encompassing Human Meaning Systems that emerge from continual negotiation of the three energetic orders and thereby create 4) human ecosystems that exhibit "centripetality" (Ulanowicz, 1997); 5) and the adaptive ecological cycle described by the Panarchists, referred to here as the Adaptive Cycle of Human Consciousness as the focus is on mind and meaning. To use Bateson's words, I am "concerned with building a bridge between the facts of life and behavior and what we know today of the nature of pattern and order" (Bateson, 1972) (p. 20).[1]

This theory of HMS was developed by *both* "scaling up" from the irreducible phenomena that create *difference* in the universe and "scaling down" from the empirically-based descriptive model of an adaptive cycle of ecosystems. The premise for the latter operation, which this theory accepts as a given, is that the development of meaning systems for humans creates differences of complexity and range of impact within the biosphere but do not create a categorical exemption for the species as distinct from the rest of all flora and fauna. In other words, contrary to the hegemonic perspective of popular anthropocentrism, human ecologies follow the fundamental laws of all ecology,[2] but they do so with greater complexity due the role of meaning systems.

The present paper is the abbreviated description of a much larger work in which I go into further detail regarding aspects, components, and interactions of the various parts of the theory. Naturally, there will be some major components that are missing. Some of these I am aware of and have chosen to simply leave with placeholders because I have no expertise in these areas (i.e., the biological question of *how* life emerges from difference, the neuroscience of mind, or the complex movements of mind that are the study of psychologists).[3]

A Systemic Understanding of "Meaning"

Perhaps it is common at the beginning of the 21st century for us to intuit the following statement as a basic distinction between "information" and "meaning": meaning always contains information but information is not always meaningful. Tied to its connotations of information theory as it emerged in the early and mid-20th century, the implication of the word "information" is that "meaning" (or "signification" as it is called in semiotics – the *value* of information, the *value* of the signal as opposed to the noise) can always be reduced to discrete and codifiable units. For our purposes, however, "information" serves as a spring-board whence we may be more inclusive of even broader connotations of "meaning" and "signification" for human beings. The present theory of meaning and meaning systems has more in common with what Robert Ulanowicz calls an "ecological metaphysic" (Ulanowicz, 2009) (p. 11). Herein, "meaning" is understood as the *perceived* capacity of a phenomenon to increase the *perception* of

interconnectivity between aspects or components of the total environment (i.e., "reality") previously deemed isolated and/or disconnected, thereby revealing inherent dynamism and initiating and sustaining further integrative processes (i.e., integrative vis-à-vis the particular scales of HMS favored by the "organism-niche" at the moment of consideration within greater cycles of the ACHC).[4] In other words, as the informational "gain" that is meaning increases perception of connections among components previously perceived as disconnected, it yields survival advantages to the organism with respect to processing solar energy (for storage as chemical energy in ATP[5]), identifying and obtaining other forms of *emergies*, and increasing resilience for the individual organism-niche or group. Most simply put: meaning is a perception that increases perception of interconnectivity. The word "meaning," therefore, is ascribable to any and all conversions of mere information by the warm-blooded (homoiothermal) human being by which the latter is more likely to at least maintain the vital thermal distinction vis-à-vis its environment and at most increase its resilience to disturbance.[6] So, whereas Bateson famously defined information as "a difference which makes a difference," I would define information as "any perceivable difference" and meaning as "the perception of a difference which makes a perceivable difference."

Accordingly, that which we refer to as "language" does not hold the position of primacy in this work. Its salience is due to its potential efficiency with regards to *the act of processing* matter-energy for the human individual and group. Language is an adaptive currency, often mistaken for the economy itself.[7] In other words, instead of accepting the common view of "language" as the sole phenomenon that comprehends signification for the human being, I view "language" as simply one mode, process, and product within the vastly more complex whole of associated meaning makers/maintainers/destroyers of HMS, which are themselves nested within the successional dynamics of the Adaptive Cycle of Human Consciousness. More encompassing than a mere eco-*linguistics*, the result is an eco-*ennoia*.[8]

Mapping Movements (of Mind and Meaning)

> "It all starts, I suppose, with the Pythagoreans versus their predecessors, and the argument took the shape of 'Do you ask what it's made of – earth, fire, water, etc?' Or do you ask, 'What is its pattern?'" (Bateson, 1972) (p. 318)

In 1937, Jakob von Uexküll wrote in "The new concept of Umwelt: A link between science and the humanities":

> "This is in fact the case: all properties of living creatures we find connected to units according to a plan, and these units are contrapuntally matched to the properties of other units. In this way we get the impression of a comprehensive harmonic totality, because the properties of lifeless things also intervene contrapuntally in the design of living things. The processes in the germ cells are not explainable from causal effects of material factors but follow pathways prescribed by their own melody. […] Plan versus matter is the watchword of the new science of life." (von Uexküll 1937) (p. 132)

Four decades later Bateson would echo such a notion. In *Mind and Nature: A Necessary Unity*, Bateson reacted against the quantitative explanation of pattern-formation recognition, writing: "Never quantities, always shapes, forms, and relations" (Bateson, 1979) (p. 10). Indeed, since von Uexküll's pronouncements, many thinkers such as Gould, Kauffman, Varela, Goodwin, De Landa, Ulanowicz, Deacon, and others have written wonderful works regarding the organic nature of mind in the universe, albeit from different viewpoints, in which the gaze has shifted to include both cause and plan, both matter and melody.[9]

As to the issue of how it is that maps are created, Bateson wrote: "'What is it in the territory that gets onto the map?' […] Differences are the things that get onto a map." (Bateson, 1972) (p. 320).[10] Indeed, we are all quite familiar with such mappings of difference. These are the maps once found in every classroom, the maps that compose our textbooks of history, politics, geography, geology, astronomy, even ecology with regards to ecological succession.[11] So, defining "aesthetic" as "responsive to pattern", Bateson sets forth the daunting challenge: "the question is onto what surface shall a *theory* of aesthetics be mapped? Consciousness and aesthetics are the great untouched questions" (Bateson, 1979) (p. 205-214).[12]

In this endeavor, the complexity of HMS requires that we look to something inter-relational, something systemic, and not merely to the "units" of difference within the relations of the system in question. To use a term already in play by Ulanowicz, (after C. S. Peirce and K. R. Popper), we must trace the "propensities."[13] In *A Third Window*, Ulanowicz writes:

> "[…] Popper has suggested that we consider propensities to be generalizations of physical forces. Popper's shift helps us to make better sense of complex situations because identifying interdependent propensities as active agencies can explain more than can our traditional reliance on isolated forces. That is, we are better off in a complex world diverting some attention from objects toward configurations of processes as the key agencies that impart pattern to the world. […] That configurations of processes may give rise to and remain embedded in behaviors that had heretofore been disregarded as epiphenomena (e.g., striving by organisms) is an exciting new feature of looking out of the third window. One advantage of focusing on configurations of processes is that they interact with chance in creative ways not possible through the conjunction of simple forces." (Ulanowicz, 2009) (p. 164)

Thus the aim of the present paper: to outline the methodology for a different cartography, a mapping of HMS within the ACHC. For this we must look first to the fundamental "differences" and "isolated forces" (as, in terms of mind, some of these have yet to be considered seriously), and only then can we generalize these to consider the "propensities" that are the very makers of meaning: the interdependent processes with the capacity to increase the perception of interconnectivity between aspects or components of the total environment. So, to the question posed above regarding what is the appropriate question – either what is it made of or what is its pattern – the most systemically sensitive or "responsive" answer would be: both. Hence, *what are the propensities of the irreducible movements that create the pattern?*

Extending the view of "organism *as* environment": the Fundamental Interactions and HMS

If meaning is a perception that increases perception of interconnectivity, and an initial perception requires difference/distinction, and responsiveness is itself a difference (of state) that is produced by a difference (a stimulus or a gradient), then the obvious question is: whence difference? What produces difference in space and time?[14] And finally, perhaps the most pertinent question with regards to the present discussion: are such sources of fundamental difference relevant to an understanding of HMS?

As we proceed in this act of re-mapping the territory of human meaning systems, we are of course aware that difference in and of itself is not life, but when combined with exergy it appears to be the engine of life in all of its bewildering heterogeneity. And, to state the obvious: it is the interactive forces that produce difference in the universe as we perceive it – electromagnetically (what is attracted vs. what is repelled), gravitationally (the hierarchy of mass, of what is the greater vs. the lesser object of attraction), by the interactions of the strong nuclear force (as what is *inside* the atomic nucleus vs. what is *outside of it*) and the weak nuclear force (by changes produced by beta decay of subatomic particles, thus the powering of stars via fusion).[15]

In a sub-section of his paper "How Come the Quantum?" titled "Millennia without Meaning before the Advent of the Meaning Makers?" John Archibald Wheeler asks:

> "Question one: If life and mind and meaning are so important in the scheme of things, then what is the status of the past? Do the early revolutions of the Milky Way, the building of the elements, and the formation of the elementary particles—all before the advent of life—rank lower in reality than today's wind, snow, and shiver? No. Through the photons that reach the telescope, we see more clearly a quasar event of six billion years ago (before there was any life anywhere) than we can perceive the three-encyclopedia-long sequence of bits in our own DNA, in the here and now. Does the past exist (and exist only) in the records of the present? If so, then the past ranks no lower and no higher than the rest of what we call existence. In the words of Torgny Segerstedt, 'reality is theory.'" (Wheeler, 1986) (p. 309)

Wheeler is stating that the past is not only the present in an artifactual sense, but in the sense of being current reality and our thoughts of current reality, i.e., our theories, our meanings.

In the sub-section titled "Why Are the Dimensionless Constants of Nature Such as to Permit Life", Wheeler asks one of the most confounding questions imaginable: "Question two: How does it come about that the universe ever makes a home for life, mind, and meaning?" He states:

> "Many upholders of the anthropic principle propose one answer, which is based on selection. The concept of observer-participancy suggests quite another, which is founded on construction. Both analyses note that life as we know it (not only

> human life, but any carbon-based life) would be forever impossible in a universe (if such a universe can be imagined) in which one or another of the basic dimensionless constants of physics [such as the coupling constants for the electromagnetic, strong, and gravitational forces and the proton-to-electron mass ratio, among others] differs by a few percent either way from it;" (Wheeler, 1986) (p. 309)

So, if Wheeler's latter statement is correct, and taking into account his previous statements in "Question one", not only are the fundamental interactions necessarily fundamental to the origin and development of life on planet Earth, which is obvious, but the implication is that they cannot *not* be integral to the deep epistemologies and ontologies of humans, since our meaning systems are part and parcel of our evolution. ("the past ranks no lower and no higher than the rest of what we call existence.")**)** To put this in a different way, if the fundamental interactions are conditions for the origin and development of any carbon-based life, should not the same forces be considered when attempting to understand the very processes by which any given organism manifests life – in our case, the processing of meaning for the human?

Though this paper proposes an inclusion of the interactive forces within a comprehensive consideration of HMS, the exact relations between the three, or four, or a hypothetical fifth force and HMS is not fully understood by the author. As it stands, a good deal of ecology posits the reduction of the solar-energetic gradient on planet Earth as *the* principal impetus of terrestrial ecosystems (clearly described by Schneider & Kay, 1994). This, of course, is a consequence of the weak nuclear force causing hydrogen fusion, and thus creating the source of virtually all of our energy – the Sun. The consequences of this fundamental interaction is obvious and therefore central to the science of ecology. But, if indeed our human meaning systems are not mere representations of human ecosystems but are, instead, "the thing itself" – inseparable from and inherent to our ecosystems – then perhaps a more complete understanding of our meaning systems would extend beyond the singular consideration of the imperative of solar-energetic gradient reduction by terrestrial ecosystems to include other gradients produced not only by the weak nuclear force, but the other interactive forces as well: gravitational, electromagnetic, and strong.[16]

In considering such a vast scope of forces and energies and their possible influence on our meaning systems, the objective is not to engage in such a foolish practice as that of attempting to present a totalizing system wherein all (by definition, limited) questions have been "answered," but rather to amplify and re-territorialize the inquiry concerning the nature of our meaning systems – such that the only borders and limits thereupon not be those of fenced-in academic disciplines, but rather the limits of our own imaginations and perceptions with regards to what constitutes the extensive environment that allows for and influences life on Earth. Fundamental to this objective is the understanding that there is only one "context" in the original sense of the word (L. *contextus* "a joining together," pp. of *contexere* "to weave together") that applies in our quest: the context wherein the most elemental sub-atomic parts and waves are joined with the most distant and massive phenomena in the universe, with our wet human selves and self-organizing systems of meaning filtering matter-energy between these two extremes. As we further ponder the role of the interactive forces within our HMS, we see that some of our archaic borders between organism, environment, and universe evanesce.

The irreducible triumvirate of Local, Medial, and Permeative Orders of HMS[17]

Human meaning systems are nested and holistic within, at least, the framework of the entire biosphere. Just as a consideration of the origins of difference (the interactive forces) is essential to the understanding of life within the biosphere and the operations of the universe in general, and the study of electrochemical gradients is essential to the study of cellular biology, so we might ask the questions: Whence difference for our meaning systems? What are the irreducible gradients within our systems of meaning? What are the fundamental relations, the most fundamental interactions, that are ineluctable to any and all human ecosystems? From those initial questions we may get closer to the goal which is, to use Ulanowicz's precise language, to "identify interdependent propensities as active agencies."

The human species has thrived due to the evolutionary advantages afforded by its meaning systems – commonly reduced to "language" (Pinker, 1994; Deacon, 1997). Because HMS (or "mind") co-evolved with the human species' ascent given the constraints and advantages of its ever-changing ecosystems, it is only logical that HMS formed within those same constraints and are subject to the same propensities (of "centripetality", for example) as the human ecosystems they sought to exploit/develop. Who can claim that "human mind" has ever been distinct from – has ever existed outside of – a human ecosystem? No matter how broadly we define "consciousness," the fact is that such has not yet occurred. But, how could such hard ecosystemic gradients and thermodynamic imperatives be related to the activities of the human mind, our languages, our social systems, the stochastic behaviors of individuals and groups, the negotiations of our identities, our meaning systems in general? Should we continue to abandon such a ligation due simply to its supposedly "reductionist" air? By looking at propensities, can we not propose a map that is at once fundamental and non-determinist?

As an interconnected subsystem of the entire biosphere (albeit a subset with incommensurate impact), the human ecosystem uses meaning as a complex means of acquiring, maintaining, and degrading energies and *emergies* via a continuous negotiation of the three energetic orders. Each order can be understood as "energetic" because each is characterized by a dominant energetic phenomenon: securing of thermal disequilibrium (local), maintenance of exergy and creation of *emergies* (medial), and in a more abstract, precisely unknown sense, the permeative order might be characterized by such a thing as a quantum field, a hypothetical fifth force, or some other material-energetic phenomenon that unites all systems in the universe, thereby allowing for surprise and disruption to systems without nullifying the unifying *propensities*. (Note: the term "quantum field" here is only a placeholder, and can and should be substituted by anything at all, as I shall explain below).

Temporally, each "order" can be associated with a discernible movement (i.e., a space-time-symbol) that is also, ultimately, a function of scale: the temporal order of the local order is linear and irreversible; a ray between the consumer and the consumed and vice-versa. The temporal order of the medial order is cyclical/dynamic (dynamism within that which is cyclical is expressed by the spiral). The temporal order of the permeative order can only be *ventured*: non-defined by the ultimately non-understandable nature of time as a category – thus, it can be referred to by such constructs as infinity or timelessness/atemporality. In order to ascribe

temporal adjectives that have more of a qualitative dimension to each of the three orders, we could think of these orders as constant (local), usual (medial), and inevitable (permeative).[18]

The Local Order

The homoiothermal human organism must, by definition, continuously maintain a state of thermal disequilibrium with respect to its environment (by ingestion of calories and water, seeking shelter and fire, avoid or vanquish attackers, etc.). Because no other operation of mind can occur lest the thermal disequilibrium of the entire soma be maintained in homeostasis, I propose that: i) a "local order" of HMS emerges that is characterized by binary opposition as an ineluctable conception, a primordial idea, of requisite thermal disequilibrium; ii) humans efficiently use this highly stable primordial idea (of duality/binarism) as an irreducible instrument to produce entropy as the fundamental operation of HMS —i.e., to identify, acquire, and degrade energy within its ecosystems; and iii) human language, and ultimately, perhaps the human flavor of consciousness itself, arises *in origin* from the necessity to maintain thermal disequilibrium. Michel Serres (Serres, 1977), inspired by the work of Henri Atlan, posited that this thermal difference may be the origin of language (in an irreducible utterance such as "keep me warm"). Viewed thus, it could be said that the weak interaction (by means of initiating the hydrogen fusion in our Sun) is the source of difference for the local order.

I propose, then, that binarism is a true gradient dissipator that has remained fundamental to and consistent with human evolution across various operations and stages, including the non-binary, self-organizing, and autopoietic operations of the encompassing meaning systems that produce our concept of human consciousness, since "the irreversibility demanded by [the] second law bespeaks a degree of causal openness" (Ulanowicz, 2009). Thus, this conceptual instrument of binarism is fundamental to and is included in the development of human meaning systems and production of languages, thoughts, ideologies, identities, and so forth by its constant inclusion at all times within the negotiation of the three orders. By maintaining survival at the most basic level, the binarism of the local order yields to the cycles, spirals, and roundedness of the medial order—whereby the emphasis shifts to the maintenance and optimization of exergy (thus, the production of *emergies*).

The Medial Order

The medial order is the locus of accretion, storage, maintenance, and destruction of various energy qualities, from physical fuels to information, knowledge, and wisdom – in all of the vast complexity of these inter-related processes and at continuous scales. At the processual/systemic level, the medial order is the locus of greatest accretion by means of centripetal tendencies common to all ecosystems (Ulanowicz, Jørgensen & Fath, 2006) and the highest attainable values of *emergy* are created and stored therein, (according to H.T. Odum's proposal of self-organization for maximum *emergy* use).[19]

Patterns of recurrence, rotation, and explicit cyclicality allow for far more than a merely metaphorical understanding of the natural processes of our lives, as these movements and

patterns create both the shape of our knowing and the space within which a negotiation of the local and permeative orders are synthesized.[20] Of course, the life-death (procreation-survival) imperative serves as perhaps the greatest regulatory force in time. Thus, it is the life-death imperative that urges the systemic need for the maintenance and maximization of storages and flows of energy. Likewise, gravity and electromagnetism are perhaps the most obvious shapers of the space of our HMS within the medial order, as most of what we observe externally as roundness and cyclicality is a consequence of these two forces – from the ephemerality of our fabrications ("things fall apart") to our planetary orbit whence our cycles of sleep/wakefulness and seasonal food productivity. These shapes and patterns of our fields of knowing – roundness and cyclicality – translate into the concrete human experiences of communality and centrality, expressed variously by means of ritual, tradition, social functions and patterns, and architecture.

It is in the medial order where the human plays and works within the circles that are home (*domus*), family, community, city, state, planet, solar system, galaxy;[21] according to the informational accumulations of meaning of relatively higher density/higher internal coherence that are codes, laws, grammars, grids, taboos, mores, customs, traditions, rituals, etc.; and in addition to the accumulations of food, fuel, water and weapons. In the medial order, we trade/maintain and co-evolve by means of linguistic, ritualistic, and traditional devices that are beyond the strictly utilitarian, dialectic devices of the local order. In the middle space, we are the creatures of constant mutual checks, of transactional operations, of power maneuvers, of purposeful and ludic language: with humor, irony, and paradox, we continuously, incessantly, suggest, reaffirm, and challenge the existence and necessity of such inalienable characteristics of biological life as randomness, chance, adaptability, robustness, and resilience.

As the space into which and out of which all paths lead, the medial is the marketplace of HMS. The path inward from the local order is of a lower quality (lower *emergy*) than the path from the medial order to the local order. (E.g.: an emphasis on binarism can be mediated and attenuated in the medial order; intolerance, for example, can be mediated, then redirected toward the binary order to loosen such oppositional dialectics). The path outward from the medial to the permeative is uncertain of exact purpose beyond that of seeking greater interconnectivity; while the path inward from the permeative to the medial and the local is created by the need for community-subsistence (medial) and survival (local). Thus, the medial order is in constant negotiation with the requisite of survival of the local order and also yields to the unknown and unknowable nature of the permeative order when the individual or collective organic system needs to recognize its fundamental interconnectedness.

The Permeative Order

By definition, the permeative order must be that which is always just out of reach. Thus, for the purposes of our theory of HMS, the question as to the exact contents or composition of the permeative order is, precisely, the wrong question. All we know is that it is what we continue to seek. It is a concept that has been in circulation since the dawn of consciousness, as it is the spring inside our sense of "faith" and "hope", and it is the "substance" of non-institutional spirituality. In the context of resilience theory and complexity studies, it is equivalent to Gunderson's, Holling's, and Light's defense of "uncertainty" and "surprise" (Gunderson,

Holling & Light, 1995), Stuart Kauffman's notion of "the adjacent possible" (Kauffman, 2000), or Terrence Deacon's descriptions of "the absential" or "constitutive absence" (Deacon, 2012).

Let us examine the question of how the permeative order serves as the attractor state of Human Meaning Systems, and the relation of the permeative order to the Ω-Phase of the ACHC. I have proposed elsewhere (Porto, 2000) that it is not what is known and worded, but what is unknown and unworded, that propels all Human Meaning Systems at the scale of the three energetic orders and thus ultimately drives the procession of phases of the ACHC through what Holling described as the α / Reorganization Phase, r / Exploitation Phase, K / Conservation Phase, and Ω / Release Phase of the adaptive ecological cycle:

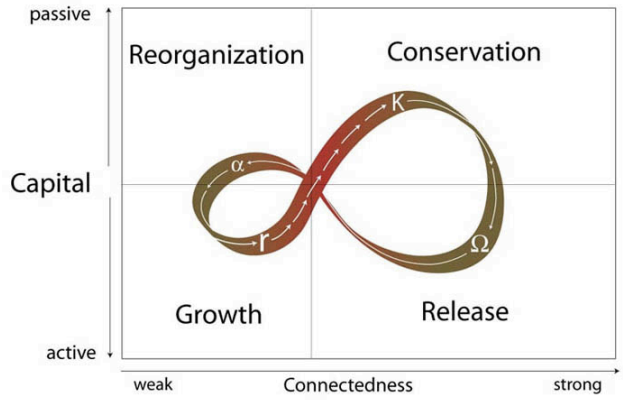

Figure 1: The Adaptive Ecological Cycle (Holling, 1986)

If our meaning systems are "lit" by the continuously stolen fire of the imperative of thermal disequilibrium in homeostasis (local order), and sustained by our interaction with the recurrent patterns that we recognize in natural cycles (the same patterns we duplicate, create, and use through natural language and thought) in order to conserve energy and either become more adaptive/resilient or more vulnerable/rigid (the processes of the medial order), then what truly propels these meaning systems – and our species as one that is co-evolutive with these meaning systems – forward in time is the inherent understanding of humans regarding the ineluctability of the third, permeative order; especially the inherently unknowable nature of attractors within this order. As discussed in the previous section, the words that we create in every language – such as Chance, Fate, Destiny, Mystery, Fortune, Providence, Luck, Accident (and the polar manifestations of "Accident": Serendipity and Tragedy), Beauty, God, Eternity, the Divine, the Sacred, and certain forms of Love – are attempts to describe the forces that move each one of us forward into a new day, after every single night. Thus, after the requisite acquisition of the energy we need to survive (local order), and the trading of energies for *emergies* with the aim of maximizing stability (medial order), all further activity is reserved and produced with the more often than not concealed purpose of destroying or ignoring all that is known, because it is through the "unknown" that we sense the opportunity of never-ending change, which ultimately signifies continuation of existence (as one generation must make way for the next). Hence, if the local order is the requisite *terra firma* of HMS, the permeative (ubiquitous-perpetual) order emerges as the ineluctable attractor state of HMS.

When we understand our unknowing as a category unto itself, as opposed to that stuff about which we simply have no present knowledge but about which we could someday have knowledge (i.e., dark matter, dark energy, the quantum field, etc.), we may begin to appreciate the power and pull, the attraction and allure that such a category has on us as we engage in the process of negotiating meaning as human beings. As the order of Wonder, Longing and Imagination – the order whose dimensions, qualities, extensions and effects are unknown to us – the only way we know it exists at all is through negativity, through the existence of absences and the propellant that is curiosity: the process by which we wonder about various aspects of our reality (What is to be of ourselves? Of our loved ones?). Indeed, the permeative order even permeates what we deem as "hard". For example, our cultural fixation on the existence and supposed irreducibility of "facts", or the supremacy of "Science", I believe, appears to be fomented by the implicit understanding of the existence of a permanent category of our consciousness that is characterized by unknowability.

A rephrasing of the same: why do I refer to the permeative order as, possibly, the most *human* of the three orders? Because it is precisely because there is much that is outside of our comprehension that we exist, that we remain in motion, that we move in consciousness through adaptive cycles.[22]

A Fluid Negotiation

For the sake of simplicity, we could say that when accretion occurs at the local order, the results may be manifestations of greed and fear, such as prejudice and intolerance; when accretion occurs at the medial order, the result is the grammar, the cannon, the body of rules, laws, customs, practices, manners, mythologies; when accretion occurs at the permeative order, the result is transcendence, ascendance, spirituality (as opposed to the formalization of spirituality, "religion," which bears greater similarity to ideologies and grammars, or local and medial orders). Thus, the local order is the original constraint; the medial order is a dynamic constraint; and the permeative order only becomes a constraint in relation to the making irrelevant the first two orders of constraint, thereby threatening the survival of the particular "organism-niche" in question. In this sense, the permeative order is a constraint in its power to neutralize the constraints of the local and medial orders. The somatically fatal martyrdom of spiritual leaders which then produce high-powered *emergies* for subsequent peoples throughout history comes to mind.

Let us take a closer look at the link between HMS and Ulanowicz's notion of "centripetality" and Odum's notion of self-organization for maximum *emergy* use. I propose that it is our ability and propensity to negotiate between the binary, the communal/recurrent, and the unknowable/unknown for any given context and set of circumstances that makes us products and producers of "the core unitary agency" known as "centripetality" (Ulanowicz, Jørgensen, & Fath, 2006). By negotiating between the three orders we engage in the inter-related phenomena of energetic processing for living organisms within ecosystems that exhibits "(1) ascendency, (2) storage of exergy [i.e., maximum available energy], (3) the ability to dissipate external gradients in exergy and (4) network aggradation" (Ulanowicz, Jørgensen, & Fath, 2006) (p. 520). This is another way of saying what has been proposed above, that we have co-evolved *via* our HMS as a

physiosymbolic species.

Reflecting on the comprehensive scales of "centripetality," Ulanowicz writes:

> "It is very difficult to overstate the importance of centripetality. It is a largely neglected, but absolutely essential attribute of living systems. Furthermore, centripetality is an agency proper to the loop as a whole. Although the accumulation of resources is accomplished at the compartmental level, the drive to increase such activity is strictly a consequence of the relational structure of the whole." (Ulanowicz, 2009) (p. 72)

Everything we ascribe to "meaning" phenomena – the transferable and dynamic *logoi* of individual humans and collective relationships among humans – is a "centripetal" function of the organism-niche bartering during every moment among the three orders. Whether asleep or awake, whether at war or at work or in love, whether bored or engaged, whether alone, with a group of friends, strangers, or colleagues, or semi-consciously connected to faceless multitudes by means of some elusive zeitgeist, I propose that we are constantly negotiating between the three orders within a multitude of scales and in relation to the larger adaptive cycles (this relation is described below), and that this negotiation is what produces the phenomenon of "natural language" (and related sub-phenomena such as "narratives," "histories," and "identities"). The fact that, on average, we are able to "learn" a human language within the first couple of years of life implies that these three orders are not simply symbolic, or philosophical, or metaphorical, etc. Instead, these are encoded within us. We are born *tendentious.* We will negotiate among the three orders.

By extension – via the necessary identification, acquisition, and degradation of *emergies* and the ensuing economics and politics of those processes among groups – this multi-scalar process of negotiation produces human ecosystems. Thus, naturally occurring human language – simultaneously existential (local), normative (medial), and experimental (permeative) – is a manifestation of the crucial and continuous ecosystemic function of creating and dissipating storages and flows and creating and destroying *emergies*, all within the larger scales of Adaptive Cycles of Human Consciousness. Revisiting our previous definition of "meaning" as a perception that increases perception of interconnectivity, we see how even the non-understandable aspects of our HMS (represented by the permeative order) are essential to perceive interconnectivity. Thus, the paradoxical and often self-contradictory nature of deep "truths" as may be found in sacred texts and oral traditions of humanity. (The Tao-Te-Ching comes to mind as an example).

Next we shall look at a possible means by which the process of what would otherwise seem to be a "linear" negotiation between the three energetic orders becomes cyclical (or, more precisely, "spiral") and emergent, thereby exhibiting dynamic agency in its movement through the Adaptive Cycles of Human Consciousness at innumerable scales at any given moment for the individual and collective humans within specific contexts.

HMS and the Adaptive Cycle of Human Consciousness (ACHC)

At the simplest level of representation the three energetic orders produce something akin to what Stephen Jay Gould – after Charles Lyell's *Principles of Geology* (1830-33) and A.S. Eddington's *The Nature of the Physical World* (1929) – called the "arrow" of time, synonymous with "narrative history," while the Adaptive Cycle of Human Consciousness is of course the "cycle" of time that emerges from "immanent laws" (Gould, 1988). However, there is a major point to be clarified here, as we see that an "arrow" does not miraculously curve and become infinite to form a "cycle"; in other words, the negotiated product of the three energetic orders does not miraculously bend and assume the complexity of the ACHC. What is lacking in the "arrow"/"cycle" model is the greater complexity and dimensionality of the "arrow," the *interface*, as it were, between the arrow and the cycle. This complexity and dimensionality is evinced by the particular and indeterminate negotiations of the human individuals or groups as they process (negotiate) between the three orders, but how does this occur? A thorough examination of these interconnections and propensities would be a massive undertaking, but let us look to a few possibilities.

Using the Panarchists' nomenclature of their adaptive cycle, (where the four phases are: α = reorganization, r = exploitation, K = conservation, and Ω= release; Holling, 1986), I propose that each energetic order is "bias-heavy" within different phases of the ACHC for any particular scale of the HMS (i.e., for the dominant "concerns" or experiences at hand for the organism-niche in question).[23] The biases are as follow:

α = heavy Permeative, into Local
r = heavy Local, into Medial
K = heavy Medial, into Permeative
Ω = heavy Permeative

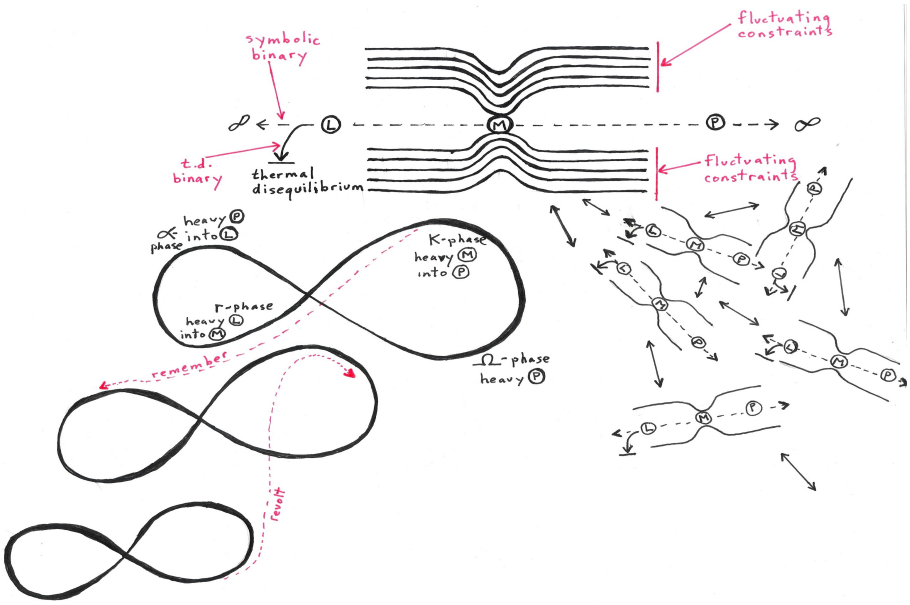

Figure 2: Nested Human Meaning Systems (HMS) within Panarchic Adaptive Cycles of Human Consciousness (ACHC); Adaptive Cycles adapted from Holling, 1986.[24]

Indeed, as we all know, the dynamics between individual and collective organism-niches produce tremendous complexity. Such questions as the following ensue:

i) which energetic order deserves bias for any given concern(s) according to the "organism-niche"?

ii) what is the position of the "organism-niche" vis-à-vis the encompassing adaptive cycle for the concern(s) in question?

iii) what is the appropriate (capable of greater production of meaning) adaptive cycle (scale) to consider with regards to the concern(s)?

iv) what are the greater adaptive cycles (scales) that encompass the adaptive cycle (scale) in question?

v) what are the recursive implications between other "organism-niches" either involved directly with the concern(s) or merely observing the "organism-niche's" negotiation of HMS?[25]

The sum of these questions and others derived from such a mapping of HMS are addressed, at least in part, by findings from or by the theories developed in such fields as psychology (particularly, distributed cognition), Language-Action Perspective, various branches of sociology, economics, anthropology, and political science, or a potential panarchic psychology (Varey, 2010). I paint over these dynamics with a broad brush because my interest here is to map some of the movements of HMS as nested within panarchic adaptive cycles.

Some Analogues and Distinctions between Mind Ecologies and Non-Mind Ecologies

Certain phenomena of trickery found in HMS may be found in meaning systems throughout flora and fauna, where gender illusions, size illusions, species illusions, and other forms of substitution and trickery are common.[26] In HMS, an example of predatory trickery may be what I call "counterfeit constructs" – whereby an "organism-niche's" *idea* of its position vis-à-vis the three orders and within the ACHC has been externally created and proposed to the "organism-niche" as if it were a function of its own systemic correlation. A common phrase for this in cultural studies is "cultural hegemony."[27] Cases of cultural hegemony may produce what in complexity studies is known as a self-defeating system. In the case of HMS, when the counterfeit construct (such as a parasitic government or social policy) has been implanted and adopted by the "victim" organism-niche, an extended cycling of that counterfeit construct or process will eventually endanger the counterfeiting entity, i.e., the hegemon. This occurs when the ratio of the hegemon's input to output is too low or negative, which may occur if the victim organism-niche is being systemically impoverished by the adoption of the counterfeit construct or process to the point that the hegemon can no longer extract the desired quantity or quality of energy (*emergy*) from the tricked organism-niche.

Conversely, HMS may exhibit other qualities and states that may be unique to HMS; that is, that may not be found in other species' ecosystems (though to categorically assume so would be foolish). While a study of these extends beyond the space of this article, we may look to a few in particular as examples.

A fascinating characteristic of the medial order in particular is that because it is the locus of accumulation of autocatalytically-produced constraints and gradients of human ecosystems and HMS, it is the locus of work, and thus, of the complex systems we call "culture" and "society." This is autocatalytic because the emergence of "societies" reflexively creates more constraints via codes, cannons, laws, ethics, etc., thereby producing more work: to paraphrase Kauffman, constraints are required to perform work, which then produces more constraints (Kauffman, 2000). In periods of extreme accumulation of medial order constraints, such as might occur when at the extreme of the K-Conservation phase of the greater adaptive cycle, the pressure within the societal system can produce a forceful propensity toward the (possibly infinite) division-divisiveness of the local, binary order. In other words, because we are physiosymbolic beings, the incorporation of memory is such that we can revert to the local order not only as the finite base of physiological survival (i.e., of thermal disequilibrium) but, once the physiological is perceived as "secured", the local order is remembered symbolically, as an infinite possibility of binary division (see Fig. 2). Possible constraint variables of this state could be viewed as pressure and volume, psychologically expressed as "expectations of productivity." Such a condition could be called hyperlogic or (to use Yuri Lotman's word) hypersemiotic. This hyperlogism or hypersemiosis could be seen as the manifestation of the resistance to the perceived culmination of the K-Conservation phase and the immanence and foreboding of the Ω-Release phase.[28]

Yet another distinction between non-mind ecologies and mind ecologies is this: even though net systemic connectedness is highest in the late K-phase (see Fig. 1), the *perception* of interconnectedness falls in this phase precisely because there is less of a survival need for the observer that is the human organism-niche to perceive contrast/difference and there is less difference/contrast to be perceived. In other words, when internal connectedness is high, *perception* of connectedness by humans composing the particular scale of the K-phase in question is low.[29] This may be behind the much-discussed existential ailments of "modern man," as variously described by so many modern "western" thinkers, from Baudelaire, Nietzsche, Freud, Jung, to the existentialists and beyond.

As a means to better understand the dominant mode of contemporary thinking and being in the "modern West", we might say that the intense focus on the accumulation of technological knowledge and capital goods since the birth of modernity (approx. mid 15th century) is demonstrative of a relational biasing of the local and medial orders to the r and K phases of the adaptive cycle. Accordingly, our HMS have been characterized by heavy local and medial modalities manifested as emphases on binarism and accumulation/growth as dominant paradigmatic values. From this perspective, we might ask: Is it an accident that one of the most influential and culminative inventions of the age and time is the binary-logic based computer? Or, whence the epistemological basis for an economic paradigm (capitalism) that is popularly predicated on "infinite growth?" The possible relations between these two diverse phenomena –

one artifactual and the other paradigmatic – and the local and medial orders of HMS and to the r and K-phases of the ACHC are at least thought-provoking.

The complexity hinted at in this sub-section should make it clear that, at most, we are talking about *propensities* of HMS within ACHC. Such a study could elucidate tendencies of patterns and help to better understand positions and movements of "organism-niches" within patterns, but never result in a deterministic model, especially at such macro-levels.[30] As Ulanowicz writes:

> "As for the scale at which ontic chance can happen, the key word here is *ubiquitous*. […] nothing stands in the way of its appearance at macroscopic levels, where complexity abounds. In fact, complex chance is even *more likely* among the complexity of macroscopic biotic phenomena, where individuality reigns. Popper's (1990) attitude toward macroscopic chance was that it gave rise to interferences that made necessary the switch from forces to propensities at higher scales—the actual fall of an apple depends on far more than the (necessary) force of gravity. The fact that chance is ubiquitous and unruly does not, however, imply that a system will disintegrate as soon as it encounters a novel event." (Ulanowicz, 2009) (p. 122)

Fortunately for the sake of our understanding, ontic openness does not preclude the possibility for us to both form and observe patterns.

Conclusions

> "The individual mind is immanent but not only in the body. It is immanent also in pathways and messages outside the body; and there is a larger Mind of which the individual mind is only a sub-system." (Bateson, 1972) (p. 326)

I have proposed that, since human ecosystems *are* ecosystems – that is, they are not exempt from the ecosystemic "laws" but rather exhibit levels of complexity and incommensurate impact due to the (relatively) greater development of its faculties of mind – a mapping of the movements of HMS can extend beyond but must at least be consistent with the gradients and imperatives of all ecosystems.

The fact that the HMS are nested and scaled – holistic – phenomena means that HMS serve the physical organism-niche as individuals and collectives just as they serve the "ideational" or "symbolic" organism-niche, to no lesser or greater extent, since only in language can there be a division between human organisms, human ecologies, human meaning systems, and the greater biosphere. HMS are simply another co-evolutionary catalyzer, albeit a relatively powerful one, that accelerates the flow and use of matter-energy by this particular organism-niche known as the human+ecosystem. Bateson wrote:

> "Moreover, the very meaning of 'survival' becomes different when we stop talking about the survival of something bounded by the skin and start to think of

> the survival of the system of ideas in circuit. The contents of the skin are randomized at death and the pathways within the skin are randomized. But the ideas, under further transformation, may go on out in the world in books or works of art. Socrates as a bioenergetic individual is dead. But much of him still lives as a component in the contemporary ecology of ideas" (Bateson, 1972) (p. 326)

Systemically and holistically speaking, there is no division between the ecology of organisms and the ecology of ideas because, in a literal sense, Socrates' ideas (to use the arbitrary example given) are *emergetic* phenomena. They are phenomena of higher quality energies used at particular scales by particular human organism-niches with which to seek, balance, or negotiate disequilibrium (push toward greater binarism (local), optimize exergy or produce more *emergy* (medial), or experience uncertainty (permeative) according to its systemic position and its subjective reaction to its position within the greater human meaning system. This is perhaps one way to describe why, in the words of Maturana and Dávila: "whenever something biological occurs to a human being his or her cultural living changes, and whenever something cultural happens in the life of a human being, his or her biological living is affected." (Maturana & Davila, 2000).

Wittgenstein wrote: "Don't get involved in partial problems, but always take flight to where there is a free view over the whole single great problem, even if this view is still not a clear one." The present proposal for an ecological theory of HMS (a "single great problem") has been mainly the product of a contemplative approach as an observer of the movements of human thought in perceivable time and space. We note Will Varey's astute assessment that "The problem of the many forms of conceptual ecology is not really a problem of the discipline of ecology. It is perhaps a very natural feature of the ecology of thought" (Varey, 2010). Indeed, what appears clear at this juncture is that – inclusive of each person's particular vantage point or brand of observation – there is a need to engage in both the analysis of "partial problems" as well as the "single great problem" if we are to dissolve the illusion of humankind as miraculously exempt from the ineluctable forces, processes, and propensities that appear to originate and guide *all* degraders of energy within this single biosphere.

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Endnotes:

[1] As an outsider to science, I will briefly explain how I came to develop a theory of human meaning systems. My entire life I have been a student of such systems, practically and explicitly – working to achieve fluency in a variety of languages – and philosophically and implicitly – by studying historical formations of knowledge and culture. My first question to this regard emerged from observing a violet crape myrtle (*Lagerstroemia*) as an adolescent: "am I not, in producing and using language, doing something akin to that flower, as it produces purpleness and pollen? As it communicates interspecially to continue to process energy for itself as organism, its species, and other species of fauna and perhaps of other flora as well?" (Semiotics, attractors, vehicles of propagation, etc.). Later, this would lead me to write a dissertation of a four-phased cycle of human meaning systems as coalesced in works of literature that I referred to as a "developmental chronology: that is, a systemic evolution from a state of relative diffusion of meaning, intention, and consciousness to one of relative concentration of the same." I wrote: "Because this development is not linear but cyclical, the state of greatest concentration […] will require and provoke its own implosion, thereby ending in (at least the search for) semantic and intentional diffusion." (Porto, 2000) I had been observing a similar phenomenon to the successional dynamics of the Panarchists four-phased adaptive cycle, but in terms of human meaning and constructs of culture. Of course, the observation of cyclicality is as old as the observation of seasons; nevertheless, I make note of this to point to a beautiful fact: what the systems ecologists had been carefully observing for quite some time in the behavior of ecosystems, I had been observing from another set of phenomena altogether – the movements of human mind and culture. Then, in 2002 I had my first contact with the world of the Panarchists (I was not yet a student of systems ecology, much less of Holling's initial conceptualization of the adaptive cycle in 1986). Ever since, I have been fascinated with the world of systems ecology and ways to understand, as tied to the constraints of homoiotherms and the processing of matter-energy (i.e., as non-metaphorically) as possible, the movements of human meaning systems. At the very least, it seems that the existence of such a "non-scientific" or poetic path to the complex, four-phased adaptive cycle could bolster the case for a deep grammar of the "pattern that connects" (Bateson, 1979).

[2] The most complete list to date (2009) consists of ten principle laws with explanations and can be read in their entirety in S. E. Jørgensen's article "Fundamental Laws in Ecology," which also includes important additions/exceptions made by other ecologists. For the sake of conciseness I do not list the ten principle laws here, though in the same article S. E. Jørgensen puts forth a synthesis of that list, in five summary laws: "I. Ecosystems are physically and ontically open, meaning that they can exchange mass, energy, and information with the surroundings and that it is not possible to make exact predictions on their development due to their enormous complexity. II. Ecosystems have directionality. III. Ecosystems have connectivity. IV. Ecosystems have emergent hierarchies. V. Ecosystems have complex dynamics (growth and disturbances)" (Jørgensen, 2009) (p. 37).

[3] I have tried as best I could, and always in good faith, to synthesize the work of those trained in physical and applied sciences to my own understandings of human meaning systems that I have developed through formal cultural, linguistic, political, historical and literary studies. My hope is also that the gaps, errors, and possibilities for greater descriptive accuracy with regards to this proposed application of systems/process ecology to human meaning systems be noted and addressed by others who share a similar interest in the questions presented here.

[4] My use of the term "interconnectivity" is analogous to Holling and Gunderson's use of the word "connectedness," which they define as that which "determines the degree to which a system can control its own destiny, as distinct from being caught by the whims of external variability" (Holling & Gunderson, 2002) (p. 62). For their purposes, the ecologists refer to connectedness as one of the three properties defining the Adaptive Ecological Cycle metaphor, the other two being "potential for change" and "resilience").

[5] Adenosine triphosphate, the currency of utilizable chemical energy for living organisms.

[6] This is often referred to in biology, philosophy, and even anthropology as the "thermodynamic imperative." Early formulations include the ethical postulation by Robert Lindsay of civilization's role in reducing entropy in his 1963 book *The Role of Science in Civilization* and the anthropologist Steven Polgar's 1961 article "Evolution and the Thermodynamic Imperative," which described the transmission of information through the development of culture by sequential generations of humans over time (Polgar, 1961).

[7] This, of course, is not a "global" situation. Such a confusion is particularly pronounced in societies influenced by European-based empiricist/materialist/positivist epistemologies, since it can be heard, written, expressed, and manipulated.

[8] From the Greek *ἔννοια*, which has been translated as variously as thought, thinking, intention, purpose, consideration, design, meditation, notion, conception, mind, understanding, will, and *manner* of feeling and thinking.

[9] In his essay "The emergent self" Varela expressed: "Life is in the configuration and in the dynamical pattern, which is what embodies it as an emergent property" (Varela, 1995) (p. 216).

[10] As is often cited, Bateson defined "information" (variously as a "bit" or "unit" of information, or even as an "idea") as "any difference which makes a difference in some later event." I propose that his definition of "information" is not incompatible with my definition of "meaning," but the latter is an extension. "Meaning" here is not only that which makes any difference, but that which increases the perception of interconnectivity (Bateson, 1972) (p. 271).

[11] In general ecology, it appears that *difference* is in fact at the root of the phenomenon of ecological succession. Accordingly, what ecologists refer to as "disturbance" and even periodic changes could be understood, fundamentally, as an *introduction of difference*.

[12] Bateson's question and ensuing statement could be recast, replacing his use of the word "aesthetic" with his definition of the same: "onto what surface shall a *theory* of ["responsiveness to pattern"] be mapped? Consciousness and ["responsiveness to pattern"] are the great untouched questions." Slavoj Zizek maintains a compatible definition of "the aesthetic" as that pronounced by Bateson: "In past generations, when the animal recognized a pattern in its environs that enhanced its chance of survival (to get food, avoid danger, and so on), this recognition was marked/accompanied by the experience of pleasure; now, the organism directly produces such patterns simply in order to obtain pleasure. This matrix accounts for food, drink, and sexual pleasures—and even for art: the foundation of the aesthetic experience is the recognition of (symmetrical, clear, etc.) sensual patterns that, originally, enabled us to orient ourselves in our environs" (Zizek, 2006) (p. 249).

[13] R. E. Ulanowicz writes: "Our awareness of the expanded domain of chance will lead us to question whether physical-like forces or mechanisms play an exclusive role in scientific explanations. One particular alternative is Popper's (1990) broader notion of "propensities," which could provide a more appropriate glue for holding the world together" (Ulanowicz, 2009) (p. 11).

[14] There is also this, perhaps philosophical question: If such a source were truly fundamental, would it not also have to be the same source whence totality and unity at the most comprehensive scales?

[15] Because temperature gradient plays such an important role in biology, and thus in the present theory of human meaning systems, I will retain the now outmoded distinction between "weak" and "electromagnetic" forces instead of the current unification of "electroweak."

[16] Though further explanation is beyond the scope of this paper, we might consider the prominent role of gravity, as humans not only *signify*, but *exist* (process, acquire, and maintain exergy) through their erected elements and monuments of all sorts – whether menhirs or pyramids or edifices or statues chiseled from wood or cast in metals; and that our thinking produces and is co-produced by the spaces we inhabit, themselves functions of gravitational and strong forces of the materials used. The electromagnetic force (and the ensuing efficiency of the sphere) may be behind certain roundness-curvature biases in our visual searches. (See, for example, the work of Alan H.S. Chan, Larry S. Liebovitch, Denis Dutton, Jeremy M. Wolfe, and Doris Tsao). I propose that the argument that biases toward that which resembles a (round) face or a (round) rear-end are nevertheless related to electromagnetism, ultimately. Even if their recognition increased chances of survival, it does not detract from the issue of the *cause* for their round shape to begin with.

[17] Though the present triad was deduced by direct observation and contemplation of human systems by the author, one will of course be reminded of other compatible triads, such as both Kant's and C. S. Peirce's triad of "necessity", "actuality," and "possibility." (Kant called these "categories" of "modality."). As for a current triad that also reverberates with the proposed orders of HMS, we may think of Terrence Deacon's triad of "nested hierarchical architectures" – the homeodynamic (non-organizing), morphodynamic (self-organizing), and teleodynamic (living) processes as possible correlates of the local, the medial, and the permeative orders, respectively. (Deacon, 2012). Surely there are other potentially analogous triads in addition to these.

[18] Perhaps these three could also be considered according to the distinction of the Gnostic, then Jungian, concepts of *creatura* and *pleroma*, with the local order being the order of *creatura*, the permeative order being the order of *pleroma*, and the medial order then being the locus of the negotiation of these two worlds. To call forth another possible partial confluence, we might think of the local and medial orders as analogous to Robert Rosen's concept of the basic components of a relational biology: metabolism and repair. While I do believe that the local and medial are indeed analogous to his use of the terms "metabolism" and "repair," I don't believe that my concept of the

permeative order has a place in his relational biology. (An "anticipatory system" would be a description applicable to the entire organism-niche).

[19] In the book *Maximum Power: The Ideas and Applications of H. T. Odum*, Charles A. S. Hall – himself a former student of H. T. Odum and a leading ecological researcher and theorist – defines "emergy" in the process of explaining the interconnection between the "maximum power principle" and "emergy": "Beginning in the 1970s H.T. increasingly focused on aspects of the *quality* of energy, which he originally called simply "energy quality" and later 'Emergy.' Maximum power was ever present in the development of the concepts of energy quality, and in fact was the impetus for its development. Maximum power concepts lead to energy quality as Odum worked to explain why any system would dissipate energy already captured to create another form of energy. He reasoned that such behavior made no sense unless the higher quality energy (fossil fuels or electricity) was more useful than the lower quality energy from which it was made. Thus the higher quality energy had more amplifier feed back effect and was capable of increasing total power of the system commensurate with the costs of making it. . . . H.T. Odum always emphasized that an ecosystem and its components had to maximize the use of all the energies available to it in its selection for maximum power" (Hall, 2004) (p. 111). It is important to note that while H. T. Odum was working from a strong tradition in the study of maximization of power and self-organization, his introduction of the concept of "emergy" was a crucial advancement from the original work done in self-organization by such theorists as S. Podalinsky, L. Boltzmann, F. M. Ostwald, and A. J. Lotka. Odum writes: "Efforts to explain self-organization as a selection of designs for maximum power were begun long ago by scientific theorists, S. Podalinsky, L. Boltzmann, F. M. Ostwald, A. J. Lotka, and many others starting in the last century, but these explanations ignored the different qualities of energy. Work of an intelligent human counted no more than that of a plant leaf. Now, however, insights from ecological food chains help us reformulate definitions of work and distinguish energy types quantitatively" (Odum, 1988) (p. 1133).

[20] If indeed we are seeking to better understand *terrestrial* epistemologies and ontologies, *terrestrial* meaning systems, we must take the forces of gravity and electromagnetism into full consideration, for these are what make things round; it is gravitational and electromagnetic forces that make things big and small spin in circles (or ellipses), as opposed to move in straight lines. As a constant not only of our individual perception, but of our normative experience as a species, this is so. Accordingly, (for there is no *outside* to this ecosystem), the movement of our knowing occurs well before the pyramids, obelisks, and menhirs are erected, and because this movement occurs both within and without the individual erections, it is the movement itself which ensures that the pyramids, obelisks, and menhirs crumble and fall. The movement ensures, too, that matter will be erected yet again by humans, simultaneously in defiance of and with the aid of gravity.

[21] Incidentally, the word "dome" is related to the Latin *domus* (house), from the Greek *domos* (house) from *δέμω* (to build, to construct). I mention this only as an inspiration for thinking of the proximity between the concepts and actions of "building," and "building something round" in these two languages.

[22] In the words of Lou Reed: "It takes a busload of faith to get by." Of course, we know this same, profoundly human assertion in a literal myriad of forms. What are some of the names of the constituents of this order, then? The answer is a problematic one according to the current status quo of academia, because their names are those of siblings separated at birth, placed in the foster care of divided, divisive families known as Religious Studies, Theoretical Physics, Philosophy, Cultural Studies, Theology, Cognitive Science, Anthropology, Critical Theory and others. Some of the most common names include: Imagination, Wonder, Shamanic Wisdom, Plant Knowledge, God, gods, the Devil (s), Djinns, Fairies, Goblins, life-force (i.e., Aztec teotl, Buddhist Nirvana, Hindu Brahman, Polynesian Mana, Christian "love," etc.), and Qualia; there are also names for properties or phenomena that we claim to have some knowledge of objectively, though in interconnected terms, in terms of their effects/affects on us and our effects/affects on them, we have but the dimmest understanding at most, such as Quantum Mechanics, Electromagnetic Radiation, the Earth's Magnetic Field, Gravitational Force, Cosmic Radiation and Dark Matter and Dark Energy.

[23] A weighting of characteristics according to the four phases of the adaptive cycle was proposed by Gunderson, Holling, & Light (1995) in which attributes of human groups that dominate activities were considered as they apply to resource management policy. I believe their work is wholly compatible with the above.

[24] As with any act of mapping, we must keep in mind the inherent limitations as described by Jakob von Uexküll: "A map is never anything else than an abbreviated description in a conventional sign language. A map can at the most be correct but it can never be a likeness." (von Uexküll, 1936) (p. 110).

[25] Such ratiocinations, of course, do not even include conditions such as apathy or depression, in which there would be insufficient energy directed to the questions proposed.

[26] I refuse to accept that only our species has "meaning" and other species have only "semiotics." I believe that it is all *either* "meaningful" *o*r "semiotic" across species. This might be a first step in ceasing the view of humans as systemically privileged and therefore exempt from the consequences and rewards of interconnectedness.

[27] Two of many possible examples might be expressed by Antonio Gramsci's work on "cultural hegemony," or more recently, in the historian Thomas Frank's work of 2004 entitled *What's the Matter with Kansas? How Conservatives Won the Heart of America*.

[28] Thus, at the extreme of the K-Conservation phase, infinity has two directions within HMS: not only into the unknown and uncertain space of the permeative order, but also in the other direction, into the eternal binary division of the local order. There is groundlessness in both the unknown and the consistently divided.

[29] "Low connectedness is associated with diffuse elements loosely connected to each other whose behavior is dominated by outward relations and affected by outside variability. High connectedness is associated with aggregated elements whose behavior is dominated by inward relations among elements of the aggregates, relations that control or mediate the influence of external variability." (Holling & Gunderson, 2002) (p. 34).

[30] The possibility of such a map of HMS existing does, nevertheless, bring up some interesting questions with regard to Argyris and Schlön's (1974) theories of actions: "theory in use" and "espoused theory." An interesting realm of inquiry would be the implications (modifications?) of behavior that an awareness of these maps of meaning movements within a greater ACHC could have on an individual or a group ("espoused theory"). There is also the question as to the degree to which we already intuitively act in accordance with such general, understood patterns of ecosystems ("theory in use").