

A Tentative Model for a Living Universe

Part One

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The ancient Greek word for science was philosophy – *philos sophias*, the love of wisdom. This name intended to set science on a course of searching for wisdom, for practical guidance in human affairs through understanding the natural order of the cosmos to which we belong.

It was precisely this search that motivated me to study science and continues to motivate me, though only the rarest of western scientists I encountered shared it, most having abandoned that search in the belief that science should be neutral – i.e. free of values and social intent – or that the ever new technologies spawned by western science are all humanity needs to solve its problems and continue its “progress”.

Jonas Salk, one of the rare scientists who never stopped pursuing wisdom and guidance for humanity through science, was marginalized in his own prestigious scientific institute. He sought me out as a kindred scientific spirit on the remote Greek Island to which I had retreated to work on my own, feeling a similar marginalization by my peers. I shall always be grateful for his recognition and encouragement.

Prologue

Western science assumed the existence of an objective material universe that can be formally modeled through objective observation and measurement. Thomas Ehrlich describes objectivity as follows:

*Objectivity is commonly taken to mean, “freedom from idiosyncrasies”. An idea is objective to the extent that it is unpoluted by the individual’s beliefs or presuppositions; a critique is objective to the extent that the person making the criticisms and suggestions ignores their own personal feelings and biases. Objectivity in this sense is often defined as the negative of personal subjectivity, or as the opposite of personal opinion.*¹

Science set out not only to eliminate idiosyncrasy and bias by decreeing the separation of subjectivity (our inner world) from objectivity (our outer world), but to create a comprehensive and detailed model of the outer world as a universe independent of any individual human conception of it (whether revelatory or observed) and independent of human participation within it – an undisputed, public model of a “reality” entirely independent of our thoughts and actions.

The word physics is taken literally from the Greek word for nature: *physis*. European scientists from Galileo on

assumed that physics in its modern meaning, including astronomy, was the true science of nature, while life sciences from organic chemistry to biology, evolution biology, and psychology were (and still are) deemed secondary. Natural laws are still limited to the physics of a non-living universe, into which biologists are expected to fit their explanations of life. Toward this end, the concept of *negentropy* was coined as a kind of swimming upstream that could increase order locally within the overall river of entropy. Negentropy is credited with the descent of man, according to Darwin, his predecessors and his followers, as the natural creature of an evolutionary process billions of years long.

Consider what might have happened had Galileo looked down through a microscope into a drop of pond water teeming with gyrating life forms instead of up through a telescope into the heavens, already conceived in his time as celestial mechanics? Might biology, rather than physics, have become the leading science into whose models all others must fit themselves? Might scientists then have seen life not as a rare accidental occurrence in futile struggle to build up syntropic systems against the inevitably destructive tide of entropy, but as the fundamental nature of an exuberantly creative universe?

Instead of projecting a universe of mechanism without inventor, assembling blindly through particular, atomic and molecular collisions a few of which came magically to life and further evolved by accidental mutations, I propose that there is reason to see the whole universe as alive, self-organizing endless fractal levels of living complexity as reflexive systems learning to play with possibilities in the intelligent co-creation of complex evolving systems.

I propose that it is actually more reasonable to project our life onto the entire universe than our non-living machinery, which is a derivative of life, a truly *emerging* phenomenon, rather than a fundamental one. I propose that it is possible to create a scientific model of a living universe, and that such a model is not only scientifically justified but can lead to the wisdom required to build a better human life on and for our planet Earth as the ancient Greeks intuited it should.

New Assumptions for an Integral Science

The current revolution – the impending paradigm shift – in science is forcing reconsideration of its most fundamental assumptions, that is, of the worldview described above, of the basic beliefs supporting the current scientific

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model of our universe or cosmos and ourselves within it. *Cosmos* is defined as “the universe as an orderly construct”, so because I am proposing an orderly model of the universe, I will usually prefer the word *cosmos*.

Western science set itself the task of describing reality. In eliminating those aspects of the perceived world that are not measurable, it relegated them variously to subjective, mental, mythological, imaginary, storytelling, fictional, spiritual, and other categories identified as *unreal*. A few aspects of our world, such as taste, smell, and electromagnetism were shifted from unreal to real as ways of measuring them were discovered.

To contribute to an Integral Science, my model of the cosmos must include *all* human experience. The goal of this new version of science is proposed to be: a) to model a coherent and self-consistent cosmos as a public reality conforming as much as possible to necessarily private individual realities; and b) to interpret this model for the purpose of orienting humanity within the cosmos and thus permitting it to understand its particular role within the greater cosmos.

Toward that end, I propose:

1. The scientific definition of reality should be the collective human experience of self, world, and universe as inner and outer worlds perceived from individually unique perspectives. (We have no other legitimate basis for creating cosmic models.)
2. Consciousness (awareness) shall be axiomatic for the simple and obvious reason that no human experience can happen outside it.
3. Formal experiments have as their purpose the creation of publicly shareable models of reality that permit common understanding and prediction.
4. *Autopoiesis* (continuous self-creation) shall be adopted as the core definition of life. Since galaxies, stars, planets, organisms, cells, molecules, atoms, and sub-atomic particles all fit this definition, this implies that life is the fundamental process of the cosmos, a self-creating living whole with self-creating living components in co-creative interaction.
5. Nature shall be conceived in fractal levels of holons in holarity, holons defined as relatively self-contained living entities such as those listed in (4) and holarity defining their embeddedness and co-creative interdependence on energy, matter, and information exchange.

Beginning with these few assumptions and definitions as a conceptual framework for an Integral Science, we can reassess the past findings of science based on previous models, discover past errors and redesign experiments as necessary. We can also look for new patterns of regularity. (I shall avoid the term laws because of its implication of a lawgiver.)

Reality as Direct Human Experience

The idea of defining reality in terms of human experience may seem strange to any western scientist accustomed to firm belief in a firm firmament that includes our Earth and humanity but exists separately from human experience of it. Yet the whole edifice of a separate, objective world has been built on a belief in objectivity that has been discredited by philosophers of science and increasingly by scientists themselves (see below). If the claim of basing science on reason — on experiment (a word derived from experience) and rational argument — is to be upheld, then *we cannot postulate a world that is not within human experience as long as we have no way to be outside human experience.*

The simplest case for conceiving reality as human experience, as stated above, is that we have no other legitimate basis for creating cosmic models. Note that this definition happily eliminates the need to define nonreality.

Merriam Webster defines reality as:

1: the quality or state of being real;

2 a (1): a real event, entity, or state of affairs (2): the totality of real things and events; b: something that is neither derivative nor dependent but exists necessarily.

The first three definitions tell us nothing as they define reality in terms of *real*. Only the final definition begins to tell us something meaningful, that reality “is neither derivative nor dependent but exists necessarily.” The only thing fitting this latter definition is direct perception, for once any perception is reported to another, whether by a three-year-old, a scientist, or a theologian, it clearly becomes derivative.

The *Cambridge English Language Dictionary* adds “**existing in fact; not imaginary**” to its definition of reality, but a perusal of its definition of *fact* tells us:

fact: something which is known to have happened or to exist, especially something for which proof exists, or about which there is information.

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The only way to truly *know* that something has happened or exists is to have direct experience of it, as we just determined. This clearly implies that truth can only be subjective. Unfortunately, western science has denied subjective (direct) experience as a valid reality in maintaining that the objective practice of science is the only way to demonstrate it. This belief is still strong among scientists, though philosophers of science have long held that science cannot reach truth but only useful hypotheses.

The way in which hypotheses are determined to be useful or not lies, of course, is testing them experimentally. If the experimental outcome predicted by the hypothesis is found, they are considered useful. The validity of extrapolation beyond the experiment itself can only be judged in terms of consistency with our direct experience of the world.

It has now been shown in very careful research, for example by Elisabeth Targ^{2,3} and Marilyn Schlitz^{3,4} that remote intention and experimenter expectation clearly influence experimental outcome despite laboratory controls. The repercussions of such research have only begun to be felt, but certainly threaten to undermine the basic premises of western science if not its results.

More generally, the objectivity so sacred to western science has proved logically impossible. As Gregory Bateson noted decades ago, philosopher of science Alfred Korzybski warned us (in discussing the relationship between scientific models and reality) that “the map isn’t the territory and the name is not the thing named.” As Bateson himself put it, “there are no pigs or coconuts in the brain.”⁵ In a *Metalogue* with his daughter Mary Catherine Bateson, they put it thus:

GB: ...one thing you can be sure of is that the conversation isn't about "something solid and real." It can only be about ideas. No pigs, no coconut palms, no otters or puppy dogs. Just ideas of pigs and puppy dogs.

MCB: You know, I was giving a seminar... and Wendell Berry was arguing that it is possible to know the material world directly. And a bat flew into the room and was swooping around in a panic, making like Kant's Ding an sich. So I caught it with somebody's cowboy hat and put it outside. Wendell said, "Look, that bat was really in here, a piece of the real world," and I said, "Yes, but look, the idea of the bat is still in here, swooping around representing alternative epistemologies, and the argument between me and Wendell too."⁶

No human has ever had a direct (real) experience except in the eternally present Now moment; all the rest can only be stories that weave particular and more general past experience into the present. We cannot directly experience the past or the future. Whatever we are experiencing, from whatever combination of inner or outer sources, is our in-the-moment reality. Esoteric traditions have made much of this fundamental truth – the only truth there can be – while western science has totally ignored it until now. The only exception I have found was on a scientific delegation to China (in 1974), where a Chinese scientist defined science as “the summation of people’s experience.”

The task of Integral Science, accepting this fundamental truth, is to sort and order reports of direct experience into an abstract public model of reality, using tools of reason, math, logic, experiment, and narrative to construct it.

Consciousness as axiomatic

Sooner or later a certain truth is brought home to you [namely, that consciousness] is the inner side of the whole, just as human consciousness is the inside of one human being...Although it makes sense to inquire how and when consciousness developed into what we now experience as such, it makes no sense at all to inquire how and when mind emerged from matter...Once you have realized that there is indeed only one world, though with both an inside and an outside to it, only one world experienced by our senses from without, and by our consciousness from within, it is no longer plausible to fantasize an immemorial single-track evolution of the outside world alone. It is no longer possible to separate evolution from evolution of consciousness.

– Owen Barfield⁷

The fundamental assumptions of my model, as listed above, have to do with human experience of the universe and human conjecture about the universe based on, or derived from, human experience of it, because these are all we have to go on in creating models – scientific or other – of that universe. Human experience includes the perception of a tangible, substantive world, but this experience of a material world, even if coming through sense organs, lies entirely within human consciousness, or awareness.

The *Merriam Webster Dictionary* defines **consciousness** as “**the quality or state of being aware**” and **awareness** as “**having or showing realization, perception, or knowledge**”. The *Cambridge International Dictionary of English*

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calls **consciousness** “**aware, thinking, knowing**” and **awareness** as “**knowing that something exists, or having knowledge or experience of a particular thing**”.

Consciousness and awareness *are usually listed as synonyms of one another*, though awareness is more often linked to the concept of knowledge than is consciousness.

The problem with this link to knowing is that knowledge is clearly culture bound. I shall therefore distinguish cosmic consciousness, as a universal field of awareness such as that to which Owen Barfield refers, from human consciousness in its broadest, most fundamental, cross-cultural understanding as awareness of self-in-world and world-in-self.

This human awareness of *having* an internal and external life perceived in images, sounds, touch, smells, feelings, thoughts, stories, etc. can be shared with others to a certain extent through verbal and other forms of language, thus giving rise to a broader cultural, or public, shared awareness of many-in-world. Once humans acquire language, this awareness arises in large part as verbal thought, which is why Descartes’ stated his bottom-line of *knowing* as: “*I think, therefore I am*”.

Taking Descartes’ lead in seeking my most basic observations, they are:

- * I experience myself and others as alive.
- * I experience myself at the center of an apparently spatio-temporal “outer reality” or universe.
- * I experience myself as an inner self of perceptions, feelings, and thoughts.
- * I/we have no experience of the apparently spatial “outer world” outside of our conscious awareness.
- * I/we have no direct experience outside of an eternal present or Now, yet I perceive my experience as though it lies on a continuum from past through Now to future.
- * We can share our experiences in stories that transcend direct experience because of this timeline and our ability to communicate.

Thus we clearly perceive ourselves as existing in a physical time-space world, and are able to describe it, model it symbolically, and create other sharable stories of past (memories, histories, evolutionary trajectories) and future (forecasts, projections, anticipations) experience within it. But we have no way of knowing whether any of it exists apart from human experience.

Therefore:

- * Science can only order and model human experience within consciousness as communicated among humans;
- * We cannot prove any “true” reality other than that composed of both uniquely personal and collectively shared experience
- * Recognizing our formalization of spacetime as a model of perception, rather than an objective reality, it becomes an important way of ordering shared experience.
- * That human individuals *can and do* share considerable (though far from perfect) agreement on external reality and varying degrees of agreement on internal reality is of very significant interest as it both makes society possible and produces a larger reality than any one individual can experience independently.

The best argument we have for the existence of a “real” vast universe is the *limitlessness* of human conscious awareness, whether it is focused inward or outward. Every scientific or spiritual discovery can be contained within its expansive capacity. Inner focus, when sufficiently practiced through meditation and other spiritual practice gives rise to the experience of ultimate truth in a limitless Source, called I AM, Cosmic Consciousness, or God by many names across all cultures and felt as loving bliss. Outer focus, when sufficiently practiced through scientific study and reasoning gives rise to the experience of a coherent, comprehensible, though limitless universe or cosmos and recognition of arrival at its truth also produces “breakthroughs” felt as bliss. Those who practice both disciplines come to recognize the unity of these end results as a non-dual cosmic reality.

Thus, building a scientific model on the fundamental assumption of consciousness as the source of reality does not shrink the cosmos one whit. But it keeps us within that cosmos as co-creators of it, as reflections of cosmic creation at all other levels. For reality co-created by humans through a private and public collaborative process suggests a greater holarchic universe of collaborative process. All Nature can thus be elegantly conceived as conscious collaborative process, as I will try to show.

Sophisticated ancient cultures such as Vedic, Taoist, and Kotodama, along with many indigenous cultures, recognized the fundamental consciousness of all Nature, the entire Universe or Cosmos, and much in the findings and conceptualizations of physics today leads us in that direction, as I will show.

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Note that as we have found no limits to human conscious awareness, our awareness is (necessarily) coextensive with any models we build of the entire universe. Anything we “discover” scientifically about the universe becomes part of our conscious awareness, and therefore of our experience.

Physics Meets Biology

One of the important requirements for an Integral Science from my perspective is to end the sharp distinction between physics and biology, to avoid having either one forced into the mold of the other. Rather, I seek out new models of cosmic physics that are naturally compatible with seeing the universe as embedded living systems. Since familiar biological life forms – from nucleic acids to bodies – take on fundamentally toroidal (vorticular) structure, which is the simplest structure meeting the definition of autopoiesis and is evident in proto-galactic clouds, galaxies and planetary energy configurations such as Earth’s electromagnetic field and surface weather patterns, I gravitate toward cosmic physics models that begin with this elementary living geometry.

For me the beauty and usefulness of autopoiesis as a definition lies precisely in helping us see beyond our narrow focus on familiar life forms to their relationship with both smaller and larger entities from subatomic to galactic. The simplest entities I could find that fit the definition were a whirlpool in a river, a tornado, a proto-galactic cloud. I reasoned that any differential gradient, whether in water, our atmosphere, the supernova dust cloud that gave rise to Earth or the earliest universe itself, would cause things literally to curl in on themselves – to form vortices that held their form as matter/energy was pulled into and spat out again by them.

This concept became extraordinarily clear to me one day on the Greek island of Kos, considered the birthplace of the twins Apollo and Aphrodite. Walking across a flat field of sand with a friend, I was contemplating the universe and the concept of autopoiesis, picking up various seed pods and small shells as examples, each another version of the same spiraling form, musing aloud to the friend with me at how prevalent it was in the universe. My reverie took me deep into a cosmos of wheeling galaxies when suddenly the sand some twenty yards from us lifted into the air and formed a perfect funnel that swept a graceful curve and smacked directly into us.

As the day was otherwise completely calm and windless, my friend, getting the connection, asked in amazement

“How did you *do* that?” I replied, “I didn’t!” and then, on further reflection, added, “But I may have attracted it.” He looked at me strangely and asked, “Does the motion in a vortex go inward or outward?” Without having thought about it for a moment, I shot back “Both ways!” I knew this with a certainty – that it had to be centripetal and centrifugal at once. Never having taken a single physics course, even in high school, I could not explain it; I simply knew it, and it surfaced in my consciousness then and there on the island of the Twins. I was sure the vortex was the real key to how the universe worked.

Gregory Bateson, speaking of a conch shell, gives us a sense of how such structures play out at the familiar biological level in saying:

This that you see is the product of a million steps, nobody knows how many steps of successive modulation in successive generations of genotype, DNA, and all that. So that’s one story, because the shell has to be the kind of form that can evolve through such a series of steps. And the shell is made, just as you and I are, of repetitions of parts and repetitions of repetitions of parts... This conch is what’s called a right-handed spiral, and spirals are sort of pretty things too – that shape which can be increased in one direction without altering its basic proportions. So the shell has the narrative of its individual growth pickled within its geometric form as well as the story of its evolution.⁵

As a torus is a self-contained rotating vortex, continually turning itself inside out, I was delighted, not long after, to discover the “smoke ring universe” of Sir William Thomson, later Lord Kelvin, the father of thermodynamics, who was buried next to Newton in Westminster Abbey. Dissatisfied with the prevailing theory of atoms as hard material objects, Thomson, like myself so much later, saw the essence of his vortex theory of the universe and his vortex atom in a flash, as described in a contemporary book on updated vortex theory by David Ash and Peter Hewett.⁸ His famous demonstration to the Royal Society of Edinburgh in 1867 involved the actual creation of smoke rings from a special device to demonstrate their remarkable integrity.

Thomson’s next breakthrough came when he learned that his friend Herman von Helmholtz, working with vortices in liquids, had realized that vortices would be permanent in a frictionless liquid. Thomson reasoned that the ether, believed in at that time, must be such a liquid and could therefore support permanent vortex (rotating toroid) atoms. With this model, Kelvin developed a unified theory

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of matter and light. His vortex theory attracted leading British physicists, including James Clerk Maxwell, who developed electromagnetic theory, making possible radio, television and radar. But the popularity of vortex theory was largely forgotten in the heady excitement of the explosive new developments in physics at the beginning of the 20th century.

Nevertheless, having come to a vortex theory of an autopoietic living universe—a universe of self-creating living geometry—I continued to seek out physicists working with vorticular, toroidal models of macrocosm and/or microcosm, especially looking for models with two-way (centripetal/centrifugal) motion. It is apparent that more and more physicists are coming to see inwardly and outwardly spiraling waves as the very essence of cosmic creation.

Gary Schwartz has made an interesting model of the universe as a giant intelligent memory-encoding device based on recurrent (circular) feedback loops of radiation among objects in the universe.⁹ In essence it points out that everything in the cosmos continually emits its wave pattern of radiation (in-formation) outward to everything else, each object absorbing information reaching it from others, its own radiation thus being continually modulated. Any two objects “reflecting” each other in positive feedback loops store their own histories or memories including these interactions.

Everyone is familiar with the example of looking into the night sky, absorbing historic photons from stars of different ages past in the same moment as our own radiation, however much weaker, goes continually outward toward them. Carl Sagan played with the same idea in having Hitler’s historic radio speech picked up again on Earth by a radio telescope in his book and movie *Contact*.

Milo Wolff states that there are no spherical solutions for e-m waves but posits spherical quantum waves to build a very similar and much more formal geometric picture of the interactive Wave Structure of Matter^{10,11} in which quantum objects emit spherical outward waves the interactions among which actually generate the zero point energy field that gives rise to them in turn—an elegant model of co-creation at the quantum level from which he derives the classical laws of physics, though there is no mention of consciousness.

Nassim Haramein, building on Walter Russell’s^{12,13} and others’ models of spherical interactive wave mod-

els, extends them significantly by positing a universe of galactic, stellar, planetary, cellular, molecular, atomic and particulate “wholes” that are simultaneously dynamically rotating white holes radiating (electromagnetic energy) infinitely outward from their centers and equally balanced dynamic black holes collapsing (gravitationally) infinitely inward through that same center.^{14,15,16}

This perfect balance of radiation and gravity in all universal objects of all size levels including the universe itself permits us to see all objects as continually and dynamically re-creating themselves in the zero point energy field, and is a strong candidate for the long-sought unification of gravity with electromagnetic energy. It also eliminates the need to postulate strong and weak nuclear forces, dark matter and dark energy, all of which Haramein proposes were invented to fill gaps in previous models.

His solution to the problem of the one-way degradation of entropy lies in balancing it with gravity’s generoactive *centropy* (close to my biological term, *syntropy*), thus eliminating the need for the imbalanced concept of negentropy to explain life. This model permits me to compare radiation/gravity or entropy/cen(syn)tropy with the biological metabolic process of anabolism/catabolism toward an integral science model of a self-creating universe filled with self-creating entities.

Further, Haramein provides a living geometry of wave interactions that *co-creatively* build complex entities and their histories-as-memory similar to Schwarz’s “living energy universe”, but in the more complete framework of creative recycling dynamics at all scalar levels of size. He sees the feedback looping quantum wave interference among co-creating objects at all fractal levels of size (read holarchy) up to the whole universe as both the source of scale generating structure in the vacuum (from microcosm to macrocosm) and as consciousness itself (private communication).

In the next section I shall refer to Haramein’s model with parallels to a living systems model of the universe built up from human experience because it is the most complete and most compatible physics model I have encountered.

The basic data of experience I listed above imply that “I” exist as a kind of boundary between infinite inner and infinite outer worlds—a boundary Haramein would call, in the language of physics, the “event horizon” of the black/white whole generated by my singularity. Since I

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observe that this seems true of every other human “I” as well, while each of us has an apparently different perspective on these inner and outer worlds, we seem to be both boundaries (event horizons) and unique points of perspective, quite as is required by Hara-mein’s model.

This biological perspective on the universe beginning with any particular observer agrees very well with Hara-mein’s abstract physical model of an integral omniscient universe that extends both outward and inward via every object’s singularity in the vacuum.



Editor’s Note: You can find more work by Dr. Sahtouris at <http://www.sahtouris.com>

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