

THE HUMAN CONNECTION: Part I

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Abstract

As Carl Sagan famously said, we are "star stuff" exploring the stars. Life is the information pathway by which the universe achieves consciousness and self-awareness, and begins to explore itself, including evolving new modes of experience, creativity, and beauty. In terms of creativity, humans represent a fractal iteration of the creative energy of the Cosmos, as well as of its evolutionary powers. Because the entire material universe devolves from light, matter and life are a conserved form of the information content latent in the energy of light, expressed primordially through the broken symmetry of light - leading to our "matter-only" cosmos, charge conservation, atoms, the Periodic Table, chemistry, biology, and humanity. *The charges of matter are the symmetry debts of light (Noether's Theorem)*, and through these charges the energy of light is transformed into the information content of the world. Hence it is ultimately through the connection between light and matter (atoms), charge conservation and symmetry conservation, that humans retain their connection to the primordial creative energies and information content of the universe (and the multiverse). "We come trailing clouds of glory..." (Wordsworth)

Introduction

We have reviewed the physical evidence for matter's connection to spacetime and the universe (see: "[Nature's Fractal Pathway](#)"). We found multiple linkages between spacetime and matter, of which the most familiar are light, time, inertia, and gravitation. More esoteric connections include the creation of particles from light and vice versa, the particle-wave duality of energy, and the Dirac/Heisenberg "virtual" particles of the vacuum. Finally, we saw that matter was an inherent and indeed necessary property of the universe, contributing negative energy through gravitation, and making up at least half of the "[Tetrahedron Model of Light and Conservation Law](#): Conservation of Energy, Conservation of Symmetry, Entropy, Causality. Below, we will consider some other specifically human connections with the Cosmos. In general terms, the view presented here is that life is the means by which the universe awakens to and explores itself; humans are (locally) the most advanced expression of this continuously evolving cosmic self-awareness and consciousness. (See: "[Chardin: Prophet of the Information Age](#)".)

The Spiritual Connection

Evolution, through the development of our consciousness, self-awareness, imagination, and abstracting intelligence, has conferred upon humanity a unique awareness of our connection to the Cosmos, which we call "spiritual" awareness and which, as social animals, we symbolize and institutionalize as various forms of "religion". "Spirit" subsists in the connections between things; human spiritual awareness is our self-conscious connection to the Universe. While it is undoubtedly true that other animals "feel" their connections with the rest of nature, humans are probably unique in their ability to abstract, symbolize, and objectify this feeling ("think" their connection), often in this process actually losing the comfort of the more basic intuitive feelings. We are certainly the only animal to formally codify spiritual concepts and produce organized and ritualized spiritual/religious practices, including priests, shamans, and prophets, sacred texts, philosophies, cosmologies, social structures, traditions, religious art, music, architecture, etc.

Human spirituality constitutes a further emergent property of the connection between matter and the Universe, produced at the natural organizational level of species and abstract consciousness. Here, too, we find as we might expect, a reflection of the 4x3 universal fractal form in our religions, mythologies, legends, and cosmologies. In its emphasis upon "divinely ordained" religious law (God as "Lawgiver"), human religion seems to reflect an intuitive awareness of the highest form of connectivity in physics: the existence of, and connections among, the conservation laws that govern all natural interactions. Science is a rational, social expression of our awareness of cosmic law and connection, also unique to humans. Conflict between science and religion occurs when both lay claim to the same set of cosmic laws and phenomena - as in the case of Darwinian evolution vs "special creation".

The origins of human spirituality lie in our animal feelings of connection, but are developed out of these through the abstracting abilities of our minds into the elaborate religious forms we see today, universally present in human society. The feeling of connection to our fellow creatures, nature, and the Cosmos is the psychological and emotional basis of mental health; insanity is the consequence of its loss. Mental illness is the evolutionary price humans pay for their big brains and their ability to abstract their feelings, for in this abstraction process lies the risk the physical/intuitive contact with reality may be lost. There is always a thin line between genius and insanity; it takes a very healthy individual to survive the onslaught of genius, just as only a very healthy animal can deal with abstraction at all. The immense length of time it required for humans to evolve from walking apes to modern Man is a testament to this difficulty, which plagues us still in the precarious balance of our mental health.

Death as Disconnection

The psychological price of human awareness, self-consciousness, and abstract thought is expressed in a single word: Death. When humans began to have the ability to think about the meaning of death, of the annihilation of the personal consciousness, identity, individuality, and life experience of which they were just becoming aware, they stepped over a gigantic threshold in psychological evolution, the mythical "expulsion from the Garden". One can only suppose that their strong evolutionary heritage of animal intuitive feelings of connection carried them through this terrible time, and resulted in the first religions, a means of social comfort and solace, celebrating their connections with the "spirits" of the dead and with the "spirits" of nature and the animals. Early forms of religion always emphasize man's connection to nature and the animals; purely "spiritual", abstract, intellectual, or "scientific" forms of religion come much later, when the human psyche is more comfortable with its sense of isolation. We would indeed wonder if any evolutionary form which had no spiritual awareness or "religious" practice was fully "human" (speaking here of species not individuals).

Death is the great test of our conviction about connectedness. If we become too abstract, we tend to lose this conviction. In the end we are all forced back to "feel" our way, through our physical and animal connections, to the "brave new world", the "undiscovered country" we all must enter. This is why our animal pets provide such comfort - they don't have the "disconnection" problem. The whole intent of this paper is to give some comfort to the rational, abstracting mind that these intuitive feelings of connection are valid and can be trusted.

People everywhere need religion, otherwise people everywhere wouldn't have invented it. Religion is what you get when an intelligent, abstracting, creative mind confronts the annihilation of death: mind finds a way out. The universe knows it is eternal, and we (and all life) are part of the information domain of the universe - which is the whole rationale for the existence of the cosmos. We intuit our own immortality as part and parcel of the immortality of the universe, and we formalize this intuitive knowledge through religion.

Death as Connection

Death became perceived as the great disconnection; life, in contrast, was the experience of connection. This psychological crisis, created by the abstract mind, was also bridged by the abstract mind through the invention of "spirit", the connection that is immortal, that persists after death, that is the abstraction of connection itself. In the "spiritual" interpretation, death becomes not a loss of connection, but a return to the pure realms of connection itself - life becomes in fact a lesser expression because the body "contaminates" or interferes with the essence of connection - spirit. This concept eventually took the extreme form that life itself was to be less valued than spirit. This view, widespread in the western religions of today, as well as those of the past (the Aztecs and the Egyptians come to mind), had the unfortunate result of separating humans further psychologically from their true feelings of the connection to other living things, each other, and ultimately, self-reflexively, themselves. Man's vaunted spirituality became more real and valued than life itself; the abstraction became of greater significance than the physical model, and life was (and is) gladly sacrificed to spiritual or abstract "truths" and conceptual "realities".

Scientific and evolutionary theory has been at pains to repair this gap, demonstrating rationally our physical connection with nature and the Cosmos as a whole. Our spiritual awareness grew out of our animal feeling of connection with all things; ironically, religion has ended by separating us from the rest of nature (as a *unique* species and "creation"), asserting that we alone are truly connected spiritually to the Cosmos and its Creator (only humans have "souls"). In fact, only humans become *disconnected* from the Cosmos due to the

abstracting ability of our minds - the intellectual symbol (including words) replacing the intuitive reality. Music is a universal, emotional language addressing this problem.

The Separation of "Self", Matter, and Historic Spacetime

A fundamental physical cause for humanity's unease at the thought of death is our feeling of separation from the rest of the Universe - our awareness of "self" and personal identity necessarily means a distinction between "me" and the environment. Matter, and all massive entities such as ourselves, are in fact (as well as in thought) separated from our true conservation domain, historic spacetime, the conservation domain of matter's "causal information matrix". Massive objects do not inhabit historic spacetime in the way light inhabits its conservation domain, space: we live not in history, but only in the "universal present moment". Time is connected to space only tangentially, at right angles to all three spatial dimensions; that [tangential point of connection between space and time](#) is the "present moment" of our experience, our point-like "touch" upon expanding history. Only information can pass from space into history, massive objects such as ourselves cannot. There are several very good reasons for this physical arrangement, beginning with the fact that matter cannot travel at velocity c and hence cannot participate in the entropic expansion of light's conservation domain, space. (See: "[Spatial vs Temporal Entropy](#)".)

When light is converted to matter, or when any form of free electromagnetic energy with "intrinsic motion c " is converted to massive, immobile, bound forms of electromagnetic energy, the symmetric (all-way) spatial entropy drive of light (the "intrinsic" motion of light), is replaced by an alternative, asymmetric (one-way) historical entropy drive, the "intrinsic motion" of matter's time dimension. The historically expansive "march of time" is the metric and entropic equivalent of the spatially expansive "march of space" - seen as the "red shift" of distant galaxies). Time is an alternative, asymmetric (one-way), causally connected (constrained) form of space, providing the primordial entropy drive and historic conservation domain of bound electromagnetic energy. Time is derived from space by the gravitational annihilation of space, exposing a metrically equivalent temporal residue. (See: "[The Conversion of Space to Time](#)".)

Light, space, and the spatial entropy drive of free energy (light's intrinsic motion) are all bound up together. Because of this lack of separation between the energy form (light), its conservation domain (space), and its entropy drive (the intrinsic motion of light), the energy of light is subject to extremely rapid vitiation via light's spatial entropy drive, gauged by "velocity c ". The energy of light is dissipated rapidly as light expands and cools along with space, its entropic conservation domain. Light creates its own (spatial) entropic conservation domain by the action of its own intrinsic motion, that is, light's embedded entropy drive. The conservation role of light's embedded entropy drive is precisely to create a dimensional (spatial) conservation domain in which light's energy can be transformed and used, while simultaneously being conserved. But when light is converted to matter and bound energy, a different form of entropy drive must be found, since matter cannot travel at velocity c . Nature's solution is to allow the energy form (matter) to remain stationary ("rest mass"), and allow matter's time dimension and entropic conservation domain (historic spacetime) to move and expand instead. (See: "[Gravity, Entropy, and Thermodynamics](#)".)

Matter remains stationary in space and is only tangentially connected to its entropic, historical conservation domain via the point-like "touch" of the "present moment", while history expands, at right angles to all three spatial dimensions, moving at the metric equivalent of the entropic expansion of space, all gauged by the electromagnetic constant "velocity c ": "time flies" (see: "[The Time Train](#)"). Nevertheless, today is real only because yesterday remains real. Our "yesterday" is some other observer's "today" and vice versa. We are all immortal in historic spacetime. (See: "[A Spacetime Map of the Universe](#)".) The tangential connection between matter and its entropic conservation domain (historic spacetime) means that the charges of atomic

matter, and even (to some extent) its rest mass energy, are protected from time's entropic dilution: "diamonds are forever". Atoms simply do not age: the rest mass energy and, more especially, the charge of an atom, is invariant through time. Atoms can only be (completely) destroyed by black holes, "proton decay", or antimatter annihilation. As guessed by Dirac, gravity is weak because of this tiny tangential connection (the "present moment") between matter and its historic, entropic conservation domain ("bulk" historic spacetime, matter's causal information field or causal "matrix"). (See: "[Proton Decay and the 'Heat Death' of the Cosmos](#)".)

This is the basic physical reason why we feel separated from the Universe - we *are* separated (connected principally by the "present moment" and gravity - hence the importance of living "in the moment", as stressed by Eastern religions). But this separation is only partial and temporary, and exists for very good reasons, because it allows us as individual, living "agents" personal freedom of action and experience, while also guaranteeing that when it does come time to redeem the symmetry and energy debts represented by atomic charge and rest mass, they will be undiminished in magnitude by time or use. Conservation will eventually be complete and in full measure. Temporary separation is simply the only way the entropic conservation domain of matter ("history") can function to allow a "free will" personal, individual, physical experience and still guarantee complete conservation "in the fullness of time" in the parallel spatial domain of light. Gravity is actually our (and all of matter's) physical connection to the greater Cosmos; so long as gravity functions, you can have faith, and trust in the physical reality and security of our connection to the immense double conservation domain of historic spacetime that constitutes our remarkable Universe. (See: "[A Spacetime Map of the Universe](#)".)

The Psychic Connection

Psychic phenomena of all kinds offer further examples of what we suppose are uniquely human expressions of our connection to the Universe. They are obviously related to spiritual connections in an "antiestablishment" way, an "undernet" of intensely personal experiences of connectivity. I have myself experienced them on at least one memorable occasion; it was for me an experience of pure connection, a "state" of knowledge, explicitly manifest in my own mind in very concrete images. These personal experiences must forever lie outside the range of scientific analysis, since the essence of science is its repeatability on demand by other observers; no personal experience of this kind can be repeated at will even by the individual who reports it, much less by others. This says nothing about their reality however, only that they are personal, subjective experiences of connection, which by definition cannot be replicated, and hence are not susceptible to "scientific" analysis or validation.

I have come to believe, as did my father ([he wrote extensively about this topic](#)), that psychic phenomena of many kinds (not all kinds) are real experiences of the wholeness, integrity, connectivity, and conservation function of the Cosmos. Genius lies in an exceptional quality of personal connectivity; madness lies in either its absence or an overexposure. Quantum physics is telling us there remain purely physical phenomena of connectivity we do not yet understand; we may also be sure there are corresponding emergent properties of our minds in terms of connectivity ("metaphysical" phenomena) that we do not yet understand. They may well be the harbinger of a new evolutionary state of consciousness, a higher connectivity, attempting to break through the barrier of mental instability into normal mental health, a process we have been through before, long ago when our species discovered death and the abstraction of spiritual connection, when we were emerging from our animal ancestry in the Garden of Nature.

Connections Between Religion and Science

Conservation

The principle of Conservation is one of the major conceptual linkages between religion and science; another is Causality or "Karma"; a third is Energy, and a fourth is the Unity or wholeness of the Universe; others include Symmetry (beauty), Entropy (evolution) and Information (knowledge).

Conservation is the basic principle of science and indeed of religion as well; neither could function without it. In science it refers to an active quantity that remains unchanged (as in the total energy of a closed system) despite the variety of transformations that quantity may undergo (energy may not be created or destroyed, but only transformed). In mathematics, it is familiar as the conservation of number. In religion we find the notion of the conservation of the individual soul, or personalized human "spirit", its immortal or unchanging identity. Similarly, the notion of "heaven" corresponds to a conservation domain of the spiritual realm (in which individual souls may be "saved" or conserved - perhaps for transformation to another life).

Energy

A second idea common to science and religion is energy. In both cases energy is the prime mover or First Cause of the Universe, physical or spiritual. No prior explanation for the existence of energy can be given in either science or religion; energy cannot be derived from any preexisting or more primitive source. What we can say about the essence of energy is very limited: 1) it is the principle of action, expressed through change, especially entropy; 2) it is the cause of all reality, taking various forms (including information and life); 3) it is absolutely conserved; 4) its source is unknown. Are these terms religious or scientific? The case could be made for either view.

Is energy created in the "Big Bang"? It is thought that the negative energy/entropy of gravitation exactly balances the positive energy of the "Creation Event", so that the Cosmos originates from a state of no net energy (and, due to an equal measure of antimatter, from a state of no net charge). There is a familiar resonance here with the mythological division of the cosmos into light vs dark domains, the Heavens ruled by the God of light, the Earth/darkness/matter ruled by an evil god (the "devil").

Entropy

The principle of change inherent in energy is called "entropy" in scientific (thermodynamic) terms. The Universe must expand or contract, it cannot stand still; time and evolution march forever onward. The intrinsic motions of light, time, and gravity are common expressions of entropy (both positive and negative) in its primordial, embedded mode. There are two forms of entropy, positive and negative (entropy and negentropy). The intrinsic motions of light and time are examples of positive entropy, respectively causing spatial expansion and cooling (due to the intrinsic/entropic motion of light), and aging, decay, and destruction (due to the intrinsic/entropic motion of time). Gravitation and biological evolution are examples of negative entropy, or negentropic processes, causing the gathering and warming of matter and spacetime, and the progressive increase in the complexity of biological information systems (life forms).

In spiritual terms, we recognize this constant progressive (negentropic) motion as the never-ending evolution or "redemption" of the spiritual nature of the World ("matter"). The traditional view of constant spiritual struggle against a competing and equally constant destructive force (sin/evil/the "devil") is the analog of the worldly competition between the forces of negentropy (gravitation, life, evolution) and positive entropy (death, decay, destruction). This constant force for "good", "redemption", or evolutionary progress, we associate in the (Christian) religious sense with the activity of the "Holy Ghost". Christ's resurrection is the ultimate symbol of the triumph of spirit over the entropy of the World - via the conservation function of the Father. In physics, it is symmetry conservation in the service of energy conservation which wins the battle over matter and temporal entropy - the conversion of bound energy (mass) to free energy (light) in stars, quasars, and Hawking's "quantum radiance" of black holes being primary examples.

Symmetry

Another important characteristic of energy is expressed in "[Noether's Theorem](#)": not only must energy's total amount (quantity) be conserved, but energy's symmetry (quality) must also be conserved - which is the reason for the existence of the conserved charges of matter: charges are all symmetry debts of light, absolutely conserved through time, patiently waiting to be repaid. "Noether's Theorem" relates conservation and symmetry: where we find one, we find the other. *The charges of matter are the symmetry debts of light.* Noether's theorem is the mathematical, rational equivalent of Keat's poetic intuition that "beauty is truth, truth beauty", where conservation = truth, symmetry = beauty. In poetic terms, then, the "beauty" of energy must also be conserved. Beauty in nature, or rather our ability to recognize and appreciate beauty, is an emergent expression of "Noether's Theorem" in biology at the human level of consciousness. Ethics and morality are also emergent expressions of this theorem: the "Golden Rule" is an excellent example of symmetric behavior in human relations. Finally, beauty and our aesthetic appreciation of it are our native, inborn guides to truth, enlightenment, and "salvation" - spiritually, intuitively, socially, and rationally. This is why the "arts" are such an important part of the educational curriculum. Political analogs include the principles "liberty, equality, fraternity", "all men are created equal", and "one man, one vote". Finally, physical beauty has long served as a significant reproductive and evolutionary guide/force in our species and in many others - the "Birds of Paradise" offering a remarkable example among the animals. Compare the female chimpanzee with the female human: there is an obvious linkage here between beauty, intelligence, and spiritual awareness, produced by the action of sexual selection within our species. We have emerged from the apes by following the pathway of beauty.

Karma and Information

A third link between science and religion is the notion of causality or "karma", and the sequential linkage of cause and effect. The notion extends to the proscription of action-at-a-distance; in physics there must be an intervening field of particles, virtual if necessary, to transmit a force - causality requires time, connection, and information. In the case of light, gravitation, and inertia, spacetime itself supplies the connecting field. The connectivity of all life is demonstrated by the DNA "field"; the "particle" field extends this principle to all matter; spacetime and gravitation are examples of metric fields which bind together all forms of energy at the cosmic scale. Matter-antimatter annihilation reactions demonstrate the universal character of electromagnetic energy. In the temporal domain, at astronomical scale, our "yesterday" is part of some other observer's "today", and vice versa. Today is real only because yesterday remains real: historic spacetime is the conservation domain of matter's causal information field, network, or "matrix". Light is connected by space, matter is connected by history; gravity connects all, [converting either into the other](#). The connectivity of the Cosmos is complete in a physical sense. But this very connectivity is the essence of spirit and causality, in both its religious and scientific sense. ("Chaos" and quantum theory do not describe a lack of connection, but only the lack of certain kinds of predictability concerning these phenomena.) Information is a necessary adjunct of Causality, and in its most primordial and biologically significant form, it corresponds to the charges of matter. Information in the form of charge (including gravitational charge) controls the fate of the Cosmos, providing on the one hand a roadmap for the lawful return of the material Cosmos to its symmetric origins in light, and on the other, a pathway to life, consciousness, and the self-awareness of the Universe. *Gravity is matter's memory it once was light.*

Monotheism and Genesis

A fourth link between science and religion is found in the notion of the unity of the Cosmos. Theologically, this is expressed in the concept of monotheism; scientifically, in Einstein's quest for a unified field theory, or in the notion that all energy is electromagnetic in origin. Both science and religion have produced cosmologies describing the creation of the universe, and in several respects they are strikingly similar.

Of particular interest, beyond its explicitly 4x3 (and 4x4) pattern, is the evolutionary process described in western religious cosmology, which proceeds from the "Creation Event" and a period of symmetry or "golden age" (the Garden of Eden), to a fall from "grace" in both Heaven and Earth. From thence there is the promise of redemption and salvation, a life everlasting, and the return of the world and humanity to the golden age of symmetry, connection, and grace in which it began (in obedience to "God's Will" or "Divine Law").

This cosmology is strikingly similar to the scientific cosmology which has been developed in the 20th century: the Cosmos begins as light in a discreet event (the "Big Bang" - light being the most symmetric state of free electromagnetic energy), subsequently descending or "falling" into the asymmetry of particles and matter (bound electromagnetic energy - "manifestation"), eventually returning to its original unified and symmetric condition, with particles giving up their individual identities as they are reconverted to light (in obedience to "Noether's Theorem" or "Natural Law"). This story applies not only to the Cosmos as a whole, but to each individual life and particle, again the fractal expression of a nested pattern, great and small. (See also remarks above regarding the "good God of light and Heaven" vs the "bad devil of darkness and Earth".) (See: "[Symmetry Principles of the Unified Field Theory](#)".)

The Spacetime Connection

The principle of Causality has a physical expression in historic spacetime. For example, as we look out into space, we look ever further back in time. With our telescopes, we can see galaxies as they were billions of years ago, long before the Earth was formed. Conversely, distant galaxies can see us in every stage of the Earth's history. None of this information is ever lost (unless the Universe collapses into a "Big Crunch"). For all observers, spacetime is divided into 2 equal halves, one past and one future. It is the past half of the universe that everyone can see, but everyone sees a different past half (since no one, for one example, can see their own past). And we see part of the future that other galaxies will only eventually see: for example, we ourselves are now part of that future for distant observers. Conversely again, they can see part of the future, already formed, that we will someday see, but whose light has not yet reached us. (Of course, nobody can see a future that is not yet formed. A glance at my "[Spacetime Map](#)" will make all this clear.)

We are speaking of a past and future that is encoded in spacetime as light and gravitation, and that can only be observed, not touched or influenced. If there were a (very) large mirror in the Andromeda galaxy, for example, we could look into it with our telescopes and see Earth as it was about 5 million years ago. So in theory at least, it is possible to see our own past, if only in a mirror. The point is, spacetime does keep a record of everything that happens; we are looking at it every time we see the stars. And it is real; if it were not, we could not feel the Sun's heat, nor could the Earth respond to the Sun's gravitational pull; both come to us from the "conserved past". A little thought reveals the simple truth that the connection between today and the day of our birth cannot be broken or we would instantly cease to exist: yesterday, its influence and connection, are very real, and this necessary causal connection extends from the present moment and from every atom in our bodies all the way back to the "Big Bang" itself. This causal connection extends to and embraces every part of the Universe, either directly or indirectly - historic spacetime is the causal matrix of matter and the conservation domain of information - the "Akashic Record" of the ancients. The continuing reality of yesterday as the cause of today is the factual basis for the universal practice of ancestor veneration.

We have always been part of this Universe; we will always be part of this Universe. Conservation is a demonstrated fact. Will our individuality persist in any sense greater than that of a holographic image in spacetime? I for one would certainly not enjoy being stuck forever in this present life and experience. We all hope for a new and better life and experience, for growth and evolution, if we hope at all. Nevertheless, if the causal law is to be fulfilled, some personal element must survive death - if only in the historical sense. But we

must be cautious in these assumptions - natural law may not respect our human conception of justice - especially social justice. The Universe brought us "here and now" without our personal concern or consent; we can expect no less of the future. No amount of worry brought us to our present life; no amount of worry will take us to the next. Enjoy the experience we have while we are privileged to have it. And love the Universe which creates and conserves us all; we are its human opportunity to experience joy, love, pleasure, beauty, understanding, self-awareness, and new modes of creativity. (See: "[Is There Life After Death?](#)")

The conservation domain of Information, matter's "causal matrix", is the domain of "history", the temporal analog of space, existing at "right angles" to space. The fleeting image of history, moving at velocity c , is briefly visible to us as we look outward to the stars. Its reality cannot be doubted, even though we cannot touch it. We are all immortal in historic spacetime. (See: "[The Time Train](#)"; See also: "[A Spacetime Map of the Universe](#)".)

The Arts and Sciences as Connection

"Eureka" shouted Archimedes (c. 278 - 212 B.C.) according to the legend, as he ran naked through the streets of Syracuse, having found a nondestructive means of determining the purity of King Hiero's golden crown. Perhaps the most famous "Aha!" in history, it is the story of the formation of a rational connection to the world, for in his bath, Archimedes had serendipitously realized the connected physical principles of "density" and displacement buoyancy.

The arts and sciences are, like religion, uniquely human, and, like religion, they have their source in the capacity of our minds for abstraction. While Archimedes had discovered the solution to a practical problem, the source of his overwhelming joy was the rational connection he had made with the world, the discovery of an abstract principle ("density"). Plato spoke of the world of "ideal forms"; Euclid and Pythagorus discovered in geometry and mathematics a practical, rational connection to this ideal realm (including the seminal music/math connection). The Greek philosophers, scientists, and mathematicians began the breakthrough to our connection with Natural Law; they were the tool-makers of a new age, the age of science. Theirs were not tools chipped from stone or cast in bronze or iron; theirs were tools of the mind, in fact a new language of abstraction, which opened the door to Plato's world of ideal form. This was in effect the discovery of another "spiritual" realm, not the realm of the gods, but the abstract, rational world of Natural Law and mathematics, which led to the rise of science. Science is our rational mode of connecting with the Universe; mathematics is the abstract language of this mode of contact. Without the development of this abstract language we could not have achieved the rational connection. (Mathematics is powerful because it is the symbolic representation - the abstract language - of the natural conservation laws.) Mathematics is a symbolic system of quantitatively conserved relationships, useful for abstractly describing and modeling physical systems which also consist of quantitatively conserved relationships. Through science we have learned of our physical connections to the Cosmos, a story that is still unfolding and without doubt, with many surprises and connections still to be revealed.

Art is another uniquely human connection to the Cosmos, even more ancient and universal than science. Whereas science is a rational abstract mode of connection, art is an intuitive abstract mode of connection. Both art and science have physical, external "outputs" as intended consequences of their modes of connection; the truly religious mode is nonphysical, completely mental or spiritual, although it may have a behavioral output and social expression, and hoped-for physical outcomes (for example, as a consequence of prayer). Religion, art, and science are similar in their mutual concern for ideal form. While science searches for natural law, art searches for aesthetic law, and religion searches for spiritual law. Religion, art, and science all have their respective formulas for successful contact - all have courses of study, meditative practices,

behavioral norms, institutional settings, etc. All have enormous influence on human social organization. Secular political systems establish social behavioral laws and connect with religious systems in the search for "moral" law.

Much of modern art may be seen as the attempt to isolate, identify, or define the pure elements or principles of aesthetic law, to achieve an abstract language of ideal form, color, and composition in much the same way that mathematics has served science. Similarly, "scientific" principles have been applied to the spiritual search for contact, attempting to render this process more successful as well as practical in its results. "Christian Science", "Scientology", and "TM" are explicit examples of this approach, but practices such as rituals, incantations, prescribed movements, mantras, meditations, chants, and the development of arcane, mystic, and occult formulae, some considered to be "black magic" and "witchcraft", can also be considered attempts to deduce the essential elements of spiritual contact and render them pragmatically and repeatably successful.

It seems likely that our great geniuses of art, science, and spirituality, whether rational or intuitive, were all simply "better connected" than the rest of us, both internally in their brains and externally, as if their minds were both better receivers and "antennas" than those of ordinary people, allowing them a contact with the cosmic order that for most of us is either garbled, noisy, or feeble. Indeed, what is great art, science, and spirituality, if not the product of an exceptional quality of personal contact with the Cosmos, both locally and globally?

Religion, art, and science have emerged as uniquely human connections to the Cosmos, all products of our abstracting minds. All have become powerful institutions because of our social nature, which in itself is a mode of connection with each other, and through each other, the World. The "divine right" of kings and the pageantry of royalty have, since antiquity, been thoroughly conflated with religion, attempting to make a fractal connection between the governments of the heavenly and human realms.

"Mind" as Cosmic Self-Awareness

The four fundamental functions of biology and their relation to the parameters of the [Tetrahedron General Systems Model](#):

- Metabolism - Energy
- Reproduction - Symmetry
- Perception - Causality-Information
- Evolution - Entropy (positive and negative)

Light is the messenger of causality - as Einstein's Special Theory of Relativity informs us, through the invariance of "velocity c " and the "Interval". The interaction between an electron shell and light constitutes perception in its most elementary form. Perception is a basic property of the Causal-Information Realm, beginning with the electrical character of matter and culminating in human consciousness and "enlightenment". Mind and Consciousness is an emergent phenomenon of life which has its physical origin in the ability of the electron shell of an atom to absorb and emit light (stimulus reception and response), and its biological origin in the adaptive value of perception (finding food, mates, enemies). Whereas plants (mostly) use light for energy, animals (mostly) use light for information. Perception, in its higher expressions, is an intuitive synthesis between information and causality. Causality implies information, and perception is the business of (mentally) assigning sensory information to appropriate causal sequences. Mind and "cosmic self-awareness" is a "goal" of evolution to the same extent that life is a goal of evolution; that is, the rationale for

life is to provide the Cosmos with self-awareness and a means to know and experience itself. Life is the rationale for the Cosmos; consciousness is the rationale for life; ever higher modes of consciousness (as in art, science, philosophy) are a rationale for evolution. [Life is the inevitable emergent product](#) of the 4x3 fractal hierarchy of organization in the Information Realm. The development of the fractal hierarchy and the evolution of life is driven by matter's universal and eternal search for antimatter (via electromagnetism), entropy, and the conservation of symmetry. See: "[Nature's Fractal Pathway](#)".

Mind is the only "metaphysical" goal of the Universe - the evolutionary achievement of human consciousness is a self-sufficient goal of the Universe and evolution, requiring no further justification or explanation, in spite of our confusion regarding life's rationale. We are the Universe become self-aware; our awareness is the awareness of the Cosmos. The aesthetic pleasure derived from experiencing the beauty of the Universe is a sufficient justification and reward for human consciousness; information and experience "live" forever in the historic domain of spacetime. Just as the existence of light requires no explanation because it is both completely conserved and completely symmetric, so the experience of life requires no explanation because it is the self-awareness of the Cosmos - an obviously desirable condition for the energy content of the Universe. Life experience is immaterial and eternal in its essence, with joy, love, aesthetic and intellectual pleasure (through the experience of beauty and truth), and spiritual pleasure through "enlightenment" (a sort of universal perceptual resonance) as its highest goals. (See: "[Chardin: Prophet of the Information Age](#)".) Life is the means by which the universe experiences itself and achieves self-awareness. Life is therefore an evolutionary goal and desideratum of the Cosmos. What should we do? Appreciate, respect, and understand life, ourselves, and the Cosmos; explore and become co-creators with the Universe; develop new modes of creativity and discover and produce new forms of beauty.

A Hierarchy of Connection

Let us review the physical nature of our connections to the Cosmos, for they stand in a structural hierarchy, all related. First is the elemental composition of our bodies, which unites us with all material particles in the Universe - as Carl Sagan informed us, we are made of "star stuff" formed in the "Big Bang", and subsequently reworked in the heart of stars and exploding supernovas. With our material nature we also share all the charges and forces which we have elsewhere identified as the [symmetry debts of light](#). All material particles are essentially an asymmetric form of light (one-half of a particle-antiparticle pair), just as time is an asymmetric form of space, and gravity is an asymmetric form of spacetime; our common origin in light is the most fundamental physical connection of all. *The charges of matter are the symmetry debts of light.* (See also: "[A Short Course in the Unified Field Theory](#)".)

An especially important physical connection, which we have not considered earlier, is the ability of electrically charged particles and systems (atoms, molecules) to interact with and capture the energy of light. Light is an electromagnetic wave and as such it can and does interact with the electrically charged particles it has itself created. It is of course this interaction which allows life to capture energy from the Sun (photosynthesis), or indeed from any source which produces free energy of biologically useful intensity. Spacetime is not only the conservation domain of energy, but also the medium of energy transport, transferal, and transformation, connecting as well as enclosing and conserving all energy forms. (See also: "[The Sun Archetype](#)".)

Second, we are united with all Earth life, through the common heritage of DNA. Third, we are forced to interact with our environment and all other life forms out of our common need for air, food, water, shelter, etc. We are thoroughly connected with the bacterial realm through the symbionts in our cells (mitochondria) as well as those in our digestive tract. In fact, the whole of life works together in a necessary global symbiosis

and mutualism (plants produce oxygen for animals, animals produce CO₂ for plants, etc.). Fourth, we are a pair-bonding and sexually divided species, required to seek out and join with the opposite sex to reproduce. Finally, we are social animals, out of the necessity for self-defense and common survival. All these are modes of contact and connection with our environment and the Cosmos, and most of these we share with the other higher animals. Added to these we have our human specialties, our reasoning, imaginative, and abstracting brains, our language, and our clever hands. Language is the first abstraction of human experience, the foundation for all the others. From this fertile mix of ingredients, the most successful "adaptive syndrome" nature has ever produced, arose modern humanity, whose emergent properties include a variety of new connections to the Cosmos, chief among them religion, art, and science. The joy of creativity is the joy of this contact experience in any mode.

It seems especially significant that life arises as a consequence of the energy produced during the cosmic process of symmetry conservation/restoration - the Sun, of course, is a stellar stage in the return of asymmetric matter (asymmetric due to the lack of antimatter) to its symmetric state, light. We are emergent products of symmetry restoration. Life is matter enlivened and enlightened by light, the divine leavening which raises the dust of the Earth toward Heaven. Life captures this energy only very temporarily; it is lightly bound in the electron shells of our atoms and soon goes on its way again. In the meantime, life and consciousness arise to participate ever more fully in the mystery, beauty, majesty, and evolving fractal Information dimension of the Cosmos.

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