

THE HUMAN CONNECTION

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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 atomic matter and charge conservation. *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 atoms and light, charge conservation and symmetry conservation, that humans retain their connection to the primordial creative energies and latent information content of the universe (and the multiverse). "We come trailing clouds of glory..."

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 an 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 connectedness of 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.

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").

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 "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 intrinsic motion of light (the "march of space" - seen as the "red shift" of distant galaxies). Time is an alternative, asymmetric (one-way) form of space, providing the primordial entropy drive 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 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.

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). But this separation is only partial and temporary, and exists for very good reasons, because it allows us 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". 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 conservation domain of historic spacetime that constitutes our 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 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 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 cousins 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 a quantity that remains unchanged (as in the total energy of a system) despite the variety of transformations that quantity may undergo. 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 rebirth in another physical form).

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, including 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.

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, expanding space, time, and gravity are common expressions of entropy in its primordial 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, causing expansion, cooling, aging, dilution, dispersion, decay, and destruction. Gravitation and 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 abiotic and 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 to free energy in stars, quasars, and Hawking's "quantum radiance" of black holes being the primary examples.

Symmetry

Another important characteristic of energy is expressed in "Noether's Theorem": not only energy's total amount (quantity) must be conserved, but also energy's symmetry (quality) must be conserved -

which is the reason for the existence of the conserved charges of matter: charges are all symmetry debts of light 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.

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. 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 atomic charge. 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: "[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 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; 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 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 World, 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

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 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), and the conservation of symmetry (via gravitation). 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 and inertia; 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 restoration - the Sun, of course, is a stellar stage in the return of matter 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.

Shaman-Priest-Magician and the Weak Force IVBs

In physics, it is the role of the weak force "Intermediate Vector Bosons" ("IVBs" - the W, Z, (X?)) to "marry" a "real" particle with the appropriate alternative "virtual" charge carrier so that a transformation of identity can take place. The alternative charge carriers (leptons, neutrinos, and mesons) exist in the "spirit world" of quantum physics, the Heisenberg/Dirac vacuum "sea" of "virtual" particle-antiparticle pairs, which wink in and out of existence continuously as they form, self-annihilate, and form again. Essentially, the IVBs provide a bridge between the 4-dimensional "real" world and the 2-dimensional "virtual" world; the real particle and virtual particle pairs meet on this IVB bridge, where the particle receives from the virtual pair the alternative charge carrier it needs for its transformation, then returns to the real world with a new identity. (The IVBs can also be seen as a bridge to the electroweak force unification symmetric energy state, where particle identity exists at a generic rather than a specific level.) The similarity of this process to the trance possessions of

shamans and mediums and their purported journeys to the "spirit world" to effect healing or other transformations is evident. The shaman or medium is in the specialized, high energy role of the IVBs, providing a bridge between the real and the spirit world of "virtual" or unmanifest beings. (For a discussion of the physics of the weak force, see: ["The "W" IVB and the Weak Force Mechanism"](#) and ["The Higgs Boson and the Weak Force IVBs"](#)).

In the human world, the priest, shaman, or medium provides a bridge between ordinary people and the spirit world. It is the role of the priest, shaman, or medium to ensure that proper rituals are followed, so the exchanges can occur and the transformations take place; this is the analog of the IVB insuring that the proper quantum rules are followed, while it provides the special high energy, dense metric in which the joining of the virtual and real worlds can take place. When the ceremony is over, the people and the spirits return to their respective worlds, both transformed. (The human body functions as a temporary, physical, alternative charge carrier for individual "identity", of which the "soul" is the presumed immortal or spiritual component.) The church is always a special "holy" place, where the "wholeness" of life is celebrated, that is, where the spiritual realm is reunited with the physical, the "virtual" or 2-dimensional realm is united with "real" or 4-dimensional particles and people. In some sense the church (building as well as institution) acts as the massive IVB, producing a "special metric" or "holy space" in which the manifest and unmanifest worlds can meet and effect transformations of identity and/or charge (for example, "born again").

The services of the priest are most necessary when identity transformations are occurring between this and the spirit world, such as at birth (baptism), marriage, and death. The joining of people in marriage requires the services of the priest because it is a genuine transformation of identity: names are changed, families are joined, and formal preparations are made for the conception of new lives and identities. Marriages are usually declared to be consummated in the spirit world as well as in the material world ("What God has joined together...").

The archetypal magic trick is to vanish or create a real item - "now you see it, now you don't". The rabbit comes out of the hat and disappears again. The quarter disappears from the hand and reappears behind the ear. This is also nature's ultimate magic trick - the creation (or transformation) of real particles from light or virtual reality, and their disappearance or return into the "vacuum" (whether elementary particles or people). This is likewise the ultimate magic of the shaman, the creation (for example) of prey animals for the hunter by intercession with the spirit world through the use of alternative identity carriers, symbolic drawings and sculptures which are analogous to "animal neutrinos" or souls. In the church today, our modern dimly lit "magic cave" with its priest/shaman, we find iconic art with a very similar "miraculous" purpose, the intercession with the spirit world through alternative identity carriers embodied as symbolic or representational icons, talismans, figures, etc.

The Fractal Connection

As Chardin so eloquently realized, life is the whole rationale, purpose, and goal of the Cosmos; that is why life feels so natural, right, and good to us, and why the Universe appears to be so beautiful and friendly (the "Anthropic Universe"). We belong here, the Universe exists for us and wants our awareness, intelligence, creativity, and capacity to experience, appreciate, and create beauty. The production of life from inanimate matter is the great miracle and sacred mystery of the Universe. The energy and information contained in every atom is the Divine Presence. Every religion however

constituted celebrates the experience of life and its ultimate triumph - everywhere and always - over death. As the patient eons turn, the creation of the elements in the stellar forges of the galaxies provides a firm foundation for the information age that emerges as a dominant and fertile parameter from the primordial chaos of raw energy, spacetime, matter, charge, and force. It is no wonder that when life achieved the capacity for self-contemplation, it declared itself a miracle and created religion to sanctify and celebrate itself, the Life Force, and the Information content (including Natural Law) of the Universe.

Among the many great wonders of our existence that we might mention, at least six stand out: 1) the "Big Bang" creation of our life-friendly universe; 2) the evolution of the planets, stars, and galaxies; 3) the evolution of the atoms and elements; 4) the evolution of life; 5) the evolution of humans; 6) the evolution of symbolic thought - producing language, spiritual awareness, religion, the arts, sciences, and technology, and the recognition of Natural Law. While it may "take a village to raise a child", it takes the entire universe to create one: the size and complexity of the universe measures both the difficulty and the significance of that task.

From the dust of the Earth, mixed with water and energized by the Sun, life arose on this planet as an (inevitable?) expression of the information content and fractal form of matter. In ["Nature's Fractal Pathway" \(and "Table"\)](#) I have documented the fractal nature of the information pattern of life, specifically DNA, as part of a nested pattern of similar forms, beginning with the three families of four elementary particles produced during the Big Bang, carried through the nuclear, atomic, molecular, and chemical levels of structure to the (biological) nuclear material of reproducing, living systems. The pattern is repeated at largest scale in astrophysical processes, bodies, and systems of stars and galaxies. Life is one expression of a universal fractal pattern which appears on every natural scale in a 4x3 and 4x4 form. The pattern occurs extensively as well in human thought concerning the form of the Cosmos, in our religions, legends of creation, mystic and occult systems, and scientific cosmologies. We have two premier examples of ancient systems of prognostication, both still in use after more than two millennia, Astrology and the I Ching, representing intuitively derived "world orders" rather than specific cosmologies or religions. Both are perfect examples of the universal 4x3 fractal pattern, one Eastern, one Western, both independently derived. Western religion and mythologies are replete with the 4x3 pattern, which is also found in Buddhist and Hindu philosophy; the pattern recurs in minor religions around the world. The fractal pattern of life and human thought is another link between the system of matter, humanity, and the Cosmos: "as above, so below". The intersection of the universal 4x3 fractal algorithm with the replicating molecule RNA-DNA is of the utmost significance for the origin and abundance of life in the Universe. (See: ["Newton and Darwin: The Origin and Abundance of Life in the Cosmos"](#).)

One of my favorite stories in the history of science is that of the discovery of the transmission of electromagnetic waves by the great German physicist Heinrich Hertz. Hertz knew how to produce electromagnetic waves, but not how to demonstrate their transmission through space and reception at a distant location. In a flash of insight, he realized that the receiver must be built in the same form as the sender. Thanks to this intuition, Hertz became the first to demonstrate the wireless transmission of what we today call radio waves. This principle of the isomorphic, resonant, symmetric (fractal) form of the sender and receiver of energy supplies us with the necessary clue to understand one of the most enigmatic statements in the Bible - the creation of man in God's own image and likeness (Genesis 1:26-27). This is an intuitive recognition and statement of the General Systemic or Fractal nature of

the Cosmos, leading us directly to an understanding of the reason for the fractal nature of the Universe: its nested, isometric form is the functional basis of its resonant connectivity, allowing the Cosmos to communicate with itself, transmitting energy and information to all its parts, regardless of distance, time, or scale. This leads us to the question: has God created us in His image, or have we created God in ours? In a thoroughly fractal Universe, are these even different questions? How are we to know the dancer from the dance? (See: "[The Information Pathway](#)"; "[The Information Ladder](#)"; and "[The Fractal Organization of Nature](#)" (table).)

The Miracle of our Universe

John A. Gowan Jan., 2014

Perhaps the most astonishing thing modern physics has revealed to us is that the world is built from the simplest of ingredients. How do we get from a proton, neutron, electron, and neutrino to a Beethoven symphony? But given enough time, Nature somehow evolves this miracle.

The "Big Bang" begins with pure electromagnetic energy (light), and a few conservation laws - the conservation of energy/entropy (Clausius, Boltzman); symmetry/charge (Noether); and causality/information (velocity "c"). These 3 linked couplets of physical law are themselves linked within thermodynamic, electromagnetic, quantum, and relativity theory, and they include an emergent, crucially important 4th linked couplet, spacetime and gravity/inertia (Einstein). It is this combination of positive electromagnetic energy, negative gravitational energy, conservation law, and information which builds our universe. Creation begins with the simplest of blind forces, the attractive/repulsive forces of electromagnetism, and the attractive-only forces of gravitation and the color charges of the strong force. The neutrinos act as an information-only component of this primordial "soup", distinguishing among leptonic "flavors", and separating matter from antimatter.

Of course, even pure light is far from simple: the rainbow tells us that much. But modern physics informs us that light not only has multiple frequencies, it contains "virtual particles" (an alternative form of electromagnetic energy), composed of matter-antimatter particle pairs of specific kinds of leptons and hadrons ([whose ultimate origin](#), like that of light itself, remains mysterious). The hadrons in turn are composed of quarks and a confining gluon field, so as it turns out, light is not simple at all, it contains hidden within itself a fantastic amount of information mostly in the form of virtual particles, a small portion of which are made manifest during the "Big Bang" or "Creation Event" (presumably due to an [asymmetric weak force decay of electrically neutral leptoquarks](#)). It is this information which will, over evolutionary time, under the impetus of energy and entropy, and the constraint of conservation law, build all the complexity of our universe, even including Beethoven and his Ninth Symphony.

Homer's "war for beauty" (for Helen) seems to me a correlate of the principle of symmetry/charge conservation in modern physics. Even in the simple snowflake we see the connection between symmetry and beauty. In physics, symmetry conservation is forcefully effected through charge conservation (and inertial force), establishing the connection between beauty (symmetry) and truth (conservation), as intuited by Keats and [proved mathematically by Noether](#). In biology, the "war for beauty" takes place explicitly in competition between (for one example) the male birds of paradise, enticing females to choose the most handsome among them. In our own species, this principle (sexual selection) has transformed prehistoric apes into modern supermodels - and likewise transformed our brains in a parallel and entrained process. In music also, we choose the best composers (or at least we

used to), according to similar aesthetic principles - principles of harmony which, as discovered by Pythagoras, translate into mathematical harmony as well - and, as revealed by quantum mechanics, extend to the resonant harmonics of electron shell frequencies.

Is the evolution of the universe, from simple energetic principles of attraction vs repulsion, into human beings, also a blind process, or is it in any sense guided? Well, it is obviously guided by physical conservation law, and by the information inherent in the primordial particles and "quark soup" (Gamow's "Ylem"). Because symmetry conservation is one of these fundamental guiding principles (manifest primitively as charge conservation), we end in biology with beautiful creatures who recognize, express, and value beauty. There is also a fractal pattern driven by a [4x3 algorithm operating](#) within the evolutionary process, beginning with the quarks and ending with our genetic code. Hence we are created in the image and likeness of a universal conservation/information principle - and if you want to call that "God" I will not object.

(See: ["The Symmetry Groups of Light"](#))

[Links:](#)

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[The Fractal Organization of Nature](#) (table)

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[Newton and Darwin: The Evolution and Abundance of Life in the Cosmos](#)

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Information

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[A Spacetime Map of the Universe: Implications for Cosmology and the Theory of Inflation](#) (full text - updated copy)

[A Spacetime Map of the Universe](#) (updated pdf diagram)

[Symmetry Principles of the Unified Field Theory \(a "Theory of Everything"\) - Part 1](#)

General Systems and Metaphysics

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[Section XII: Man's Role in Nature](#)

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[Is There Life After Death?](#)

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[Human Life-Span Development General Systems 4x3 Models](#)

Books by my late father Prof. John Curtis Gowan

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[Stewart C. Dodd's 4x4 Mathematical General System Matrix](#)

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Go to [Trance, Art, Creativity](#) (book by Prof. J. C. Gowan, Privately Printed, 1975)