Being in the World as If There's Nothing from the First:
A Praxis-Framework for Emergence

by

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Abstract

Life is an ongoing process of unfolding within a continuum of matter-cognition-semiotics. Evolutionary dynamics and biophysical forces exhibit end-directed (teleonomic) behavior. They increase interconnection over time, integrating antecedent foundational emergent layers into new aggregations, with their own forms, semiotics, and cognition capable of better navigating the environment from which it emerged.

Our current technologies and systems, an outcome of these currents of aggregation and agency, are increasing capabilities to interconnect and integrate across abiotic, biotic, semiotic, and cognitive spheres, leading to strong emergence and enframing.

Critical aesthetic practices enable us to become conscious of the dominant epistemic, technological, and semantic structures that have become enmeshed in our perception giving us more agency, increasing our evolutionary flexibility, and allowing us to influence our becoming.

By understanding underlying biophysical forces, evolutionary dynamics, and the relation of entities as a space inseparable from "Being," artists and cultural producers engaged in critical aesthetic practice can more easily perceive, embody, and analyze deep interconnections and dynamics within a world of increasing integration and complexity.

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Acknowledgements

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The Whole is Greater than Its Sum and the Parts Contain the Whole

What is the pattern that connects? What pattern connects the crab to the lobster

and the orchid to the primrose and all four of them to me? And me to you? What

is the pattern that connects all living creatures?

– Gregory Bateson, *Mind and Nature*

Over the years, I have designed and implemented several large-scale agroforestry systems

in New York City and Palestine. Agroforestry gardens are agriculture systems modeled after the

relationality and functionality of organisms composing various successional ecosystems with the

understanding of energy circulation defined by biophysics. The design process requires you to

build tacit knowledge of the properties, needs, and utility of perennial and self-seeding plants

suitable for the specific ecology of a site. Once you embody this knowledge, you more readily

and efficiently arrange an ecology of relations. You place each plant and plant community in an

ecological niche that minimizes competition and amplifies mutually beneficial relationships.[1]

One can think of an agroforestry system as a puzzle made of semiotic, abiotic, and biotic

components existing in space and occupying sequentially expanding timescales throughout the

day, month, or season, and over years through ecological succession. This is a system latent with

its own potential aggregation and thus its beingness is dependent on the amplification, or

dampening, of various recursive relationships that form internally and externally to the system's

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[1] Dave Jacke and Eric Toensmeier, *Edible Forest Gardens*, 2 vols. (Vermont: Chelsea Green, 2008).

porous boundaries in the context of the larger system into which it is enfolded. I hold this interdependence and dynamism as I design the system to capture the maximal energy inputs from the sun, wind, rainfall, biomass, and tendencies of animals, insects, fungus, bacteria in and around the site-specific biosphere. I circulate and recirculate the exergy as it degrades-transforms through the agroforestry system. My aim is to make a system continuously generating itself at its porous boundaries in symbiosis with the biosphere.

Ecological gardens, and the healthy forest ecosystems they mimic, are a bridge we have from our semiotic world to the logic of atmosphere, the recursive agile processes of evolution, the effortless and graceful decentralized coordination of multi-species, and the rhythms of non-equilibrium metastability within a world of complexity. Nature at this scale reflects back into us, resonating at our most fundamental being within the (evolutionary) older parts of ourselves, parts that are still unconsciously tied to the ebbs and flows of nature or biophysical processes. These are the cells that constitute our bodies, with our medulla oblongata responsible for unconscious processing. These cells regulate our lungs with ease and without self-reflection, allowing us to continuously breathe oxygen from the atmosphere and expel carbon dioxide back out to be taken up by our symbionts, the vegetal beings.

Life is characterized by complex adaptive systems recursively interconnecting outwardly and internally in order to maintain homeostasis, learn, and adapt. Deleuze and Guattari praised the rhizome and its many deterritorialized lines of flight, but the rhizome logic now dominates as networks. It surges through all parts of our lives, separating and moving us along through it, from bureaucratic state systems to planetary-scale infrastructures, even leading some to drive into rivers and deserts towards their untimely GPS deaths. We use computers as extended minds;

the internet itself is altering the structure and functioning of our biological brain. Algorithms are superseding human agency and creating partitioned echo chambers, leading to global disruption faster than we can comprehend. The technology that enframes us and our ecological thinking can be traced back to the science of cybernetics that arose at the end of WWII.

The Macy Conferences, started by the Josiah Macy Jr. Foundation in 1946, assembled a diverse group of leading scholars, researchers, and scientists in an attempt to unify the science of systems and networks, with the core of its participants, like Gregory Bateson and Margaret Mead, coming from the humanities. They were joined by mathematicians, engineers, and neuroscientists such as William Ross Ashby and Norbet Wiener, the latter of whom in 1948 coined the word cybernetics from the Greek word *kybernetes*, meaning rudder, pilot, or a device used to steer a boat or to support human governance. These cross-disciplinary discussions would become the foundation for cybernetics and systems theory.[2] Systems thinking was arguably a scientific paradigm shift in Western Modernity. Physicist Robert B. Laughlin describes this shift as moving from "The Age of Reduction" to "The Age of Emergence."[3] This was the start of a technoscientific understanding and glimpse of holism. After the war, these ideas would be disseminated and used by participants in their respective disciplines, including anthropology, biology, and the burgeoning fields of computation and artificial intelligence.

The conference spurred systems thinking in at least two ways: mechanistic and organismic, which correlates to what art historian Caroline A. Jones calls "right-cybernetics" and

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[2] Steve J. Heims, *Constructing a Social Science for Postwar America: The Cybernetics Group, 1946-1953* (MIT Press, 1993).

[3] Wendy Wheeler, *The Whole Creature: Complexity, Biosemiotics and the Evolution of Culture* (London, England: Lawrence & Wishart, 2015), 13–21.

"left-cybernetics."[4] The science and engineers, who Bateson sometimes called the

"mechy-machs," saw systems and information only energetically and devoid of meaning.[5]

Norbert Wiener viewed information metaphorically as negentropy, or the means in which order

is maintained even as the energy dissipates due to the second law of thermodynamics. The

military-funded engineers and scientists following this line of logic held a positivist view and

believed the feedback circuits they designed could maintain order and be refined by reducing

"noise." Wiener's "command and control" cybernetics is a continuation of colonial logic with a

technoscientific framework. Cybernetics emerged to absorb contingencies and make sense of a

world of increasing interconnectivity and complexity. Cybernetics arose from the rubble of

WWII in the midst of human organization on a scale never seen before. For example, the

intergovernmental body of the United Nations.

Military-funded cyberneticians such as Norbert Wiener paved the way for our networked

reality. They understood data to be as real and cold as particles. In our times, their beliefs have

crystallized in silicon and in the vast interconnected networks that have emerged as a global

megastructure. Systems born from the cybernetic legacy correct "errors" within themselves

without undergoing changes to their structures until absolutely forced by drastic contingencies,

in which case they are forced to either absorb the disturbance, dissolve, or realign the

components within the systems.

Life is characterized by complex systems that learn and interconnect across other matter

and logics in order to adapt forward into space and time. In this time of accelerated

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[4] Caroline Jones, "A Common Sense: A Conversation With Caroline A. Jones," *The Edge*, March 15, 2018, https://www.edge.org/conversation/caroline_a_jones-a-common-sense.

[5] Peter Harries-Jones , "Bioentropy, Aesthetics and Meta-Dualism: The Transdisciplinary Ecology of Gregory Bateson," *Entropy* 12 (December 1, 2010): 2361, https://doi.org/10.3390/e12122359.

destabilization of Earth systems within strong enframing—along with the aggregation of algorithmic dominance, the spread of fake news, and the rise of deep fakes through planetary-scale computational networks—the rhizome-network logic has reached its end-point. We now seek the comforts of compost, the recursive future-forwardness of adaptation within the present, and the logic of atmosphere, where there are simultaneous transformations and connections within degrees of cognizing-flexibility to influence our own morphogenesis. This type of interdependence and recursive interaction occurs in all living systems; this is a network of multidimensional structural coupling.[6]

The dominant Cartesian paradigm created a metaphysics that was based on a mechanistic, reductive, and dualistic worlding, one where everything would eventually be pulled and delineated from the "chaos" of the natural world by quantitative means to finally be known, understood, and assimilated into the human symbolic world, where it would later be recalled through our print-based technologies and processed rationally. However, the failure of the mechanistic and reductive scientific inquiry into organic structures in the 1930s resulted in the emergence of organismic biology.[7] Wiener's mechanistic cybernetics and Bateson's biocybernetics is a continuation of this tension between the ability to understand phenomena through reductionism and holism. Biocybernetics' emphasis on being in the world through developed, tacit knowledge embedded within the constant interdependent flow of the natural world is the counterpoint to first-order cybernetics' highly conscious epistemologies in their top-down created closed systems. This is a tension perpetuated by our binary logic and is

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[6] Humberto Maturana, "Autopoiesis, Structural Coupling and Cognition: A History of These and Other Notions in the Biology of Cognition," *Cybernetics & Human Knowing* 9, no. 3/4 (2002): 15–17.

[7] Ludwig von. Bertalanffy, *General System Theory: Foundations, Development, Applications* (New York, N.Y.: Braziller, 1968), 6.

something we are still grappling with today, but in actuality, both have merits. Their effectiveness depends on the scale at which one is operating.

Humans, with our self-reflective consciousness and our systems, or what I call *self-reflective nature*, are enveloped in shared worldings that are coordinated through our communication systems and regulated by governing bodies. We have aggregated into a global swarm with the communication system of a forest, allowing us to create planetary-scale systems that have caused wide-spread destabilization, from atmospheric to governmental. The negative feedback from these shifts has forced us to sense and now face the interconnectivity and simultaneity of social, technical, ecological, material, and biological systems, and their relationality to our notion of "Being."

As our technology progresses, it becomes more biological in processes and materiality, leading to more seamless integration into our everyday field of experience. The cybernetic systems we consider non-living are reaching their growth limitations, according to Moore's law. They are beginning to merge with the biosemiotic systems we consider living. Autonomy, emergence, and distributed intelligence are replacing control and centralization. In order to deal with increasing deep interconnectivity across abiotic-biotic-semiotic-cognitive spheres, we need to enlarge our worlding and metaphysics from the human-egocentric to a planetary-ecocentric, from egocentric spatial processing to allocentric, from the Western ontology of Being and Non-Being to Being as an ongoing process relative to other *scales of beingness* within underlying forces, including entropy and evolutionary dynamics.

 I am an artist, a user-experience designer, and an agroforestry designer. I do not come from a specialized scientific field, but in my practice as an artist I often work in an

interdisciplinary mode to generate new semiotic logic and channel that logic through embodiment. In my agroforestry practice, I organize the relationship between entities in space and time to construct self-sufficient systems connected to various flow systems in the biosphere. As a user-experience and interaction designer, I use agile methodologies and mental models to create human-computer interactions. In order to be in the world with increasing interconnectivity (and thus complexity), I leverage these methodologies to go beyond single-level linear interactions and causations to construct a temporal and spatialized trans-contextual mental model, instead of connecting organisms such as plants, bacteria, fungi, humans, creatures, and insects into an emergent self-maintaining open system connected to the biosphere, as in my agroforestry practice. I'm using various disciplines, including physics, anthropology, and biology, threaded together by systems thinking and biosemiotics to connect the "Human" back to "Nature," Being to an emerging planetary-scale body and consciousness, and our semiosphere to the multilevel phenomena of biophysical processes. I will contextualize the framework with Endel Tulving's consciousness framework (Figure 1) consisting of anoetic (affective-sensory and perceptual), noetic (knowledge-based), and autonoetic (self-awareness based).[8]

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[8] Endel Tulving, "Memory and Consciousness.," *Canadian Psychology/Psychologie Canadienne* 26, no. 1 (1985): 1–12, https://doi.org/10.1037/h0080017.

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MEMORY SYSTEM        CONSCIOUSNESS


   EPISODIC    <----->  AUTONOETIC
       |                     |
       v                     v
   SEMANTIC    <----->    NOETIC
       |                     |
       v                     v
  PROCEDURAL   <----->    ANOETIC
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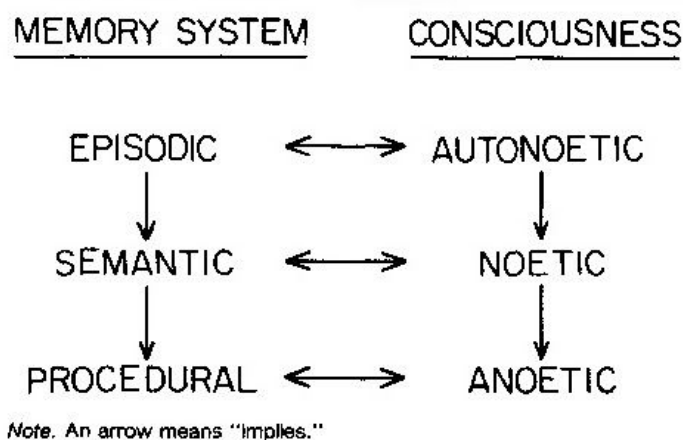*Note.* An arrow means "implies."

Figure 1. Schematic Arrangement of Three Memory. Systems and Three Kinds of Consciousness
Source: Endel Tulving, "How Many Memory Systems Are There?," *American Psychologist American Psychologist* 40, no. 4 (1985): 388.

I am constructing this praxis-framework I'm calling *scales of being* foremost for my artistic practice.[9] I am concerned with how to be in the world as an individual, or an *emergent self,* in relation to various levels and scales of Being. For the past several years, I've utilized various ontological propositions across disciplines aiming to create an aesthetic experience able to create a fissure within our hegemonic worlding and attune our embodied cognition to biophysical processes, but I found these proposals lacking and my own being still too rooted in seventeenth-century Western metaphysics. I realized I had to first orient myself within this world of increasing complexity and work towards what Gregory Bateson called "ecological intelligence."

I am focusing my efforts to connect and integrate the material, biological, social, cognizing, and semiotic spheres into a praxis to aid me in my artistic practice. In doing so, the

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[9] The term *scales of being* connotes the aggregation of matter and range of cognitive-flexibility that constitutes beings within the ongoing transformation of matter, semiotics, and cognition. The term is in reference to Charles S. Peirce's phenomenological concept, "Categories" and Caroline A. Jones' concept, "Scales of Aggregation" from Caroline Jones, "Virions: Thinking Through The Scale Of Aggregation," *Art Forum*, June 2020.

scope of this thesis is interested in laying out pathways and creating zones of contact to find

patterns that connect and fissures for me to take into my practice. I will not have time to fully

develop this large range of ideas into the depths I would like. This is something I will complete

through artistic means.

I will be using systems thinking terminologies and frameworks in this thesis to weave

together concepts from various disciplines. It will be beneficial to remind the reader of the

various conceptions of systems generated by theorists from different fields of expertise. Many

are related and have influenced each other. First-wave cybernetics emerged from the

aforementioned interdisciplinary Macy Conference. It focused on feedback loops in a closed

system, and although Norbert Wiener titled his book *Cybernetics: Or Control and

Communication in the Animal and the Machine*, first-wave cybernetics was incredibly

mechanistic.[10] The closed-loop logic failed to encompass the context-based or parts-to-whole

relationality between organisms or systems and their environments, as well as the "multiplier

effect" of information circulating through these complex adaptive systems.[11] It revealed the

limited views and understanding of natural systems at the time, a legacy we are still wrestling

with today. Second-order cybernetics incorporated the observer into the system and rooted it

back into a context.[12] The Santiago School ushered in a more biological approach with

autopoiesis, which defines living systems like cells that are operationally open, informationally

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[10] Norbert Wiener, *Cybernetics or Control and Communication in the Animal and the Machine* (Mansfield Centre, CT: Martino, 2013).

[11] John H. Holland, *Signals and Boundaries: Building Blocks for Complex Adaptive Systems* (Cambridge, Mass.: MIT Press, 2012), 14.

[12] Margaret Mead, "Cybernetics of Cybernetics," in *Purposive Systems* (First Annual Cybernetics Symposium, New York: Spartan Books, 1968), 1–11.

closed, and able to self-produce at the organizational level.[13] Jay Forrester's systems dynamics

focused on the non-linear circulation of energy and mass. It relied on computer simulation to

model the flow between input, output, and stocks. It was used by corporations to manage the

growing network systems of globalization.[14] Anthropologist Gregory Bateson, who participated

in the Macy Conferences, folded the cybernetic idea of communication and information into

ecology to form his biocybernetic theory of mind, a sort of modified bio-cybernetic panpsychism

and pansemiotic world.

The system dynamics framework tends towards the mechanistic but nonetheless is useful

to understand the very basics of systems. According to system dynamics, systems thinking places

an emphasis on the informational or physical flow between the input, output, and feedback loop

rather than a quantitative understanding of the system's stock. Complex adaptive systems, like

organisms, universities, and governments, sometimes emerge from these interconnections and

can only be understood through qualitative analysis of multiple recursive, positive (amplified)

and negative (regulated) interactions of their subsystems or agents, which retain various levels of

autonomy internal and external to the encompassing system.[15] Donella Meadows, a student of

Jay Forrester, defines it this way: a system is more than the sum of its parts. It may exhibit

adaptive, dynamic, goal-seeking, self-preserving, and sometimes evolutionary behavior.[16]

The advancement of computational power in the 1960s enabled nonlinear dynamic

modeling and complexity theory to emerge, ushering in a new type of ecological thinking in the

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[13] Maturana, "Autopoiesis, Structural Coupling and Cognition: A History of These and Other Notions in the Biology of Cognition."

[14] J. W. Forrester, "The Beginning of System Dynamics," *The McKinsey Quarterly.*, no. 4 (1995): 4.

[15] Christopher Alexander, *Notes on the Synthesis of Form* (Cambridge, MA: Harvard Univ. Press, 2002), 43.

[16] Donella H. Meadows, *Thinking in Systems: A Primer*, ed. Diana Wright (Chelsea Green Publishing, 2008).

West. It furthered our understanding of evolutionary processes and the way simple elements can create emergent behaviors that lead to complexity. Evolution and nature were no longer just random chaos or "noise" but exhibited a kind of end-directed behavior (teleonomic) logic arising from variabilities and agency in constant recursive feedback within a deep pattern of complex ordered relationships.[17]

Evolutionary processes were applied to consciousness and semiotics and gave rise to the new field of biosemiotics. In this view, culture is a result of evolutionary dynamics and reiterates the same creativity in natural processes, like evolution and symbiogenesis; they are all constantly generating new forms and new levels of meaning. They are both worlding. Life, then, is not a teleological process but rather arises through continuous semiosis, feedback, adaptation, and emergence.

Art is a means to engage with this unfolding and influence the direction of its becoming; it's an indirect transmission tool to the bodily unconscious (secondness). It acts through recursion to emphasize the transformation of information, or signs, as it crosses various interfaces, including perceptual, cognitive, natural, and cultural. Art can reveal how socially constructed embodied mental categorization from systems with strong downward causation—such as the dominant culture, language, and technology—enframes us. Art simultaneously points to other ways of organizing and being organized. In many ways, critical aesthetic practices fulfill the role of second-order cybernetics.

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[17] Tom Abel, "Complex Adaptive Systems, Evolutionism, and Ecology within Anthropology: Interdisciplinary Research for Understanding Cultural and Ecological Dynamics," *JEA Journal of Ecological Anthropology* 2, no. 1 (1998): 6–29.

Biosemiotics is the interpretation of scientific biology through semiotics. It was developed with the materialist triadic semiotics and categories of C.S Peirce.[18] The biology of Jakob von Uexküll[19] and Gregory Bateson's biocybernetic theory of mind.[20] It was further developed by molecular biologist Jesper Hoffmeyer.[21] In biosemiotics, all living systems, including cells, bacteria, fungi, plants, animals, and even ecological systems, are in the process of semiosis—the processes of converting physical signals into signs—inside themselves, or *innenwelt*, and outside themselves, or *umwelt*. Each foundational emergent layer consists of their own logic and semiotics, from intercellular signaling processes to animal display, human language, and culture. Within their own semiotic porous boundaries, every living thing is interlinked in highly organized formations through semiosis and alive with meaning and intention, and as such, can help serve as a materialist, non-positivist bridge from our naturalist or multiculturalism worlding to a relational one attuned to biophysical processes. In biosemiotics, information is seen as immaterial arising from material structures, and exists as a process within Peirce's triadic sign relations—sign, object, interpretant—and in need of an interpreter with cognition or qualities of mind able to receive and interpret it. Peirce's sign systems correlate to his phenomenological categories, firstness, secondness, and thirdness. We will later extend this thinking to technology to begin to embed it into evolutionary dynamics and natural processes.

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[18] Vinicius Romanini and Eliseo Fernández, eds., *Peirce and Biosemiotics A Guess at the Riddle of Life* (Springer, 2014).

[19] Rose Hendricks and Lera Boroditsky, "New Space-Time Metaphors Foster New Nonlinguistic Representations," *Topics in Cognitive Science* 9 (June 21, 2017): 800–818, https://doi.org/10.1111/tops.12279.

[20] Jesper Hoffmeyer, ed., *A Legacy for Living Systems: Gregory Bateson as Precursor to Biosemiotics*, vol. 2, Biosemiotics (Springer, 2008), http://dx.doi.org/10.1007/978-1-4020-6706-8.

[21] Jesper Hoffmeyer, *Biosemiotics: An Examination Into the Signs of Life and the Life of Signs* (Scranton: Univ. of Scranton Press, 2009).

We left the enclosure of our original umwelt and semiotic niche, only to step into (and be captivated and enchanted by) our own self-reflective semiosphere. We could never see the object for the sign. We experience the world mediated through epistemes, and our current worlding does not believe in aligning human-made or self-reflective natural, social, and technological systems to biophysical processes. As a result, our material and information network systems have grown to planetary-scales, leading to the wide-spread destabilization across the globe—from atmospheric to geopolitical, all postulating back to us, a subunit of the larger social bodies—and the questioning of our current construct of Being as a self-contained autonomous unit, independent of the environment, living in a world of chaos.

In recent times, there have been numerous ontological propositions from across disciplines, including actor-network theory, affect theory, agential realism, new materialism, object-oriented philosophy, and the ontological turn in anthropology. Although these proposals vary within the specificities of their respective field, they are connected through their desire to decenter the human, which can be characterized as the nonhuman turn.[22] I also found these proposals were presenting similar relational ontology but presented through the specificities of their respective fields. Karen Barad proposes Being as inter-action phenomena from the discipline of physics, Donna Haraway presents the cooperative holobiont from biology, Philippe Descola and Eduardo Viveiros de Castro use anthropology to situate humanity in a cosmological framework of relationality through material and immaterial spectrums.

I attempted using these various ontological proposals to produce artworks that created bifurcation points to new semiotic niches and logic, in the hope this could form a bridge from to

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[22] Richard Grusin, ed., *The Nonhuman Turn* (Minneapolis; London: University of Minnesota Press, 2015), 8–28.

a sustainable culture, but kept running into the same problem. One of my projects involves three polyphonic vocalists singing interlocking parts while weaving through the audience. Each singer sang a pro-drop text, written in the style of shanshui (mountains and rivers) poetry. The text syntax contains no personal pronouns and prepositions while emphasizing action and time rather than the subjects. With the absence of these markers, the text fluctuates from emphasizing the agency of the human and that of the landscape. The musical and text poly-structure allowed the audience to listen to the singer separately or together as a whole. The piece emphasized the network and interrelations and not the parts to whole relations. Although interrelations are a trait of systems, it does not encompass being in a world with emergence, a quality of complex and natural systems.

The recent relational ontological frameworks operate epistemologically through relations relative to the self at a limited local scale, which goes against ecological intelligence as defined by Gregory Bateson. These modalities operate only from the multicellular scale of the emergent-self's noetic-autonoetic consciousness, creating a gaze at the social level and not penetrating down to the biotic and abiotic layers. Fixating on the self in relation to other entities creates an ego-sphere, where the "I" is the referential center (egocentric referential frame), and creates dialectical relationality from one entity to another; hence the popular frames of human and non-human, human in the more-than-human-world, and inanimate and animate; or, as a way to keep the ego intact, frameworks that completely ignore the experience of the human, or emergent-self. This type of abstraction is only possible in our autonoetic consciousness unburdened by material reality. In the natural world, everything exists within an environment. This led me to think about an ontology as a place and Being as relative to it.

Life is an ongoing combination and integration of previous emergent matter, creating newer and higher levels of complexity at a larger scale. If the human is no longer a single lonely atom, an autonomous closed system traversing through a world of chaos and without meaning, then who we are is related to where we are. Merleau-Ponty framed phenomenology around consciousness and unconscious processing, but we need to enlarge this to incorporate the environment.[23]

Existence is beingness on a scale of cognizing-flexibility, enmeshed within a continuum of matter and semiosis, and subjected to underlying long-lasting and dynamic processes with environmental variability and contingencies. My praxis-framework will make full use of our mental ability to time travel (chronesthesia) and allow the neural-body in our autonoetic consciousness to transverse beyond the human timescale to scalars and vectors of Being in a cosmo-evolutionary spacetime within the present. This places the emergent-self (the observer) always within their own relationality and embodiment as an organism composed of other emergent matter and organisms, all within the ongoing continuum of matter-semiosis-cognizing-beingness-aggregation-becoming.

Evolution proceeds with emergence; new forms, relationality, and organizational structures emerge from previous ones. Each emergent layer combines and incorporates the antecedent layers, increasing in organizational complexity and interconnectivity. Each emergent layer has its own internal register of difference, semiotics, and meaning-making, while recursively incorporating the antecedent layers all the way down.

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[23] Maurice Merleau-Ponty, *Phenomenology of Perception* (London and New York: Routledge, 2013).

I will draw on physics, evolutionary processes, and biosemiotics to situate the human as an emergent being within the continuous transformation of matter and semiotics over spacetime. I will build a cosmo-evolutionary, holarchic axis (Figure 5) off of environmental scientist Tyler Volk's grand sequence and anchor it into the present.[24] I will then frame interactions and relationality with thermodynamics and constructal law, and use biosemiotics to analyze the relationship between mind, body, and semiotics in relation to other beingness within evolutionary processes. Because nature is infinitesimally nested, the ground is a frame we decide on. This forms the underlying forces responsible for the formation of boundaries within a network relative to our analysis or needs.[25] I will construct a two-level framework to orient myself within this continuum of ever-moving and changing matter and semiosis: an ontology of place (relative mode) and its feedback, a pre-ontology of processes (absolute mode). We begin with identifying the "lowest level" of ground relative to our existence as agents within a planetary-scale technoscientific swarm.

We start at the Big Bang where protons and nuclei emerged. Hundreds of thousands of years later, electrons stuck to the atomic nuclei to form atoms and atoms bonded to form molecules. From this emerged simple cells and bacteria that contained biological codon, including DNA. Multicellular organisms emerged from complex cells and incorporated previous matter and logics into themselves but had the ability to process indexical signs. This was followed by the emergence of linguistics and symbolic signs, and then computation. This recursive and interpenetrating phenomenon resulted in the formation of complex biological orders composed of various entities that are often hard to delineate between. They-we exist with

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[24] Tyler Volk, *Quarks to Culture: How We Came to Be* (New York, Chichester, West Sussex: Columbia University Press, 2017).

[25] Holland, *Signals and Boundaries: Building Blocks for Complex Adaptive Systems*, 18.

porous boundaries and themselves-ourselves are made of other entities that can exist

simultaneously (emergent) and/or interpenetrating.[26]

We evolved to interrupt and experience the world through our epistemes and constructs,

especially ones that have become habitual. These factors contribute to what we call "reality" and

thus our experience in the world.[27] A fundamental shift in our construct of Self and Being is

needed in order to allow us, as emergent selves and subunits in a planetary-scale technoscientific

grouping, to coexist with other ways and scales of being, and ultimately with biophysical

processes. It is not enough to simply rationally understand we are not the center of life on Earth:

we need a praxis for our everyday field of experience.

We will start with an understanding of abstract concepts and ground this in the somatic

processing and embodied knowledge needed to navigate ourselves in the world of increasing

interconnectivity and complexity. The pathways used in somatic knowing enable the agent to

process more information more readily. They operate less on categories fixed by language and

allow us the flexibility to comprehend and understand the multidimensional relationality of, and

various levels of meaning and logic constituting complex systems and life on Earth. As we will

discover later, tension arises between indexical and symbolic processing, the umwelt and the

semiosphere, conscious and unconscious processing. In order to rectify this, I will incorporate

the phenomenological, semiotic, and material realms to create a two-level intersubjective,

inter-corporeal temporal, and spatialized mental model for human agents in our technoscientific

society. I will incorporate the findings from Henricks and Boroditsky's psycholinguistics study [28]

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[26] Roland Bouffanais, *Design and Control of Swarm Dynamics*, SpringerBriefs in Complexity (Singapore: Springer, 2016), 11.

[27] Hoffmeyer, *Biosemiotics: An Examination Into the Signs of Life and the Life of Signs.*.

[28]

on the correlation between language and embodied cognition in spatial and temporal processing to construct new spacetime metaphors, so that we can tacitly embed and orient the emergent-self within the constant unfolding of complexity, and in this way, resonate with other beingness and processes underlying the biosphere.

The framework's two levels, the relational *ontology of place* and the absolute *pre-ontology of process,* are in feedback with each other. The framework is a matrix of matter and semiosis forming lattices of umwelts and semiotic niches, in porous, stratified, holarchic layers in spacetime, all coordinated together by semiotic causation converging in the present within our everyday field of experience. The fundamental idea of Being I am proposing is an emergent-self always in relation with, and interdependent to, other scales of aggregated metastable matter, organization, organisms, logic, semiotics, and thus beingness. These are gradients in the ongoing transformation of exergy, matter, agency, and semiosis in spacetime. This framework orients the emergent-self in the world of complexity and emergence with a non-dualistic and contextual vantage point, while not utilizing a single unifying principle or fluttering between irreconcilable opposites.

The relational mode is relative to the vantage point of the emergent-self and therefore relies on noetic-autonoetic consciousness. It allows one to embody the interpenetrating and interconnecting relation of one entity to another. We left the umwelt only to be spellbound by our semiosphere. The absolute mode is feedback to the relational mode; it reminds us of our epistemic and semantic enclosure as we glimpse out to create new meaning and thus connections and amalgamations. It is a pre-reflective and pre-ontological modality relying on a perpetual judgment using somatic-psychic through our anoetic-noetic consciousness. It is a place of

no-entity. It relies more on somatic-psychic processing rather than the usual cognitive; it goes below the level of the emergent-self-preserving open system to Being as a process. Embodying a mode of being at the process level allows one to more easily connect with the larger underlying processes and exist beyond the socially constructed mental categorization dictated by the larger organizing bodies——in other words, to see out of the semiosphere. This is the closest we can perceive dynamic forces, including evolution's creative processes, which we can then use within our own semiosphere to increase flexibility. We can never fully leave our world of symbols, just like our actions can never leave biophysical processes. The best we can do is briefly glimpse out to touch the real.

Human individuals are swarms of swarms in swarms. We are complex adaptive systems (CAS) within nested sets of complex adaptive systems. We are agents constituting larger social entities and ecosystems. We are enfolded in these entities the way eukaryotic cells constitute the human body. The influence between the emergent, larger organizing systems and the nested subsystems is bilateral, but the larger, more complex emergent amalgamation has more influence over the entities nested in them. This is called downward causation. The individual agent or subsystem——whether they are humans in relation to large social amalgamation, or eukaryotic cells in relation to the human body——has less influence on the emergent, more complex entity they are nested in. This is called upward causation.[29]

As individuals, we are disproportionately acted on by larger organizing bodies. This varies in scale from families, businesses, corporations, cities, states, to the federal level. The large-scale systems enframe us and have strong downward causation on us, but their influences

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[29] Fritijof Capra and Pier Luigi Luisi, *The Systems View of Life: A Unifying Vision* (New York: Cambridge University Press, 2018), 157–58.

remain largely hidden to us in our everyday field of experience. What we can see are the events and emergent patterns that arise from their influence. Art is a tool to bring these systematic underlying processes to a human-scale. It enables us to sense and imagine other ways of organizing and being organized. I can imagine a eukaryotic cell in you, producing phenomena for their fellow eukaryotic cells in order to help them see and contemplate the decisions you, the emergent being, are making. In this sense, art is a regulatory system within our collective body's semiotic pathways.

An ontology based on underlying forces is suitable for a large-scale, technoscientific society with an understanding of the biophysical. This type of grounding would allow a pluriverse, all aligned with biophysical processes. I will contextualize this using anthropologist Philippe Descola's ontological quadrant grid and systems theory's Iceberg model.

The Shifting of the Ground for the Lonely Atom and the Forming of a Planetary-Body

In the aftermath of World War II, a new layer of larger organizing bodies emerged from the national level, turning nations into a subunit within larger, more complex intergovernmental organizations. These entities, such as the North Atlantic Treaty Organization, the Council of Europe, and the United Nations, sought to stabilize social organization on a new planetary-scale. One of the largest of these entities, the United Nations (UN) was established in 1945. The first meetings of the UN General Assembly took place in 1946, with 51 nations represented. By 1948, the UN adopted the Universal Declaration of Human Rights, setting a new precedent that reached all the way down to encompass the individual human layer. All these transitional planetary-scale bodies still exist today but never became truly planetary, due to insufficient leaps in logic, semiotics, and communication networks to connect the various social subunits to form a truly planetary-scale organizing body.

We are now forced to face a new level of complexity, one where we again need to enlarge our frame, this time reaching beyond the social level to encompass the full gradient of cognition, agency, biotic, and abiotic interconnectivity and aggregations, or Beingness, on Earth. We have to go back to the end of WWII to understand where we are and where we can go from here. The end of the war led to the destabilization of planetary-scale order and the emergence of new planetary-scale governing bodies and the transdisciplinary Macy Conference. The opening up of disciplinary boundaries led to the rich exchange of information from various scientific fields, the emergence of cybernetics, and the first widely accepted technoscientific form of systems thinking.

Following the war, cyberneticians and cybernetics segued into computation and artificial intelligence. The scientists and engineers in these fields inadvertently created more complexity by blanketing the Earth in networks with us inside of them. They believed they were creating order from chaos by containing and controlling nature with mathematical modeling and increasingly powerful computation. Unfortunately, this logic—and the subsequent systems produced from it—was incapable of truly absorbing or incorporating the simultaneity and multi-level phenomena of the natural world, and so created simplified systems based on silicon binary switching and made up of components with a single level of interaction. As these systems grew, so did Norbert Wiener's concern for humanity in an increasingly automated world of "command and control," so much so he penned the book *The Human Use of Human Beings* in 1950, but it was already too late and not enough. Cybernetics had dissipated and diffused through a plethora of disciplines. The subsequent technologies born from cybernetics continued the colonizer domination paradigms with Western hyper-rational epistemologies and scientific frameworks residing within a world of increasing complexity.
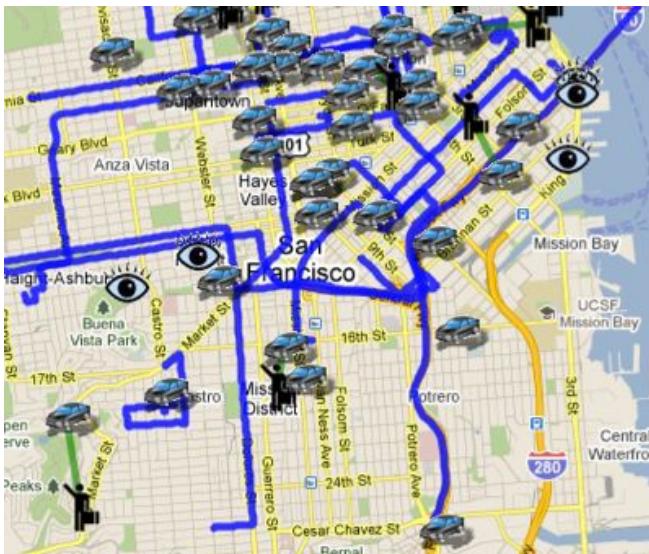

Figure 2. Screenshot of Uber's "God View."

Source: Chen, Brian X. "App-Powered Car Service Leaves Cabs in the Dust." *Wired*. Conde Nast, May 4, 2011. https://www.wired.com/2011/04/app-stars-uber/.

The creators and observers of first-order cybernetic systems are not in the world but hovering above it. They are the non-embodiment embodiment of the prefrontal cortex; the conscious and rational knower, floating in a centralizing node in the sky, way above Earth and the beings who live in a world without meaning, unknowingly circulated as cold data. The observers, with their exclusive access to these aerial panopticon dashboards, believe these tools enable them to see "objectively," giving them a false belief in their own capacities to "steer" the system. This is seen in countless projects, including Stanford Beer's Project Cybersyn, active from 1971–1973, as well as in Uber's "God View" forty-one years later (Figure 2). The human agents and subsystems within these projects stemming from the first-order cybernetic legacy are reduced to functions in a daisy chain of loop causality and are devoid of their own meaning, nested in a system without context beyond itself. This is an extension of Fordism except with a loop: a recursive cause and effect. Meaning in these systems is replaced with value and the most value comes from the ability to efficiently circulate in a way that reinforces and perpetuates the larger organizing structures. The most valuable meaning then, in colonial-mechanistic-cybernetic systems, is not from the agents themselves but the aggregate patterns that arise from the agents coming to terms with the systems; information for the steers-man to steer.

As technology progresses, it becomes more biological in material and processes, enabling it to merge with biotic and cognizing systems. Interconnectivity is becoming more like fusion, while retaining the dated logic of knowing. Our understanding of the world comes from the digestion and modeling of phenomena with technological apparatus. The world is constantly

changing and becoming more interconnected, causing more contingencies and complexity and requiring the intake of more information to comprehend it. Even with machine learning, we can never have enough information to make sense of the world or to control it, yet we hold onto the belief that sense and control would be possible if we had more information, or if not more information, more constraint. This creates a pattern of addiction for information and systems that are maladaptive to handle the complexity of the natural world and the increasingly complex technological systems that show traits of natural systems. Mechanistic systems have a tendency to not adapt or change their internal structures in response to the environment; instead, they stabilize or reduce "noise" internally with the existing structures and mechanisms. This regulation also encompasses the subunits, constraining the agents' degrees of flexibility and therefore potential. In other words, these systems favor internal stability over evolutionary flexibility and adaptability.

These simplified, rigid, and delicate systems are still growing today and consume vast amounts of energy while becoming more entangled and complex. They disintegrate some boundaries and reinforce others, while still disregarding their context: the environment and the biophysical processes of Earth. The "steers-men" continue to quantify the qualitative with dizzying amounts of information now too large for human-scale hyper-rational "command and control" processing. However, first-order cybernetics is being further prolonged with the emergence of machine learning and the recent technologies that show promise of one day linking machines and their neural networks to the human brain, as envisioned to be the solution for the inhuman condition under first-order cybernetics by Norbert Wiener all those years ago. Meanwhile, we are getting planetary-scale feedback and inching towards a tipping point to our

own demise. This kind of system mayhem is not unique to humans, although it seems we like to think so. Cancer, a threat to all multicellular organisms, can multiply unabated, robbing its environment of all nutrients and energy and causing its multicellular home to break down to the point where that environment is no longer hospitable to life in the organism. The Rocky Mountain locust went extinct after consuming all the food it could from its environment, altered by farmland. Perhaps we are more like the locust.

Bateson utilized cybernetics and systems thinking differently from Nobert Wiener and the other military-funded scientists and engineers. Instead of perpetuating systems for command and control, Bateson applied cybernetics and systems thinking to understand the organizational structures that appeared in living organisms. In doing so, he experienced the limitations of cybernetics applied to living systems. Cybernetics viewed agents as data and data like energy flow—devoid of its own internal meaning (and thus agency) within a closed system. In other words, first-order cybernetics lacked the parts-to-whole relationship that forms the natural world. These closed systems did not integrate the environment but actively kept it out. Bateson, with his background in biology and anthropology, knew systems thinking was a powerful tool, but found mechanistic cybernetics too simplistic to comprehend the natural world, with its parts-to-whole structures, and thus incompatible with its processes of mutual casualty situated in the environment. He would go on to create an organicism cybernetics.

Bateson treated homeostasis not as a dynamic energy regulatory system separate from its environment but as a system learning and adaptive within and part of the environment. If cybernetics looked at organization and structure as the circulation of data-energy with agents as passive nodes, Bateson's biocybernetic saw information full of meaning and the world

constituted by different levels of mind and learning to receive and interpret it. He believed

systems thinking would finally enable us to comprehend that human knowledge is not absolute,

that there was no such thing as scientific law. Because everything was constantly shifting and

relative, the best we could do is have well-informed approximations or best guesses that we

needed to constantly check and update. He was looking for a way to be in the world with

increasing complexity, without domination or solely relying on theory and highly rational

processing.

Marget Mead, an anthropologist present at the Macy Conference and wife of Gregory

Bateson, would take a step towards Bateson's proposal. She would go on to create second-order

cybernetics with Heinz von Foerster in the late 1960s. Second-order cybernetics differs from

first-order by incorporating the observer into their observation. Mead and Foerster called it the

"cybernetics of cybernetics." [30] It was a cybernetics, or feedback, to regulate the growing

technological infrastructure and the first-order cybernetic frameworks that spurned them, as well

as an attempt to bring the observer back to Earth. I believe critical aesthetic practices fulfill the

role of second-order cybernetics. It is the feedback loop to the systems that have strong

downward causation on us.

First-order cybernetic feedback is a bilateral linear casualty separate from an

environment. In this modality, sense relies on deduction and induction logic to analyze past

patterns to predict the future in the present. Assumptions in this frame turn into beliefs,

petrifying into absolutism while the world continues to change. Gregory Bateson's feedback is of

mutual casualty within the environment. It is one of abductive logic, learning, and actions

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[30] Mead, "Cybernetics of Cybernetics," 1–11.

enacted on from best assumptions, allowing for preemptive or future-forward actions from the present, and thus is a form of adaptation. Abductive logic is a means of knowing based on contingencies that arise is aligned with evolutionary dynamics that structure the natural world. Bateson believed in systems that show mental characteristics such as complex adaptive systems. No one part can exert unilateral control over the whole without dire consequences. Thinking that departs from Bateson's ecological intelligence leads to ideas that threaten the system as a whole.

Artists have used system concepts and technology as a theoretical framework at each system's turn, including first-order cybernetics, second-order cybernetics, autopoiesis, general open systems theory, complexity theory, and complex adaptive systems. Systems frameworks are incorporated into critical aesthetic practices in a number of ways that I will highlight. The categories I will list are not silos but more like nodes on a spectrum. Artists use systems thinking to bring large scale things— history, nature (including questions about ourselves), technology and science, infrastructure systems, and governing bodies—down to the human scale so that we can perceive and comprehend them. We can think of Ryan Trecartin, who intuitively reified the internet into a rhizomatic video form, surfacing the embodied effects the internet has on us. We can also look to John Akomfrah's video essay "Vertigo Sea," 2015, which tackles multifaceted issues like climate change. We can even go back to Hans Haacke. He was influenced by general open systems theory and brought the atmosphere down to a human scale with "Condensation Cube," 1965. The equivalent of that piece today would be Pierre Hyughe's "After ALife Ahead," 2017. The work is installed in an abandoned ice rink and exhibits traits of a complex adaptive system. Within the whole system situated in the ice rink are subunits, consisting of free-roaming bees and chimera peacocks, an incubator filled with cancer cells, and a tank of sea snails. CO_2

levels within the system fluctuate based on the movement of the bacteria, bees, and peacocks within the rink. This affects the proliferation rate of the cancer cells within the incubator, which in turn are tied to an algorithm that controls the opening and closing of the rink's roof hatches—which then affects the movement of the wandering creatures, and the cycle continues until de-installation. The subunits interconnect and influence each other, reacting to the environment, and changing over time. However, they do not integrate to the point of strong emergence and downward causation, a defining trait of a complex adaptive system (CAS).

In Ragnar Kjartansson's nine-channel installation "The Visitors," (2012) musicians performing a song together in separate rooms of a large house are displayed on nine screens. The piece progresses with individual musicians slowly beginning to sync up with each other, forming a musical gestalt that we can hear as more than the sum of the parts. This is emphasized as the gestalt breaks apart into the individual subunits and back again throughout the progression of the work as the viewer approaches and leaves each individual screen, and as the musicians take breaks to tune, smoke, and rest. The piece's emergent property is more substantial than Huyghe, but the piece does not react to its environment like a CAS.

Art is a regulatory tool to dampen or provide negative feedback to the dominant socially constructed mental categorization and the infrastructure that circulates and recirculates (amplifies) it. If signs and associated meanings are prevalent enough through daily reinforcement and circulation, they become beliefs and are eventually embodied to the point that they are enmeshed into our field of vision, dissolving into the lens through which we perceive the world. We can go back to Hans Haacke's institutional critique practice from the 1970s and Forensic

Architecture's practice today as examples of artistic practices that utilize technology and a systems approach to reveal infrastructures that enframe us.

Lastly, art is also a speculative and envisioning tool. To put it in systems terms, critical aesthetic practices are tools we use to orient, perceive, and sometimes comprehend large scale systems while creating negative feedback to the systems that have strong downward causation on us. Ideally, these practices can create a bifurcation point to new semiotics and associated logic in order to rethink how we can organize and be organized.

As our systems progress, they become larger and more interconnected across abiotic, biotic, social, and cognizing spheres, which means a majority of our systems are becoming complex adaptive systems. Art, in essence, has to adapt to deal with these increasing complexities. Art, like science, brings other scales of being to a human scale in order for us to comprehend. Science often does not look at itself and so becomes the apathetic means for technology and belief systems. Art, on the other hand, sometimes uses science and technology to look at science, technology, and the systems they proliferate, fulfilling the role of second-order cybernetics, the "cybernetics of cybernetics."

Critical experimental art practices have been a feedback loop since the early growth of first-order cybernetics systems. In 1959, Brion Gysin sat in a Paris hotel and cut up text from a newspaper to rearrange it to form new text; this would become the "cut-up technique," popularized by William Burroughs. The original method could be linked back to dadaists Tristan Tzara and Hans Arp in the 1920s, but the form in the hands of Burroughs and Gysin was situated in a reality built off of cybernetics, which enabled similar forces acting within growing distributed networks to become a means to disconnect and reconnect and to simultaneously

destabilize established beliefs and expose their constructs, all while creating new connections from normally dissociated areas. In the final paragraph of a text written about the cut-up method by Burroughs, there are echoes of the growing cybernetic world Burroughs and Gysin were trying to reimagine. This notion is something we should remember, as we are still wrestling with these systems and the frames they create today.

CUTTING AND REARRANGING FACTOR YOUR OPPONENT WILL GAIN INTRODUCES A NEW DIMENSION YOUR STRATEGY...“POETRY IS FOR EVERYONE” DR NEUMANN IN A COLLAGE OF WORDS READ HEARD INTRODUCED THE CUT-UP SCISSORS RENDERS THE PROCESS GAME AND MILITARY STRATEGY...HAVE BEEN MADE BY ACCIDENT IS WHERE RIMBAUD WAS GOING WITH ORDER THE CUT-UPS COULD “SYSTEMATIC DERANGEMENT” OF THE GAMBLING SCENE IN WITH A TEA HALLUCINATION: SEEING AND PLACES. CUT BACK. CUT FORMS. REARRANGE THE WORD AND IMAGE TO OTHER FIELDS THAN WRITING.[31]

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[31] William S. Burroughs and Brion. Gysin, *The Third Mind* (New York: Viking Press, 1978), 29–33.

The Lonely Atom, the Holon-Body, and the Ground: Being in the Age of Emergence

It is because I dove into the abyss that I am beginning to love the abyss I am

made of.

— Clarice Lispector, *The Passion According to G.H.*

Biosemiotic theorist Wendy Wheeler says the systems thinking that arose in the twentieth

century displaced seventeenth-century metaphysics but never replaced it. Even though we have a

technoscientific understanding of the natural world through complexity and non-linear dynamics,

we still experience the world as lonely atoms floating through chaos, a world without order. The

word atom is from the Greek word *atomos*, meaning "uncuttable." It was coined by the ancient

Greek philosopher Leucippus and his pupil Democritus, and was thought of as the irreducible

fundamental unit of matter.

One of the fundamental problems in grasping complexity at an embodied level for a

lonely atom is the mental model of self which is linked to definitions of life and intelligence. We

can refer back to the "I think, therefore I am" dictum by the French philosopher René Descartes

in his *Discourse on Method.* Decarte's mind-body dualism is the predominant way lonely atoms

still operate. We currently navigate the world predominately reliant on rational processing and

egocentric spatial processing. Gregory Bateson's theory of mind was one of the first scientific

counters to this stronghold.[32] Bateson also believed mind-body dualism was interlinked with the nature-culture divide and that the only way to overcome it was to develop an ecological intelligence. We had to see that mind was ecology, and ecology was mind.[33]

The atomic, dualistic, and anthropomorphic worlding is so strong, scientists working on early studies on the complex nest building in social insects hypothesize that individual agents possess a mental representation of the global structures, like a blueprint, to be produced and follow. What they discovered instead was "a direct causal relationship between nest complexity and behavioral complexity. Recent work suggests that a social insect colony is a decentralized system composed of cooperative, autonomous units that are distributed in the environment, exhibit simple probabilistic stimulus-response behavior, and have access to local information."[34]

I will build the vertical holarchic axis in the framework in this chapter. The framework is agile and contextualizes contingency and complexity. With it, one could zoom out to the planetary or zoom in to the microscopic on the axis, depending on one's situational context. I will then cover the connection between the umwelt and the semiosphere, the unconscious and conscious processing contextualized within evolutionary dynamics. Lastly, I will lay out two modes of the praxis framework: the relational and the absolute. The relational mode starts from the emergent pattern layer or the emergent-self in relation to other assemblages in the model (Figure 3) and may move up or down the lower two levels. The absolute mode starts from the foundational physical, chemical, and biological layer last tier and moves upwards.

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[32] Andrew Pickering, *The Cybernetic Brain: Sketches of Another Future* (Chicago: University of Chicago Press, 2011).

[33] Gregory Bateson, *Mind and Nature: A Necessary Unity* (Cresskill, NJ: Hampton Press, 2002).

[34] Eric Bonabeau, Marco Dorigo, and Guy Theraulaz, *Swarm Intelligence: From Natural to Artificial Systems* (New York; Oxford: Oxford University Press, 1999), 206.
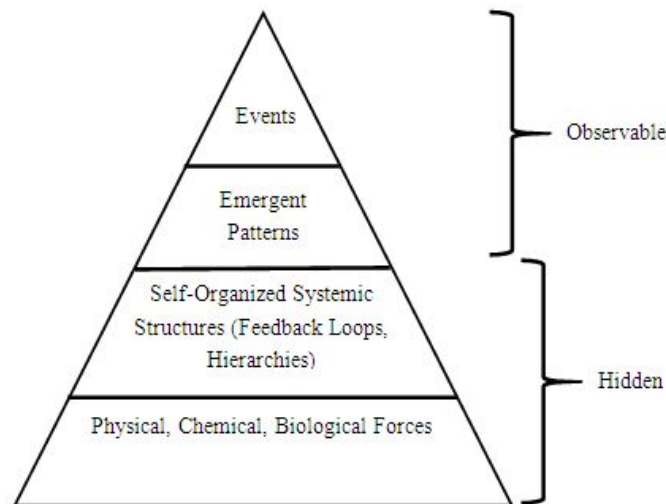
The Underlying Forces: The Nature of Nature

Figure 3. The Iceberg Model Applied to Natural Systems.
Source: Gannon, Thomas & Monat, Jamie. "What is Systems Thinking? A Review of Selected Literature Plus Recommendations." *International Journal of Systems Science.* 4. 2015. 11-26.

According to Monat and Gannon's Iceberg Model for Natural Systems, the explicit events and patterns we can observe are caused by underlying systemic forces and structures which are often implicit and remain largely hidden from us.[35] This diagram serves as a guide to help us think about the relationship between the various elements I will be covering in this thesis. I start the chapter with an explanation of some fundamental principles from physics and biology that underlie the transformation of matter and emergence. This will give us an analogous ground and overarching context from which everything emerges. I will explain the significance of this later on with Descola and Castro's ontology framework.

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[35] Thomas Gannon and Jamie Monat, "What Is Systems Thinking? A Review of Selected Literature Plus Recommendations," *International Journal of Systems Science* 4 (July 1, 2015): 11–26, https://doi.org/10.5923/j.ajss.20150401.02.

Life is an ongoing transformation of matter into metastable aggregations with internal
and external feedback, such as plants, fungi, and animals with their own logics and semiotics,
taking in energy and exchanging entropy into the larger system. The first part of this statement is
stipulated in the first law of thermodynamics; energy in any system and its environment cannot
be created or destroyed; it can only transform, but the quality of the energy may change. As
energy flows through a system, it increases in entropy and becomes what was once thought as
increasing in disorder and decreasing in exergy. French physicist Nicolas Léonard Sadi Carnot
came upon this natural tendency in 1824 while attempting to produce more efficient steam
engines. This would become known as the classic second law of thermodynamics.[36]

The sun radiates solar energy to Earth, giving life to most organisms directly or
indirectly. Organisms and other processes all generate heat when in motion, and all this heat
collectively radiates back out from Earth into the cooler atmosphere towards the 2.8K
temperature of outer space. One can understand this as the effects of entropy. Ilya Prigogine, a
physical chemist, wondered how, if the universe was increasing in entropy and disorder,
biological order was increasing in complexity and organization. He found the second law, rooted
in linear physics, insufficient to understand the non-linear "physico-chemical basis of evolution
towards structures of increased complexity."[37] We see the result of this all around us; for
example, in the plants we encounter every day. They are highly ordered structures,
photosynthesizing sunlight to aggregate and synthesize themselves from atoms and molecules

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[36] Eric J. Chapman, Daniel L. Childers, and Joseph J. Vallino, "How the Second Law of Thermodynamics Has Informed Ecosystem Ecology through Its History," *BioScience* 66, no. 1 (December 9, 2015): 27–39, https://doi.org/10.1093/biosci/biv166.

[37] I. Prigogine and R. Lefever, "Theory of Dissipative Structures," in *Synergetics: Cooperative Phenomena in Multi-Component Systems*, ed. H. Haken (Wiesbaden: Vieweg+Teubner Verlag, 1973), 124–35, https://doi.org/10.1007/978-3-663-01511-6_10.

found in atmospheric gases and soils, all while dissipating water and cooling their surrounding

environment. Plants and other complex adaptive systems are porous and in constant flux from

the material and energy exchange across their boundary and yet retain their form while

dissipating energy out into their environment. Ilya Prigogine won the Nobel prize in 1978 for

successfully formulating nonlinear equations of dissipative structures: biophysical processes

underlying numerous assemblages, from complex living organisms to hurricanes.

In the language of nonlinear dynamics, a system encounters bifurcation points at which it

may branch off into entirely new states, each characterized by a specific attractor, where new

structures, rules, and forms of order can spontaneously emerge. In biosemiotics, this translates to

new semiotics and logic. Ilya Prigogine understood biological systems and complex systems in

symbiosis with their surroundings maintain themselves far from equilibrium. In light of this, we

understand the second law of thermodynamics not as the increase of Ludwig Boltzmann's

disorder but as the spread and redistribution of energy and exergy with the tendency to smooth

out gradients in the system, leading towards a type of equilibrium. If the sun were to go out, we

would all turn into an organic sludge of fulvic acid and the Earth would stop radiating heat,

getting closer to equilibrium.

Dissipative structures are considered to be contextualized in the realm of thermodynamic

equilibrium and are not applied to the ecosystem and planetary scales systems, which are

hierarchical and evolving non-equilibrium thermodynamic systems.[38] There have been scientists

who contextualize the classical laws of thermodynamics and dissipative structures in

non-equilibrium thermodynamics to work around this, but I will not get into that here. The

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[38] Axel Kleidon, "Life, Hierarchy, and the Thermodynamic Machinery of Planet Earth," *Physics of Life Reviews* 7 (October 1, 2010): 424–60, https://doi.org/10.1016/j.plrev.2010.10.002.

physics for self-organization is still being disputed and frameworks are still being proposed.[39]
We do not yet know why self-organization happens, but only that it does happen, and for our purpose this is good enough.

We now have an understanding that there are underlying processes that have a strong, seemingly absolute downward causation on emergent patterns and events. Being an emergent pattern ourselves within this system, we and the systems we create as self-reflective nature have much less influence on these underlying forces than what we call "nature," at least until our technology can manifest materially at the interplanetary scale.

In systems thinking, there is widely considered to be two types of emergence: strong emergence and weak emergence. The well-known phrase from Gestalt theory, "the whole is more than the sum of its parts," is in reference to strong emergence and strong downward causation. In contrast, the new patterns and amalgamation arising from weak emergence has less influential downward causation and can be understood through its parts. I will be using emergence in both ways, depending on the context.

Evolution proceeds with emergence; new self-organizing structures emerge from previous ones, creating new forms and scales of increasing complexity and interconnectivity. Each emergent layer has its own internal register of difference, set of rules, semiotic logic, and meaning-making while incorporating the previous layers all the way down through recursion. According to complexity theory, the logic or laws of the new level must not violate the laws of the antecedent layers. In turn, the new layer is constrained to a degree by the incorporated

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[39] Jeremy England, "Statistical Physics of Self-Replication," *The Journal of Chemical Physics* 139 (September 28, 2013): 121923, https://doi.org/10.1063/1.4818538.

previous layers.[40] We can think about this as old sayings, logic, and patterns being reformulated for new layers of increasingly higher complexity and gradients moving towards the dissipation of overall energy, leading towards a type of equilibrium between Earth and space. According to constructal law, the direction and shape matter takes on in their-our ongoing configuration and reconfiguration over time or evolution is a tendency towards the easier and more efficient facilitation of flow.[41] The constructal law is a stipulation from physics, and like many propositions from this discipline, it views systems materially and through the distribution and circulation of energy. It does not engage with the immaterial processes of semiotics, mind, and agency, which is the core of emergence, organization, and coevolution, and thus negentropy.

When I use these scientific laws, I understand them as approximations on long-range and long-lasting foundational dynamic patterns way beyond the human scale. In the natural world, everything is dynamic, relational, and context-specific and subject to restraints, contingencies, and variabilities. Biosemiotics becomes important to understand these relational complex adaptive behaviors, or organisms' abilities to learn and generate meaning within underlying long-lasting and dynamic forces.

Cognition and consciousness is an example of strong emergence. Biosemiotics using Peirce's triadic sign system understands the world to be profuse with signs and cognition as immanence. Signs are made and interrupted by cognizing agents creating semiotic causation between entities leading to the semiosphere. DNA is just a container of information. It can be thought of as a set of suggestions, and without a reader as in the mRNA, it would be inert. This

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[40] John H. Holland, *Complexity: A Very Short Introduction*, Very Short Introductions (Oxford: Oxford University Press, 2014), https://doi.org/10.1093/actrade/9780199662548.001.0001.

[41] Adrian Bejan and J. Peder Zane, *Design in Nature: How the Constructal Law Governs Evolution in Biology, Physics, Technology, and Social Organization* (New York: Doubleday, 2012).

can be extended to atomic nucleons, alphabetic letters, boolean code, actions, aesthetics, and smells. Cognition, agency, and learning exist in varying degrees from atoms to self-reflective multicellular beings. The movement and transformation of matter then is not just a result of cosmo-scale dynamic physical forces leading and transforming all beings towards the questionable "heat death of the universe," but is also negotiated and regulated through the agents themselves, who are a combination of semiosis, cognition, and body or matter coalescing as an emergent-self-producing system with a porous boundary. At the core of all this becoming, self-organization, and emergence is immaterial information distribution and exchanges tending towards habit or generalizations arising from the agent coming to terms with their environment.[42]

Leaving the Umwelt and into the Self-Reflecting Semiosphere

All that exists, including our ability to sense and cognize, is the result of evolutionary dynamics, agency, and variabilities. Our perception evolved to rely on our autonoetic consciousness in order to survive in a world of increasing complexity. We cannot experience the world directly but rather only through abstractions largely dedicated by the larger organizing structures' epistemologies and metaphysics. Our current embodied metaphysics limits our perception and chronesthesia to the explicit metastable emergent-body layer rooted in the Western conceptualization of time, heavily influenced by concepts of "development" and "progress" and running horizontally in a linear flow from past to future, embodied in most native English speakers as moving on a left-right axis and back-front axis.[43]

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[42] Bouffanais, *Design and Control of Swarm Dynamics*, 5.
[43] Rose Hendricks and Lera Boroditsky, "New Space-Time Metaphors Foster New Nonlinguistic Representations," *Topics in Cognitive Science* 9 (June 21, 2017): 4, https://doi.org/10.1111/tops.12279.

In order to deal with complexity and work towards a noetic and autonoetic
planetary-scale consciousness, we will create a praxis for embodiment. We need to construct
new relational metaphors that create cognitive patterns that manifest as nonlinguistic tasks.[44]
This will give us the ability to dig into layers of deep time to perceive the previous foundational
emergent matter in everything and resonate across and through all beings, including our own
nestedness within larger organizing bodies.

We will pass through the egocentric social level we are currently fixated on by creating a
holarchic vertical axis containing a cosmo-evolutionary timeline, then placing this within our
ambiance of sense-experience in the present moment. Human self-reflective (or autonoetic)
consciousness and symbolic referent-based language enabled the creation of increasingly
specialized tools and more advanced telecommunications systems, which correlated to larger and
larger social swarms. In my proposed trans-contextual praxis, the emergent-self is a *holon-body*,
a contingent being with a neural-body, a digital body, a personal body made of previous
foundational matter, a social body nested in increasingly aggregated social groups; a family, a
family in a neighborhood, a neighborhood in a city, a city in a state, a state in a nation, a nation
in an intergovernmental body, an intergovernmental body in Earth.

We are simultaneously a larger organizing entity with other beingness nested in us and a
subunit nested in larger social bodies, ecosystems, and emergent techno-social bodies (or
systems), all embedded within biophysical and semiotic processes. Life is characterized by the
cascading spontaneous self-organization, or co-arising, of interacting nested agents and entities.
Complex adaptive systems are composed of subunits coordinated and regulated through internal

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[44] Hendricks and Boroditsky, "New Space-Time Metaphors Foster New Nonlinguistic Representations."

communication (endosemiosis) and energy feedback loops in order to maintain homeostasis. They also require external semiosis (exosemiosis) to allow for degrees of flexibility and adaptations in the face of contingencies from their environment.

The human holon-body is constituted by complex holarchy intra-action of previous emergent matter and organisms, coordinated mentally together through the autonoetic self (or neural body) within a semiotic world. All these components are in constant feedback to maintain homeostasis and continually generate at the level of the emergent being — always in bilateral relation to other beingness. In order to exist as a holon-body and a planetary body, or to have a planetary-scale consciousness, we need to anchor the emergent self and all the emergent foundational matter nested in us—including atoms, molecules, complex cells, microorganisms, and the social groups we are nested in—into a cosmo-evolutionary time frame.

Currently, we largely embody the social and semiotic layer, "the reality of the really made-up—the foundation, in other words, of modern sociology, anthropology, and critical self-awareness."[45] But we need to inoculate the ambiance of our sense-experience to encompass the abiotic, biotic, and underlying forces, thereby making the emergent-self porous, allowing one to embody being a whole with nested parts and a nested part within a whole. This will allow us to resonate with other gradients of beingness—semiotically, biologically, and materially—within the constant transformation of matter, semiotics, and organization.

In order to deal with external relations, including other beings, we will situate the holarchic vertical axis with biosemiotic and constructal law within the field of experience. This gives us a framework to understand the immense ongoing dynamic global flow of mass,

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[45] Michael Taussig, *Mimesis and Alterity: A Particular History of the Senses* (London; New York: Routledge Taylor & Francis Group, 1993), ix.

semiosis, cognition, and its influence on self-maintaining flow systems and their relations with other flow systems. Every entity we perceive is metastable matter-mind, and has agency within the constant shifting, interpenetrating, interrelating, moving, and co-arising through semiosis over spacetime.

Body and Mind: An Integrative and Recursive System

Organisms we call vertebrates with brains and central nervous systems have proprioceptive sense receptors distributed in their bodies: in their muscles, tendons, and joints. These matter-bodies propel themselves against gravity over the biosphere, and consume other matter-entities, absorbing-transforming, and passing them through themselves, dispelling heat, cognition, semiotics, and matter, while preserving their emergent-self. Multicellular organisms evolved a neural virtual world, or mental representation of the world, to survive in a world of increasing complexity. The proprioceptive sensors are relayed into the brain, creating a neural counterbody of the emergent self that is projected into their neural mimetic virtual world. The brain and central nervous system are in constant feedback with each other. It takes an average of 500 milliseconds for sensory information from the outside world to be processed by the unconscious and be registered consciously.[46] The initial signs that are transmitted through these networks are indexical.[47]

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[46] B. Libet et al., "Time of Conscious Intention to Act in Relation to Onset of Cerebral Activity (Readiness-Potential). The Unconscious Initiation of a Freely Voluntary Act.," *Brain : A Journal of Neurology* 106 (Pt 3) (September 1983): 623–42, https://doi.org/10.1093/brain/106.3.623.

[47] Hoffmeyer, *Biosemiotics: An Examination Into the Signs of Life and the Life of Signs*.

These mental projections emerged in organisms to allow for the faster coordination between body and brain that manifests as reflexes in response to external stimuli.[48] If instead, the stimuli went through rational processing via symbolic referent, it would take much longer, as the sensory info would need to be converted into a sign the emergent self could interrupt and analyze before making a decision to act. The process of creating a reflex also requires actions that are habit-forming, which means the organism is responding to a regular pattern in their environment and has established a semiotic negotiation with it. Of course, the organisms that accomplish this also need to retain degrees of flexibility. The one with the most flexibility will survive longer in our world of variability and contingency and thus be able to perpetuate their line.

All multicellular organisms evolve in a niche within the onslaught of the dynamic churning and transformation of matter-cognition-semiosis. The species need to maintain and continually generate itself within these relations constitutes their innenwelts, umwelts, and semiotic niche. Brain and nerves make up the material structure in the organism, and the mind is the immaterial process extending beyond the skin. Animals' neural world is profuse with indexical signs they interact with and which constitute their reality, allowing them to transmit information through behavioral means. Humans, being animals, have the use of indexical signs, but we are thought to be the only animals to have evolved self-reflective, or autonoetic, consciousness and symbolic referent language.

The same evolutionary process creating emergent matter was responsible for our self-reflective consciousness and semiotic capabilities. The continuation of life is a continuation of increasing layers of complexity and the ability to navigate through it. These evolved

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[48] Hoffmeyer.

capabilities led to the greater breadth of relationality and to larger types of organizational structures. With this, we left our original umwelt, or ecological and semiotic niche, and stepped right into an infinitely mirrored semiosphere, a world built out of our symbols and semiotics overlaid over the world. We mistook this self-reflective semiosphere as reality. We have become captivated and lost in it, often mistaking our worldings for the world. These worldings and mental projections, untethered by laws of physics, lead to organized actions that are still embedded within the biophysical processes of Earth and thus subjugated to its forces. We often forget we are in a worlding that interfaces with the world. Socially constructed categorizations are reinforced throughout the system on a daily basis, becoming habitual or patterns in the human subunit, sinking further and further into our unconscious and thus become enmeshed with our perceptions. Art and experimental aesthetics practices are a metapattern, a pattern that connects patterns and helps us see these patterns again and out of the dominant worldings.

There are various theories to explain the juncture in human evolution, from the reliance on evolutionary adaptation and changes in our morphogenesis to relying on cultural adaptation and information. Cultural adaptation is less energy-intensive and evolves faster while allowing for more flexibility than morphogenic adaptation.[49] If an organism evolves physically too well to their environment, they almost merge with it, becoming more vulnerable to any changes in their ecological niche.

Over time and with larger human aggregations, we created technological apparatuses to visit other umwelts and were able to peer into other scales of being, ranging from large social groups to microorganisms to quarks. These technological apparatuses and frameworks extended

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[49] Yoshiteru Nakamori, *Knowledge Synthesis Western and Eastern Cultural Perspectives* (Tokyo: Springer, 2016), 9–11.

and altered our senses. It bought other scales of being to our scale of perception and comprehension. The advancement of technologies also led to ever-expanding communication networks with increasing capabilities to transmit more information faster. These networks are the communication pathways of our larger social bodies. The social bodies enlarge with each leap in communication technology. We can think of smoke and drum signals, roads, the printing press, mail, telecommunication, and the internet as semiotic pathways that enable larger and larger organizing bodies.[50]

We perceive the world through the interface of our neural mapping of it, which is largely structured by the language and concepts of the dominant worlding we are a subunit of. Our neural bodies within our self-reflective (autonoetic) consciousness are not subjected to the laws of physics, allowing us to leap into the past or the future (chronesthesia). The actions we enact in the world, however, are still embedded and subjected to biophysical processes. This is a notion our current worlding doesn't believe in but has been forced to reconcile with. The systems and objects we produce reinforce, or recirculate and amplify, certain actions and beliefs while dampening others. In order to align self-reflective nature with nature, we will build a praxis to facilitate a new neural mapping of the world and a means to transverse it.

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[50] Benedict R. O'G. Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (London and New York: Verso, 2006), 37–46.
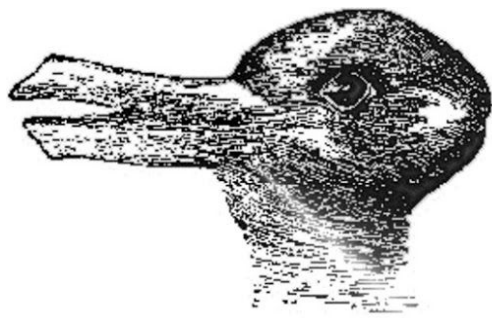
The Cosmo-Evolutionary Holarchic Vertical Axis

Figure 4. Ambiguous figure
Source: Jensen, Melinda S., and Kyle E. Mathewson. 2011. "Simultaneous Perception of Both Interpretations of Ambiguous Figures." *Perception* 40 (8): 1009–11.

Is it a duck or a rabbit? Humans are inclined to perceive individuation through differentiation. Gregory Bateson noted this with his well-known dictum "the elementary unit of information—is a difference which makes a difference."[51] Yet we are still able to see and feel continuity and duration. The ability to perceive and feel phenomena in these ways led to the opposing metaphysics of atomism and holism.

People rationally know the media-symbolic-substrate (Figure 4) contains two figures implicitly. Studies have shown that most people, however, can only delineate, or pull one figure out at a time, causing a binary code flashing between duck or rabbit. The initial figure perceived by the observer is largely dependent on their cultural context and it is also almost impossible for the observers to perceive both simultaneously.[52]

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[51] Gregory Bateson, *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology.* (Chicago: University of Chicago Press., 1999), 465.
[52] Melinda S. Jensen and Kyle E. Mathewson, "Simultaneous Perception of Both Interpretations of Ambiguous Figures.," *Perception* 40, no. 8 (2011): 1009.

Observers in a 2011 ambiguous figure study using the classic duck-rabbit were prompted with a relational phase or a tiny narrative impregnated with the dynamic continuum of matter and semiosis, "imagine the duck is about to eat the rabbit." They were then asked to report whether they could "see them as different figures at the same time." For the first time in about 100 years since the initial study was conducted, participants were pleasantly surprised to see both figures simultaneously within the substrate.[53] The study demonstrates that perception is not just "bottom-up," or mechanistic biological phenomena, but is also reliant on "top-down" influence from the semiosphere. It also questions the limitations on our visual perceptions and the ways we can semiotically expand our biological perceptions. By simply providing a relational context, the observers were able to perceive two states (or entities) simultaneously within a single entity (or substrate). We will borrow this strategy to help us move beyond perception at the single entity level to perceive the parts-to-whole relations inherent to all gradients of beingness.

Systems and complexity theories have revealed that nested systems, from biomolecules to the biosphere, operate simultaneously at different scales of complexity, existing with their own logic and semiotics but interconnect with the other scales within a continuous whole. The boundary of each system is not of self-isolation but of rich interchange. The observer usually thought to exist outside the observation is in reality, as second-order cybernetics proclaimed, embedded within the continuum and arbitrarily selecting the boundary that designates the form, entity or system being observed. [54] This is similar to how most people will either see a duck transform into a rabbit, or a rabbit transformed into a duck, based on their sociological and biological background. But with a simple relational semiotic frame, we just experienced

[53] Jensen and Mathewson, 1009–11.
[54] Neil Theise and Menas Kafatos, "Complementarity in Biological Systems: A Complexity View," *Complexity*, July 1, 2013, 11, https://doi.org/10.1002/cplx.21453.

perceiving two identities-beings from the same substrate simultaneously as parts and a whole. We just gleaned a possibility—a fissure of alignment between our interface constituted by the dominant worlding, media, perception, and cognition— of simultaneously transforming-connecting-becoming inherent in our own being and evolutionary dynamics and biophysical processes. We can extend this out to the world with a suitable framework. The relational linguistic frame should facilitate our somatic-psychic perception of entities simultaneously as parts and whole in relation within a substrate of dynamic change. As we embody this, it will enmesh with our field of perception and dissolve into the ambiance of our experience. We will start with the concept of the holon, then build a holarchic axis using Volk's grand sequence, and develop a frame around this in order to alter our perception and lead us to a planetary-scale embodiment.

Arthur Koestler, an author and journalist, who lived through wars and participated in armed political struggles, used Bertalanffy's general systems theory and cybernetics to go beyond the dualism of parts and whole to consider the multilevel heterarchical organization that appears in living nature.[55] Koestler coined the term "holon" to encapsulate open systems existing simultaneously as an autonomous whole and a dependent part within a relational stratified hierarchical organization, or "structural Gestalt constancy."[56]

Holons connected through bilateral channels form a heterarchical nodal network called a holarchy. The vertical axis in the framework contains a holarchic sequence of emergent matter within a cosmo-evolutionary timeline. I will use evolutionary earth scientist Tyler Volk's holarchic timeline, which he calls the grand sequence, as the foundation for my vertical axis. In

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[55] Arthur Koestler, "Beyond Atomism and Holism—The Concept of the Holon," *Perspectives in Biology and Medicine Perspectives in Biology and Medicine* 13, no. 2 (1970): 131–36.

[56] Koestler, 136.

Volk's framework, he defines emergence as the genesis of things through the combination and integration of previous things, a process he calls combogenesis. This process forms twelve fundamental levels of emergent matter stabilized into stratified layers. He defines the fundamental levels as 1. Fundamental quanta, 2. Nucleons: protons and neutrons, 3. Atomic nuclei, 4. Atoms, 5. Molecules, 6. Prokaryotic cells, 7. Eukaryotic cells, 8. Complex multicellular organisms, 9. Animal social groups, 10. Tribal meta groups, 11. Agrovillages, 12. Geopolitical states. [57]

The sequences of nestedness correlate to the emergence of each type in time and an increase in scale. Going through the previous layers in the sequences means going back in time and scale.[58] The levels fall under a larger category he calls the dynamical realms, which include physical, biological, and social dynamics. For more detailed information on the grand sequence, refer to Volk's book *Quarks to Culture: How We Came to Be*.

The holarchic structure means each subsequent layer is aggregated and incorporated into the next one while being recursive all the way down and up. As we move from the geopolitical level down to the fundamental quanta, we are also traveling from the top of the axis back in time and matter down the axis. Our bodies are living archives; we are the answers to questions arising from the increasing interconnectivity within a system. All of this exists simultaneously within the present moment. For my purposes, I will diverge from some of the logic of the grand sequence and include layers nested under the foundational layers such as minerals, rocks, multicellular agents including fungi, insects, animals, consciousness, self-reflective consciousness, various communication and telecommunication advancements, and lastly Earth. The advancement of

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[57] Volk, *Quarks to Culture: How We Came to Be*, 3–21.
[58] Volk, 7–9.

communication technologies is correlated with larger social aggregations. The technology

progression does not follow the same holon nesting logic; instead, as it progresses, it can become

intertwined (or not), enabling the movement from the hand ax to a smartphone. I will include

abiotic, biotic, and semiotic-cognition alongside the physical, biological, and social dynamic

realms.

Top

Upward causation

13. Earth
12.10 Machine learning
12.9 Internet
12.8 Satellite
12.7 Television
12.6 Radio
12.5 Telephone
12.4 Telegraph
12.3 Printing press
12.2 Mail
12.1 Pigeon post
12. Geopolitical states
11.2 Roads
11.1 Agriculture
11. Agrovillages
10.2 Smoke and drum signals
10.1 Wall paintings
10. Tribal meta groups
9. Animal social groups
8.5.2 Emergent-self (human)
8.5.1 Self-reflective consciousness
8.5 Animals
8.4 Insects
8.3 Plants
8.2 Fungi
8.1 Protoctists
8. Complex multicellular organisms
7. Eukaryotic cells
6. Prokaryotic cells
5.2 DNA
5.1 RNA
5. Molecules
4.2 Rocks
4.1 Minerals
4. Atoms
3. Atomic nuclei
2. Nucleons: protons and neutrons
1. Fundamental quanta

Downward causation

Down

Social

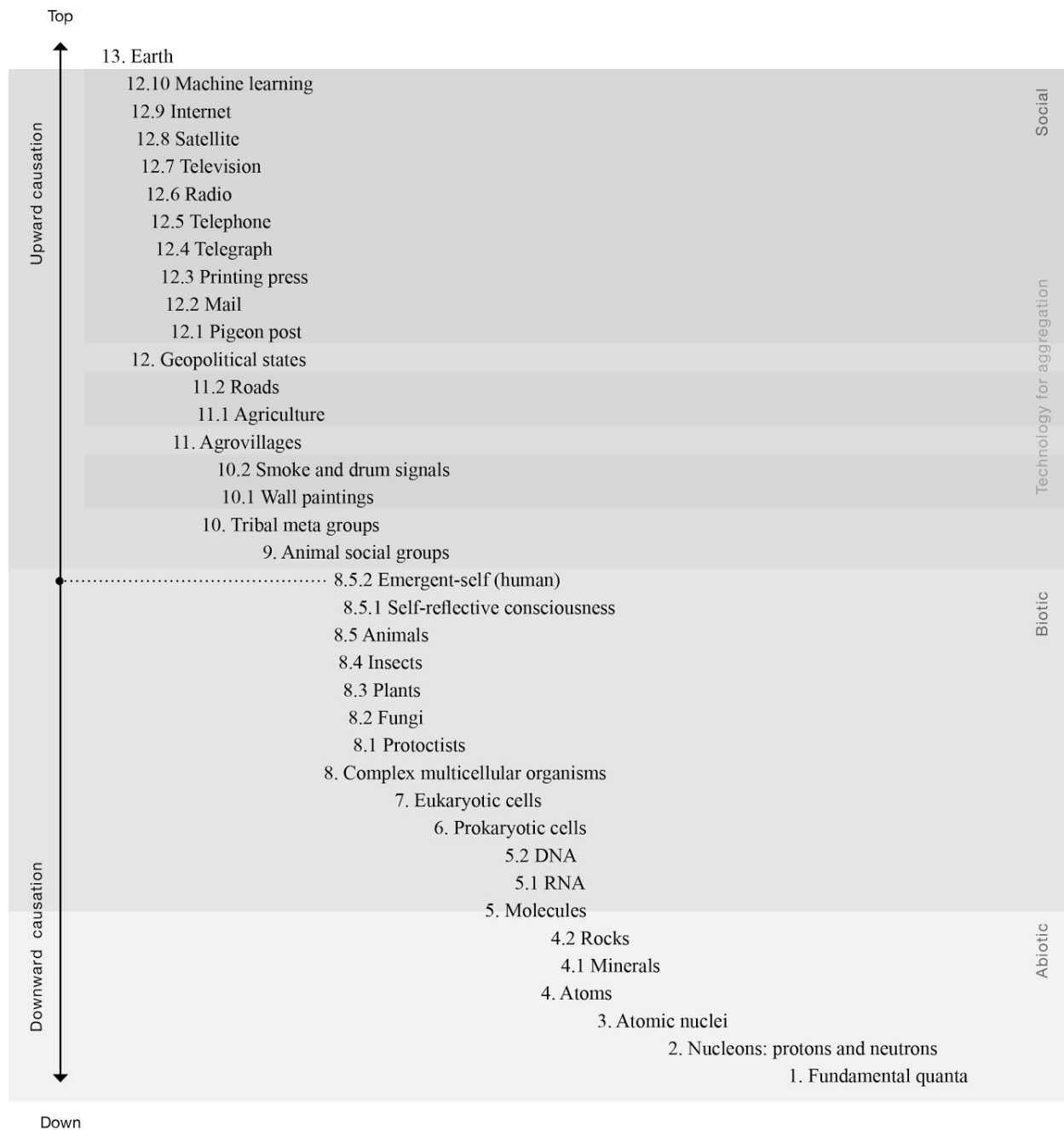Technology for aggregation

Biotic

Abiotic

Figure 5. The cosmo-evolutionary holarchic vertical axis.

The levels listed should not be thought of as deterministic, teleological, exhaustive, or absolute but as guideposts to help orient ourselves in our own emergence, relationalities, and nestedness within a continuum of dynamic matter. The framework is agile and can be altered to fit the needs of the experiencer. With our understanding of holons and the grand sequence, we can, for example, situate ourselves in our family, country, company, and/or social network, depending on our relative situation. This is also a non-linear process. There have been organisms that have simplified, as in the case of bacteria and viruses. Both are descendants from a single ancestor, but the latter became more complex while the former simplified its structure. In the living world there are agencies and contingencies requiring organisms who survive to retain flexibility.

From Resemblance to Resonance: Relational and Absolute Mode in the Scales of Being

> If he thinks of the totality as constituted of independent fragments, then that is how his mind will tend to operate, but if he can include everything coherently and harmoniously in an overall whole that is undivided, unbroken, and without a border (for every border is a division or break) then his mind will tend to move in a similar way, and from this will flow an orderly action within the whole.
>
> — David Bohm, *Implicit and Explicit Order*

In order to navigate through the world within our everyday field of experience, we evolved the tendency to differentiate matter through embodied semiotic delineations (using our noetic consciousness) and communicate from the level of the emergent-self. Because of this, we will initially locate the relational mode at the fundamental *emergent-I*. Within this modality, the idea of Being is not an essentialist fundamental unit of "I." Being is determined by degrees of aggregation and relationality between matter, cognition, and semiotics, or agency, within biophysical processes. In order to embody this flexibility, we will need a spatial reference frame not situated and relative to the self but to one's perceived environment. This modality is useful when considering the relationship between what is often referred to as "human" and "non-human," the "human" and "more-than-human-world."[59] As a reminder, I believe these terms are too human-centric, dialectical, and reinforces an egocentric relative frame, so I will periodically use scales of being instead. This helps one to think of all entities within a continuum

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[59] David Abram, *The Spell of the Sensuous: Perception and Language in a More-Than-Human World* (New York: Vintage Books, 2017).

enacted on by biophysical forces. In the previous section, we simultaneously perceived

parts-to-whole relations within a single substrate. We also have the cosmo-evolutionary vertical

axis (Figure 5). We will now develop the allocentric spatial referential frame with correlated

abductive logic and ethics that allow us to go beyond ourselves in order to transverse the

matrixial space of our framework and navigate through a world of increasing complexity.

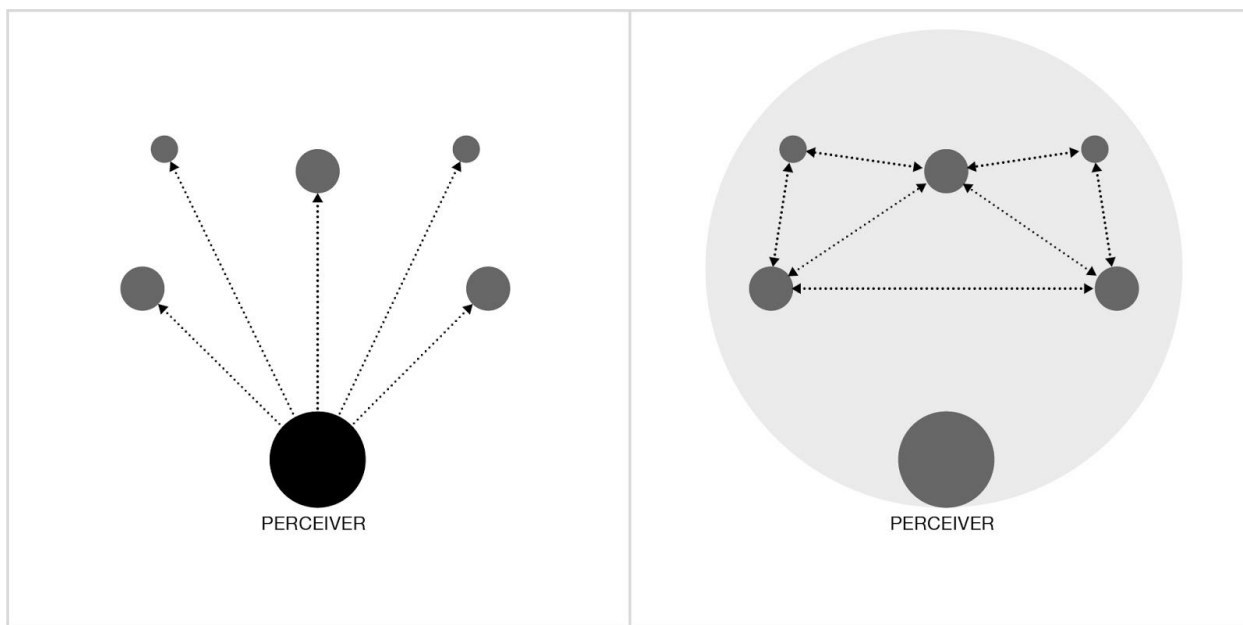*Egocentric to Allocentric*

Figure 6. 1) Egocentric (self-to-object) diagram, 2) Allocentric (object-to-object)

     Research into human spatial cognition often makes two distinctions: egocentric and

allocentric (sometimes called geocentric) reference frames (Figure 6).[60] These frames are

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[60] R. L. Klatzky, "Allocentric and Egocentric Spatial Representations: Definitions, Distinctions, and Interconnections," *Lecture Notes in Computer Science.*, no. 1404 (1998): A1234.

dictated by the dominant culture and reinforced daily by language becoming deeply enmeshed within our perception. The majority of languages encode for egocentric spatial processing, and so most people on Earth move through the world processing objects relative to themselves. Native English speakers utilize this relative frame and perceive objects in space and locations relative to themselves on a left-right axis, front-back axis, and top-down axis. To exist with a planetary-scale embodiment that encompasses all scales of being, or what Bateson called "ecological intelligence," we need to shift the emphasis from our egocentric relative frame, or self-to-object relations, and develop an embodied allocentric spatial processing, or object-to-object relations. Humans who utilize an allocentric reference frame process the relationality of objects positioned relative to each other in the environment, independent of their own position. In a few cultures, such as the Australian Aboriginal Pormpuraaw community, native speakers of the Kuuk Thaayorre language embody allocentric spatial processing. They navigate through the world oriented by cardinal direction and not themselves. This is an absolute modality and is outdoors and indoors.[61] Cognitive scientist Lera Boroditsky describes the differences between native English and Kuuk Thaayorre spatial reference frames:

> Unlike English, the Kuuk Thaayorre language spoken in Pormpuraaw does not use relative spatial terms such as left and right. Rather, Kuuk Thaayorre speakers talk in terms of absolute cardinal directions (north, south, east, west, and so forth). Of course, in English we also use cardinal direction terms but only for large spatial scales. We would not say, for example, "They set the salad forks southeast of the dinner forks—the

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[61] Lera. Boroditsky, "How Language Shapes Thought," *Scientific American*, February 2011, 64.

philistines!" But in Kuuk Thaayorre cardinal directions are used at all scales. This means one ends up saying things like "the cup is southeast of the plate" or "the boy standing to the south of Mary is my brother." In Pormpuraaw, one must always stay oriented, just to be able to speak properly.[62]

If we want to decenter the human and create a Being beyond the layer at the emergent-self to encompass the more-than-human-world rooted within a planetary embodiment, then a reference frame beyond ourselves is crucial. This resonating allocentric spatial processing, in conjunction with the cosmic-evolutionary vertical axis, would help us perceive things within a continuum of relation beyond the "human" and enable us to fluidly weave in and out, or resonate, through the explicit layer of entities to the implicit layer of previous foundational matter constituting all beings rooted in deep time within the present.

The egocentric frame is relative to ourselves and our neural body within our self-reflective consciousness that holds the concept of "Self," or emergent-self, together. If we navigate through the world using our bodies as the constant referential point, we become stuck individuating between resemblance and differences relative to ourselves and amplify severe delineations. We become stuck at the explicit level of autonomous entity that perceives other autonomous entities, never going deeper into the implicit layer of the foundational emergent levels that constitutes all we do see. The levels below are where we can perceive the patterns that connect. If we think back to the vertical holarchic axis (Figure 5), this is all foundational matter

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[62] Boroditsky, 64.

and beingness nested in the other from quanta, subatomic particles, atoms, simple cells, complex cells, multicellular organisms, and social groups.

The allocentric spatial reference frame with our vertical axis orients ourselves outside ourselves and always within a larger context. It enables us to perceive the interconnectedness of the foundational emergent layers in deep time that constitute all beings, even ourselves, and within the present. This mode moves us from the egocentric resemblance to allocentric resonance, or what Bateson called the "difference that makes a difference" to perceive "the patterns that connect." With this, we are able to embody Being based on degrees of relativity to encompass a much larger gradient of beingness and interconnection.

Golden Rule to the Mencius Extension

The relational mode helps us see beyond similarity and differences between "human" and "non-human." Holding the vertical holarchic axis within our noetic-autonoetic consciousness and navigating through it with allocentric spatial processing allows us to perceive and transverse the interconnecting and interpenetrating nature of reality while being part of it. Perhaps this was a fantasy of second-order cybernetics. I know I have not utilized the full potential of simultaneously perceiving parts and whole within this framework, but it is something to revisit later. Another portion I will quickly address is ethics. A fundamental part of relating is caring. Relations without caring, I imagine, could lead to disastrous runaway systems.

Most languages in the world use an egocentric reference frame and the compatible ethics frame, the Golden Rule. It's been used from Confucius "Do not impose on others what you do

not wish for yourself" to the Bible "Do unto others as you would have them do unto you." These frames are both relative to the self, which I believe is incompatible with a planetary embodiment. Ethics correlated to an allocentric frame would be something like the Mengzian (Mencius) extension. Both radiate out, oriented by others and not the self. Philosopher Eric Schwitzgebelis compares the self-interest ethics of the Golden Rule to the natural care we have for ones closest to us and resonates this care out with the Mengzian extension:

> The Golden Rule works differently—and so too the common advice to imagine yourself in someone else's shoes. In contrast with Mengzian extension, Golden Rule/others' shoes advice assumes self-interest as the starting point, and implicitly treats overcoming egoistic selfishness as the main cognitive and moral challenge.
>
> Maybe we can model Golden Rule/others' shoes thinking like this:
>
> 1. If I were in the situation of person x, I would want to be treated according to principle p.
> 2. Golden Rule: do unto others as you would have others do unto you.
> 3. Thus, I will treat person x according to principle p.
>
> And maybe we can model Mengzian extension like this:
>
> 1. I care about person y and want to treat that person according to principle p.
> 2. Person x, though perhaps more distant, is relevantly similar.

3. Thus, I will treat person x according to principle p.[63]

Mencius believed that human nature was a part of nature, but our self-reflective nature needed to be cultivated. This is similar to our notion of the inseparability of our semiotics with our perception. He believed humans were born with an inherent natural love that needed to be nurtured in order to grow, like a sprout with its inherent ability to turn into a tree but needs the proper conditions and environment to do so.

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[63] Eric Schwitzgebel, "How Mengzi Came up with Something Better than the Golden Rule," *Aeon*, accessed November 20, 2019, https://aeon.co/ideas/how-mengzi-came-up-with-something-better-than-the-golden-rule.

The Holon-Body in Cosmic-Evolution Spacetime: From Ego Relative Time to Planetary

You are in a park where you see a bee hovering around a lavender plant surrounded by other plants, trees, rocks, and fungi. You think of the bee as another emergent multicellular organism just like you, only older, because you know bees are a less complex creature and emerged before humans. Or maybe, you know the first bee emerged from wasps about 130 million years ago and Homo Sapiens around 300,000 years ago. You immediately pass this layer and think of the molecules, then the atoms and the subatomic particles nesting in the bee, the lavender, and in you. While thinking of the older atomic layer, you perceive the stone pavement you are walking on and think it doesn't have cells like the multicellular beings you see. You know this is emergent-older than you. You start connecting the other things you see that have atoms: the insects, trees, benches, water, and the sun. Your semiotic and biotic beingness would be impossible without the abiotic form that preceded you. This might lead you to think about the abiotic nature of the technologies we are becoming reliant on and its growing capacity for cognizing like you. You think of the stone pavement (atoms, subatomic) you are standing on and how it was put together by humans (self-reflective consciousness, multicellular, complex cells, simple cells, molecules, atoms, subatomic), but materially it is older than all of the multicellular beings you can see.

The lavender (multicellular, complex cells, simple cells, molecules, atoms, subatomic) you see is the highly bred variety Grosso. Its flowers are calling to the bee (cognizing, multicellular, complex cells, simple cells, molecules, atoms, subatomic), and the bee responds by climbing on the lavender and rapidly fluttering its wingbeats, causing a buzzing sound you can

hear. The vibration is making the pollen fall on the bee's body with a few already collected particles falling on the lavender. They have been working on this exchange, or at least a version of it, together for thousands of years, and you are watching it happening in front of you right now. You know to avoid the bee and the bee mostly ignores you. You are enveloped together in the semiosphere, but in separate umwelten.

The idea of being able to intuitively anchor beings, emergent species, and foundational emergent matter that we sense in our everyday field of experience on a cosmic-evolutionary time frame might sound ridiculous or unrealistic but we already do this daily albeit to the much more limited human lifespan and mostly to other humans and human-centric things: domesticated animals, fashion, and the built works world.

We go through the world anchoring ourselves and others in time by intuitively approximating and placing people in an age group or generation: this person is young, they are middle age, they are a millennial, Gen Y, Gen X, and Gen Z. Anytime you enter a new professional social grouping, you are asked and identified by your age, a marker in time. People unconsciously place others, including themselves, in the timeframe of a human lifespan. This punctures the present moment and diurnal time within the present. These are all markers situating you at the emergent-self and only within the social layer on the holarchic axis. Placing a human in an age group or generation is similar to anchoring bees by their species emergence or "species birthday" at 130 million years old, but if you didn't know that, you could place them in the emergence of multicellular organisms, and since they are insects, you know they are less complex relative to you and most likely emerged before humans, just like those Gen X came before millennials.

Humans evolved what Endel Tulving calls "autonoetic consciousness" (Figure 1) and this gives us chronesthesia, the ability to mentally project our neural-body in the past or future, free to roam unbound by the laws of physics.[64] Cultural norms, language, and infrastructures limit our neural-body travel to a human-centric time frame. We embody this as our ego-relative time frame as we go through life, which affects our perception and impacts the decisions we make. This has been detrimental for our burgeoning planetary body or embodiment. Placing the emergent-self and all of ourselves, or the holon-body, in a cosmic-evolutionary timescale (rather than the current human lifespan timeframe) with an allocentric reference frame orients us within this constant unfolding and recontextualizes our being; from ego and human-centric to something able to embody an ecological scale consciousness within the semiosphere.

Absolute Mode: Pre-Ontology of Processes

> Mind is empty: it is no-thing. It exists only in its ideas, and these again are
>
> no-things. Only the ideas are immanent, embodied in their examples. And
>
> the examples are again no-things. The claw [of a crab when compared with
>
> the gross anatomy of other creatures] . . . is not the Ding an sich: it is precisely
>
> not the 'thing in itself.' Rather, it is what mind makes of it, namely an example
>
> (of resemblance) of something or other.
>
> - Gregory Bateson, *Mind and Nature*

> With no mind, flowers lure the butterfly;

With no mind, the butterfly visits the blossoms.

Yet when flowers bloom, the butterfly comes;

When the butterfly comes, the flowers bloom.

- Taigu Ryokan

The ontology of place is a relational mode that starts from the social level of individualization. It is reliant on rational processing with our noetic and autonoetic consciousness "imbued with semantic and episodic memories respectively."[65] Therefore, at the core it still operates through differentiation, which confines us to a set of possibilities mostly contingent on semiotic parameters set forth by the larger organizing body. We started to push these boundaries with an allocentric reference frame and the holarchic vertical axis, moving us away from the widely held notion of "Human" and "Self" to encompass other gradients of Beingness. Our self-reflective consciousness enables us to be aware of our own umwelts and semiotic niches and extend beyond them. In the pre-ontology of process or the absolute mode, words and concepts normally used by the emergent self to delineate the dynamic transformation of mass in their field of experience are pulled into focus and routinely checked with perceptual judgment using our somatic-psychic processing from our anoetic-noetic consciousness.

The absolute modality dampens rational processing and subsumes it within our embodied cognition and somatic processing, creating a somatic-psychic knowing. In the absolute mode, Being is a process and beyond the binary logic of The Law of Excluded Middle of Western

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[65] Marie Vandekerckhove and Jaak Panksepp, "The Flow of Anoetic to Noetic and Autonoetic Consciousness: A Vision of Unknowing (Anoetic) and Knowing (Noetic) Consciousness in the Remembrance of Things Past and Imagined Futures," *YCCOG Consciousness and Cognition* 18, no. 4 (2009): 1019.

ontology, Being and Nonbeing. Being is below the level of the emergent-self, before aggregation, and operates as no-self. Instead of looking for the "difference that makes a difference" or "patterns that connect" we become the processes that connect.

Cognition in this modality uses abduction logic to surface and enfold delineations as dictated by the hermeneutics, language, and logic of the larger organizing structure that one is nested in, into our field of experience. Our mode of being here is not at the emergent level of entities but further down to the underlying process that influences the evolution and self-organization of entities and their connections (Figure 3). We embody a pure process; a being to becoming. We don't just think with but embody the logic of atmosphere, of evolution, which enables us to intuitively explore the process and forces that transform entities and connect them together. This modality allows us to extend out of our self-reflecting semiosphere and dip back into the umwelt equipped with our consciousness.

Gregory Bateson found individuals in large-scale societies overly reliant on rational processing in lieu of their own intuition or somatic processing. He noticed it was common for people in large-scale societies to not give much meaning or significance to dreams, while it was much more common for humans in small-scale societies to do just that. In other words, he delineated between societies who predominantly trusted and valued dreams and their intuition and those that didn't.

Symbolic referent language and the development of media networks allowed humans to coalesce with other humans to form large-scale swarms. We know from research into social insects that information distribution is the defining factor of aggregation. We have also mimicked their communication system within our own, as in the case of rerouting traffic in a

busy telecommunication systems network. The larger the scale of aggregation, the greater the need to stabilize the subunits. Unlike social insects, our semiosphere relies heavily on top-down information distribution within our bodies and social bodies. We place more emphasis on rational processing to govern, as in law, rather than unconsciousness processing, as in aesthetics, customs, and rituals. The human as a subunit then becomes overly reliant on their rational processing to interpret the shared lexicon and constructs spread through the network, digging them further into a rigid, inflexible, maladaptive semiosphere and away further from the dynamic natural world. Art and absolute mode help regulate cultural evolution and adaptation. They increase Bateson's idea of evolutionary flexibility and Hoffmeyer's semiotic freedom.

Life is constantly unfolding through more and more interconnectivity, stabilizing through information and habits, increasing chances for emergence and contingencies. In order to deal with this constant unfolding, it is not enough to rely on deduction and induction logic which keeps us reliant on pre-established categories. We need abduction logic along with our perceptual processing to make new connections and reasonable hypotheses, to maintain semiotic flexibility and adaptability. Peirce's triadic sign system is used as the basis for biosemiotics, and we will now return to Peirce for his abductive logic. Peirce abandoned absolute certainty knowing, which is the basis for deductive logic and a pillar of our enchanting enclosure. Instead, his abductive logic allows us to be in the world to meet novelty. It can be thought of as self-correcting, intuitive knowledge grounded in non-linguistic signs and developed through pattern recognition within our field of experience.

Where Are We? Where Can We Go?

The shifting of global powers and the global ecological crisis has shattered the hegemonic worlding of modernity and its promise that one day, all developing countries or third worlds will become first worlds. This loss of a unifying worlding has led to a search for other organizing global imaginaries in order to restructure the human collective experience at the planetary-scale.[66] This has led to a plethora of discourse and artists working around other-imaginaries, worldings, fictioning, and mythopoesis. Although I recognize their importance in diversifying the current modern monolith worlding, which has led to so much societal and ecological destabilization, the work I am interested in, be it proposals of other-imaginaries or not, are cultural devices that help with attuning our current beings as individuals in a technoscientific planetary-scale body to biophysical processes. This has led me to research different concepts of relationality. Recently, thinkers across disciplines have proposed various relational ontological theories based on their field of research, including but not limited to object-oriented ontologies, agential realism, actor-network theory, and Donna Haraway's sympoiesis or "making-with." Although different, they are related in that they are all attempts to decenter the human; to move us from a human-centric, atomistic, relativism-based ontology to an interdependent one.

The ontological turn in anthropology, led by anthropologists such as Philippe Descola and Eduardo Viveiros de Castro, revolves around ethnographic studies and fieldwork, often in

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[66] Bruno Latour, ""We Don't Seem to Live on the Same Planet…" — a Fictional Planetarium," in *Design in Nature : How the Constructal Law Governs Evolution in Biology, Physics, Technology, and Social Organization* (Philadelphia Museum of Art & The Art History of Chicago, 2019), 193–99.

Indigenous societies and focused on the ways those societies relate and interact with nature or "non-humans." This work is an attempt to understand other ways of Being while dissolving the nature and culture binary in modernity. These worldings are not just other ways of being that perhaps are inaccessible to us as a large-scale technoscientific society, but they bring into question our own "modern" technocratic worldings and positionality. This better equips us to imagine ourselves outside of modernity through an ontological pluralism or diversity, while transforming our own modernist worlding.

Similar interiorities Dissimilar physicalities	*Animism*	*Totemism*	Similar interiorities Similar physicalities
Dissimilar interiorities Similar physicalities	*Naturalism*	*Analogism*	Dissimilar interiorities Dissimilar physicalities

Figure 7. Descola Philippe's four ontologies
Source: Descola, Philippe. *Beyond Nature and Culture*. Translated by Janet Lloyd. Chicago, IL: University of Chicago Press, 2013, 122.

I will use two ontological frameworks—one created by anthropologist Descola, the other by Castro—to locate where we are currently and where we can go. Descola created a respected, but also contentious, classificatory grid model consisting of four major ontologies: totemism, analogism, naturalism, and animism.[67] In Descola's ontology grid (Figure 7), the bases of identification are defined by human relatability with non-human entities through a combination of interiority and physicality, or immaterial and material. Animistic cultures relate through consciousness, culture, and differentiate through physical form. Totemism relates through a

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[67] Philippe Descola, *Beyond Nature and Culture*, trans. Janet Lloyd (Chicago, IL: University of Chicago Press, 2013), 277.

combination of interiority and physicality. Some cultures from East Asia, fall under analogism. Cultures that fall under this quadrant see entities as differentiated by both interiority and physicality but are interrelated by an overarching underlying process. The modern is defined as naturalism, and us moderns define our relationship to the non-human through physicality and not interiority.[68] This allows for the prevalence of nature and culture bifurcation and the false belief of the techno-mastery over nature.

Descola attempts to create a new universalism based on relativity, but there is still the possibility that Descola's model is just another tool for classification to enable further dialectical thinking on par with classic structuralism. Sociologist Bruno Latour, an influence on the anthropological ontological turn, argues that research should not be conducted with an assumption of what entities constitute society and nature; rather, this should be the outcome. This is a non-reductionist approach built upon a recursive flow that facilitates self-reflexivity. The empirical findings constantly determine the conceptual frameworks and distinctions one uses to analyze the subject.[69] This recursive process echoes cybernetics and evolutionary theory vis-à-vis computer automata that eventually congealed in agile development, widely used today in the production of software and hardware.

In *Beyond Nature and Culture*, Philippe Descola makes the hypothesis that Westerners are "naturalists" who trace an unbridgeable gap between the domain of culture, to which they belong, and the "mute and impersonal" domain of nature.[70] In Western modernity, language and the realm of signs are thought to usually reside in the domain of culture, but with biosemiotics,

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[68] Descola, 122.

[69] Bruno Latour, "Perspectivism: 'Type' or 'Bomb'?," *Anthropology Today* 25, no. 2 (April 1, 2009): 1–2, https://doi.org/10.1111/j.1467-8322.2009.00652.x.

[70] Descola, 173.

these become tied back to the biotic matrix. Semiosis is not only a referential means but is

simultaneously world-building. Semiosis enables diversity and emergence, interlinking entities

into stability across material layers all becoming in sympoiesis.[71]

Castro, like Descola, is an anthropologist working in Amazonia. His proposed ontological

framework, perspectivism, is aligned with Latour's agile methodologies, and exists within a

continuum of Descola's quadrants, although some have argued the grids in Descola's framework

are not divisions but more like markers in a spectrum. In multinaturalist perspectivism, inhabited

by the Amerindians Castro was studying, humanity is a social condition and not a species. There

is a primordial universal substance with different physical manifestations, perspectives, corporeal

affection, and behavior in relation to their environment. Species differentiation is established not

by segregation but alternation in bodies and their environments. Culture thus becomes the

constant unifier and nature of the differentiator. Conversely, Western multiculturalism has one

physical shared world, nature, or reality, where cultures and perspectives differ based on cultural

points of view or belief. This is contrary to multinaturalist societies where one is able to

transform bodies with relative ease—either human to human or human to animal or animal to

human—similar to changing perspectives in multiculturalist societies.[72]

Philosopher Yuk Hui has criticized various ontologic proposals, especially those looking

at Indigenous cultures, as not realistic in their ability to map these types of relationality to a

large-scale technoscientific society. He argues instead for "earth-oriented reappropriation of both

modern technology and non-modern cosmologies" to create a world of pluralistic ontologies and

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[71] Donna Jeanne Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham: Duke University Press, 2016), 58–63.

[72] Eduardo Viveiros De Castro, "Cosmological Deixis and Amerindian Perspectivism," *The Journal of the Royal Anthropological Institute 4*, no. 3 (1998): 469–88, https://doi.org/10.2307/3034157.

cosmotechnics that can rival the hegemonic one we are currently in.[73] This catalyzed me to create a praxis-framework rooted in science and recent history in order for it to be intersubjective and intercorporeal for agents, or subunits, within our technoscientific society. The framework's main goal is to attune subunits to the underlying biophysical processes.

We are a large-scale technoscientific society with a deep understanding of explicit, underlying physical and biological forces that shape entities. Through biosemiotics, we know the agent's own agency is part of this shaping. My proposed praxis-framework contains an interplay of matter, mind, and semiosis in a cosmo-evolutionary space-time that is enmeshed into the emergent-self's field of experience. Each foundational emergent matter forms a layer within a vertical axis. Entities emerge from these layers and are subjected to the dynamics of entropy and the constructal law, creating an interpenetrating and interrelated lattice of innenwelt and umwelt linked together by semiotic exchanges, stabilize by habits or patterns, within a continuum of transformative matter. We are simultaneously creating, and are enveloped in, the biosphere and the semiosphere, all feedbacking into the other.

We cannot see the implicit forces that take part in shaping the explicit layer of entities, organisms, agency, and events (Figure 3). We widely accept some of these forces, like gravity and entropy, but not others, like evolutionary dynamics and constructal law. Evolution and its correlated phenomena, such as emergence and adaptation, are patterns influenced by these underlying processes of entropy and gravity. In the world, there are somatic and aesthetic perceptions that all channel into semiotic negotiations, like Batesian mimicry, within the transfer and transformation of matter, propelled by entropy and shaped by agency and entropy, or more

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[73] P. Lemmens and Y. Hui, "Reframing the Technosphere: Peter Sloterdijk and Bernard Stieglers Anthropotechnological Diagnoses of the Anthropocene," *Krisis: Journal for Contemporary Philosophy*, no. 2 (2017): 39.

specifically, constructal law. Contingencies and emergence arise from the neverending interactions of elements, like horizontal gene transfer, an abiotic global communication network with abiotic and biotic agents, or natural disasters causing mass extinction.

Humans and our technologies are outcomes of natural processes. We evolved consciousness to exist in a world of increasing interconnection and complexity and, for reasons still unknown, we ended up with self-reflective consciousness. We became nature that could reflect upon nature, and this includes questions of our own existence and purpose. With our self-reflective consciousness, we realized we were in an umwelt and left it, only to step into the confines of the semiosphere. We are now enchanted and transfixed in a world of symbols defined by the larger organizing social bodies we are nested in. These socially constructed mental categories become embedded in us through repetition and habit, dissolving in our perception so that our bodies can conserve energy. At the same time, this has given us extremely rich linguistics and semiotic capabilities. Our noetic and autonoetic consciousness, language capabilities, and our mental bodies give us the ability to utilize all the antecedent foundational emergent matter below us for our own mimicry and aggregation. We peer into the umwelts of other scales of Being, decoding their logics and semiotics, manipulating them through their codes to construct a new material and semiotic reality. The same abilities give us the ability to produce art and aesthetic experiences so that we can continuously break out of our enchantment to become aware of our semiotic enclosure and peer out to other ways of organizing and being organized.

Our current dominant worlding has us believe that actions are not bound to Earth's biophysical processes and that we can even master it, as planetary-scale dampening, or

regulatory negative feedback, tells us otherwise. The increasingly networked and aggregated social body formed by the undercurrents of capitalism gushing forth between our symbolic and material world carries us into our own destruction and possible integration into an emergent, more complex being. All the while, we perpetuate first-order cybernetic logics and continue to create new technologies to reach newer levels of extraction and integration. Humans and our systems, or self-reflecting nature, have aggregated to a planetary-scale and have proliferated all over it without considering our wider context; the Earth and its processes. This has led us on a path to destroying ourselves through the decimation of our habitat.

Biotic cells emerged from abiotic molecules and atoms. Complex cells formed multicellular organisms with an advanced integrative communication system of sensors and receptors channeled to the central nervous system and the brain. Humans take in energy from the sun and living matter, then generate heat, semiosis, and mind. We evolved self-reflective consciousness and can only perceive the world through our own internal mapping of it, cutting us off from it. With this, we were able to organize into larger bodies, to shape atoms and molecules into computers, autonomous drones, and into advanced planetary-scale telecommunication systems that tether us to each other through it. The devices we use are constantly communicating with satellites in space and servers in warehouses across the world. These all use energy and generate heat and data. This harkens back to atoms forming lattices, becoming rocks and minerals. Aggregated atoms led to molecules, which eventually led to the emergence of cells and biotic life. From this came bodies with consciousness and the ability to propel themselves against gravity around the biosphere. Humans have created the internet, and it has grown to a planetary-scale communication system that connects all agents, from countries down to

individual agents (including humans and machines), via the internet of things. In this process, we have also formed a planetary-scale memory that can be recalled by us and machine-agents.

Neural networks are modeled after the human brain, enabling machines to form associated links from the vast memories (or data) we give it. This is a rudimentary form of learning and adaptation. The operational image or images generated by machines for machines are processed through neural networks, forming a mechanic-symbolic world increasingly closed off from humans. The internet of things connects billions of devices with each other, and like the prokaryotic cells that blanket the Earth, this also increases the chances of emergence of a new foundational level. What these systems currently don't have is a physical boundary, self-reflective consciousness, or the awareness of themselves as an emergent-being.

With the advancement of synthetic biology, I wonder if, how, and when the human will be physically folded into this new emergent foundational layer. Will there be humans like us and another more complex entity that integrates the human with the antecedent layers? Leading to a split like the eukaryotic cell from the prokaryotic cell? Could there be an emergent being with more complexity; another type of human that emerged from the interactions between human bodies, abiotic machines, communication pathways, quantum logic, machine intelligence, and synthetic biology. Past foundational emergent events follow combogenesis; combining and integrating previous foundational emergent layers to create something fundamentally new on Earth that is able to handle and navigate the increasing complexity of the world it emerged from.

There are currently neurotechnology companies making progress on syncing the human biotic brain with machines. The internet, or the World Wide Web, is often compared to the mycelium network or the "wood wide web" in forests. Agents within it retain greater levels of

autonomy, but with the continuing advancement of neural networks and synthetic biology, the internet backbone can become a planetary-scale central nervous system encompassing human agents with less and less autonomy until our agency and flexibility is that of the cells that constitute our bodies. We have already experienced the detrimental effects of machine learning and algorithms on our agency, and more so with the passing of time.

If we go back to the bifurcation point at the Macy Conferences in 1946, systems thinking proposed at least two contrasting paths: the military-funded science and engineers cybernetics, and the humanities and biologist second-order cybernetics and Bateson's biocybernetics. One is a continuation of the colonial fantasy of total clarity through hyper-rational, top-down technocratic and bureaucratic modalities of control, where the systems become to know themselves, and our actions, thoughts, and desires are defined and limited by human-made infrastructures where algorithm dominance and catastrophes become normative. The other is a fundamentally different way of interacting with and being in the world; a science of adaptation and process, an epistemology of contingency where no matter how much data we gather or stimulation we run, we know we can never know completely. This shifts knowledge production away from rational and absolutism to embodied cognition, adaptive, and context-specific; this is an aesthetic knowing.

Gregory Bateson's ideas of aesthetics were based on the cybernetic ideal of mind. He believed individuals in large scale society were disproportionately reliant on conscious processing, or social knowledge, instead of individual self-knowledge. He believed aesthetic practices could modulate this system disparity through expanding an individual's consciousness. This is possible because artistic perception involves interaction between the biological body, its

perceptual-motor systems, and ecological and cultural specificity in an individual's development. A critical aesthetic work facilitates recursive self-reflexive knowing: information transforms as it crosses boundaries, accumulating connections and emergent patterns between unconscious and consciousness processing, perceptual-sensing and cognitive, cultural and natural, individual and society.

Aesthetic knowing is based on the exterior manifestation of the sensible. This goes beyond a simple representation of an object or subject to an anoetic-noetic-autonoetic knowing using an artwork that acts on and exists within a recursive circuit between the I (or the individual) and their many levels of information processing and we (or the collective knowing) as a whole. There is tension arising from individual potentiality, transformation, and the stabilizing collective consciousness, all within the constant unfolding and becoming of life.

As our systems grow they become bigger, more complex, and able to interpenetrate across various abiotic, biotic, social, and cognizing spheres. This interpretation moves us from an enveloping and closer to a merging. Art, in essence, has to adapt to these complexities in order to help us see out of our enclosure. Art, like science, brings other scales of being to a human scale in order for us to comprehend it, but science often does not look at itself; rather, it perpetuates technological and belief systems. Art, on the other hand, uses science and technology to look at science and technology, fulfilling the role of second-order cybernetics "cybernetics of cybernetics."

Art can transcend abstract, rationalized understandings to transform deeply-held embodied beliefs. It is a regulatory tool in our semiosphere. Applying complexity terms to our semiotic realm, critical aesthetic practices can cause bifurcation points within our semiosphere,

creating new layers of signs, logic, and therefore meaning that will eventually be incorporated into the larger culture, stabilizing in the collective. In a time of increasing destabilizations of the Earth's systems, alongside an increasing rate of technological change that works toward the seamless integration of our physical and digital realities with algorithmic governance, it is beneficial to create new critical aesthetics practices that help us see the boundaries of our semiosphere and point to other possible ontologies, epistemologies, and cosmologies; ways of aggregating-organizing and being organized.

When I consider the enmeshed history of systems thinking, science, technology, and art practices, a critical aesthetic practice that wishes to be the negative feedback systems of enframing now will need to mimic and break off from the structure of technoscientific systems and its latent beingness. Currently, science and technology, propelled by centers of power, are creating complex adaptive systems that interconnect and integrate abiotic, biotic, semiotic, and cognizing spheres—this includes us—leading to stronger downward causation and aggregating towards integration and strong emergence. Critical aesthetic practices are often in a Batesian mimetic relationship to dominant enframes, similar to a butterfly within a process that takes a sign as it appears in their habitat, recontextualizes it, and feeds it back into their world for the sign (mimic) to recirculate with the original sign (model). Spreading through the network, the new sign has a multiplier effect and alters behaviors of other agents, eventually altering the environment itself, which loops back onto the butterfly all the way down in an ongoing recursive process.

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