

Section VI: Information

(See also: [Section 3: "Fractals"](#); Section 12: "[Man's Role in Nature](#)"; Section 14: "[Causality](#)")

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Papers: "[The Information Pathway](#)" with table "[The Information Ladder](#)";

"[Nature's Fractal Pathway](#)";

[The Origin of Matter and Information](#);

[The Higgs Boson and the Weak Force IVBs](#);

[Causality vs Information](#)

The term "information" as used in physics or communication theory has a very restricted meaning in terms of entropy and "bits" of information, a definition which makes the term amenable to mathematical formulation but which robs it entirely of its usual significance in the human context of knowledge, meaning, complexity, and consequence. This is equivalent to reducing the human body to its chemical elements (for the sake of simplicity) and ignoring its biological unity and function as a specific type of living organism (because it is too complex). In these papers I am only interested in "information" in the latter complex sense. However, because the hierarchy is arranged by increasing size, its increasing information content is recognized in either case.

The "Information Pathway" is one of the more recent papers, presented at "[CPSI](#)" in June 1999. The "Pathway" paper and the table "The Information Ladder" is simply the much older "[Fractal Table](#)" reinterpreted. Each realm of the fractal table can also be considered as a realm of information; it is of considerable interest to note how far up this "ladder" of information human science, art, and philosophy have climbed. Humans have physically explored all 8 of the "Microphysical" and "Biophysical" levels, from particle physics to planet Earth. We are now exploring the first level of the "Astrophysical" realm - with Earth orbiting satellites, Moon landings, and robotic missions to various planets of our Solar System, including the Sun itself (level 9, Stars). Level 10 (Galaxies) remains in the domain of science fiction and art ("Star Trek", "Star Wars"), and of our observational and astrophysical sciences, (via telescopes and theory), as do level 11 ("Universe") and level 12 ("Multiverse" or "First Cause"), accessed through cosmology, religion, and philosophy. The metaphysical realms (human thought: levels 13 -16 and 17-20) are represented by the principles of the Unified Field Theory and/or the conservation laws of the [Tetrahedron Model](#) - in either case, the natural laws which underlie the manifest Universe (rational mode). In the intuitive mode, we find religious/mythological notions of Divine Law, or Plato's philosophic notions of the Eternal Verities and Ideal Forms which lie beyond, but are responsible for, the manifest Universe; we also find occult notions of cosmic order expressed in various "world systems" (the I Ching, astrology, etc.). Some Eastern religious categories of these higher metaphysical levels are delineated in my late father's books: "[Trance, Art, and Creativity](#)" and "[Operations of Higher Order](#)".

Viewing the "Information Ladder" table as an evolutionary sequence of information states, we see that each higher level necessarily encompasses all the information contained in the levels below. In this regard it is important to distinguish the planetary level information state of "Gaia" (level 8) from that of a lifeless planet, as the "Gaia" state would apply only to planets which support a biological information realm. Whereas the "Gaian" state is the last level of the biotic realm, the abiotic or gravitational planetary state is the first cell of level 9 (Stars) in the Astrophysical Realm.

Humans seem to have "a foot on the rung" at every level of the ladder, if only by means of theory or observation. We are at level 7 or 8, considered as separate individuals or as a globally distributed, "terraforming" species, just 2/3 up the 12 rungs of the physical ladder. Yet we have extended our influence,

investigations, observations, and theories both upward and downward to the extreme limits of the "Information Ladder". The ladder clearly suggests that we will continue the upward physical climb, probably into level 10 (Galaxy) and possibly on into the Universe of level 11.

The "Information Ladder" reminds me of two things: 1) the Biblical story of "Jacob's ladder", extending from Earth into the Heavenly realms (Genesis 28:12); 2) Chardin's "Omega Point", a universal final state of self-knowledge and unity. In Chardin's view, information, not entropy, is the chief evolutionary vector of the Universe; entropy is just the way the accumulation of information is paid for. (See: "[Chardin: Prophet of the Information Age](#)"). In the "[Tetrahedron Model](#)", information is seen as an intentional, purposeful by-product of symmetry conservation, providing the means whereby the Cosmos achieves self-awareness and further explores and evolves its creative energy and potentiality.

Causality and Information

Causality and Information share the 4th point (matter, mass, bound energy) in the [Tetrahedron Model](#) of the conservation principles and natural laws underlying the unified field theory. Information is the concept that most comprehensively and succinctly characterizes the significance of matter; without matter, the information content of the Universe is zero. Information requires an asymmetry to exist; perfect symmetries cancel each other and so carry no net information - the prototypical example is the particle-antiparticle pair which self-annihilates (see: "[The Origin of Matter and Information](#)").

Due to genetics, genes, the conservation of heritable units of molecular information (DNA) from one generation to the next, and the negentropic mechanism of Natural Selection, biological systems have become a conservation domain of information, a molecular analog of the abiotic conservation domain of information and matter's "causal matrix", historical spacetime. Human abstract information systems simply continue and extend this natural biological accumulation of information - through memory, language, writing, books, libraries, computers, educational institutions, social systems, etc.

Life, humanity, and history are all conservation domains of information. Spacetime itself is the ultimate storehouse and repository of historical information. The ancients referred to this aspect of spacetime as the "Akashic Record", and thought certain of the adept had occasional access to it (oracles, soothsayers). Science has likewise taught us that we are looking into history as we look outward into space and backward into time. (See: "[A Spacetime Map of the Universe](#)").

When we stand back a little and look at the reach of humanity into every part, from bottom to top of the "Information ladder", it is difficult to comprehend the view of some scientists that humanity is not a special creature. I subscribe to the view of Teilhard de Chardin that consciousness and intelligence and information are the principle evolutionary axes of the Universe, and that on planet Earth, at least, humanity is the point of this "evolutionary arrow", the apex or tip of the evolving vector.

A human individual contains an enormous amount of information in the trillions of cells, DNA, biochemical systems, and interconnections of the nervous system. In terms of physical size, we are puny and insignificant; but in terms of information content, we are astronomical in magnitude, both as individuals and as a species. It is on the information scale that the significance of humans must be measured and compared to the other major players of the Cosmos - planets, stars, galaxies, etc.

It seems that abiotic information conservation may be limited to the historical component of spacetime. In terms of "hardware", information begins with charge. Information is most reliably stored as charge at the atomic level, but when charges annihilate, the information they carried is gone, except for the historical component, which is more durable, although evidently subject to the entropy of "dilution" as its effects spread and divaricate, propagating throughout spacetime. At a certain high level of dilution, these effects will become subject to the operation of chaos and quantum uncertainty, further eroding their information

content. Hence even though the effects of an action may remain forever in the Cosmos, it may after a time become impossible even in principle to trace an effect back to a single, definite original cause (in the absence of an "artificial" conservation intervention requiring external energy inputs, such as human record-keeping).

There seems to be no limit to the complexity or amount of information systems can attain, if enough energy is available. The function of information is to lead matter back to symmetry upon the "straight and narrow path" of natural law via charge conservation. The information a material system contains is basically the road map or information it needs to return to its original symmetric condition of light. Hence we see the natural tendency of all material systems to convert bound energy to free energy, following the information pathway of the charges they contain (stars, supernovas, quasars, the quantum radiance of black holes, proton and particle decay, chemical reactions, matter-antimatter annihilations, etc.). Perhaps this is an explanation, in terms of physics, for the self-destructive behavior of humanity, which seems poised to end its evolutionary history in a flash of nuclear fusion and fission, imitating the stars.

Gravity

Although gravitation is an abiotic force, it is nevertheless responsible, directly or indirectly, for every level of the fractal hierarchy, including the first: gravity provides negative energy for the "Big Bang", and helps create bound electromagnetic energy from light. Gravity creates the elements in stars, creates planets to support life and the stars which supply life's energy (including radioactive energy), and organizes the various levels of the Astrophysical Realm. Newton's Gravitation stands to the Fractal Hierarchy of Nature as Darwin's Natural Selection stands to the Theory of Evolution - gravity is the negentropic engine which produces all the material realms. The fact that both these negentropic drives, and the 4x3 fractal algorithm, intersect in the replicating molecule of DNA, has enormous implications for the abundance of life in the Universe, amounting to a theory of, and a prediction for, exobiology. Gravitation, chemistry, and the operation of the 4x3 fractal algorithm are universal abiotic forces which inevitably produce 4x3 molecular structures including DNA whenever environmental conditions allow. *The information system of life is therefore not accidental, but a natural and predictable outcome of the operation of physical law, because of the universal presence and activity of the 4x3 fractal algorithm.* (See: "[Newton, Darwin, and the Origin and Abundance of Life in the Cosmos.](#)")

The tendency of biological and material systems to create large and interconnected information structures (such as the biological web or matrix of Earth, and the dispersal of life into the galaxy) is apparently due to matter's never-ending quest for antimatter, as driven by charge and symmetry conservation, the long-range electromagnetic and gravitational forces, and matter's attempt to recreate in material systems the original connectivity, unity, and symmetry characteristic of light. *The charges of matter are the symmetry debts of light* ("Noether's Theorem"): charges are matter's memory it once was light. The unity and connectivity of light are evidently also ultimately conserved correlates of light's state of perfect symmetry. (See: "[Symmetry Principles of the Unified Field Theory](#)"). The emergence of "beauty" in material and biological systems is an imperfect expression of symmetry conservation manifesting as best it can in an intractable medium.

The problem posed to the Cosmos by the asymmetric creation of matter is this: does asymmetric matter contain enough information, in the absence of antimatter, to return to its symmetric origin as light? Matter is only 1/2 of light's particle form, and so contains only one-half of the original information contained in particle-antiparticle pairs. The answer to this question is a provisional "yes": provided another dimension, time, is added to space to allow the working through of the difficult return path. During this return journey, the information pathway develops as a consequence of matter's eternal search for antimatter, and appears to be an attempt to recreate in material form the original attributes and potentials of light, including its unity, connectivity, symmetry, and creativity (light creates space and helps create matter). The material realm is a parallel construction, an analog in matter of the Universe of light, Heaven reproduced on Earth, Chardin's

"Omega Point". The material universe is a laboratory in which the creative potential of symmetric energy (light) is explored and realized in material and specific form. (See also: "[Comment on the Metaphysical Realm \(rational mode\)](#)".)

Our species' special position comes about through our discovery of Natural Law and the scientific method. Natural Law is the same everywhere in the Universe; hence a knowledge of the information content of Natural Law is a necessary prerequisite for a universal traveler, a galactic explorer and colonizer, a true Citizen of the Cosmos. The human "niche" has evolved from its beginnings in local Earth biology to a universal expression: the extraction of energy via the social apprehension and application of Natural Law. Our biological role is to be the seed of Gaia, dispersing earth-life into the galaxy via our space program and rocket ships. Nor is it likely that Earth is the only planet in the Milky Way entering its dispersal phase. We need to stop fighting among ourselves, protect our fragile mother-planet, and move on to the new frontier that beckons us from above and is the evolutionary purpose, promise, and destiny of our species.

Language and Information

Terence McKenna (*True Hallucinations* (1993) and *The Archaic Revival* (1991) MJF Books) has said he believes the universe is made from language - which is true enough of the biological realm, since DNA is certainly a form of molecular/chemical language, by any definition. The question remains, therefore, is the abiotic realm similarly created by language, and if so: 1) is there an analog of DNA for the creation of the abiotic (particle/atomic) realm? 2) Is there a linkage between the language systems of the biotic and abiotic cosmos? I think the answer to both questions is yes: for question one, the analog of DNA for the particle/atomic realm is the spacetime metric or "vacuum", which serves as a template for the production of elementary particles both during the "Big Bang" and currently (via virtual particle-antiparticle pair creation). (See: "[The Higgs Boson and the Weak Force IVBs](#)".) For question two, the linkage is obviously through the carbon atom and its five levels of 4x3 fractal resonance, which also has its beginning in the 4-D metric of spacetime. (See: "[The Fractal Organization of Nature](#)".)

Matter is an asymmetric, conserved form of light (one-half of a matter-antimatter particle pair). (See: "[A Short Course in the Unified Field Theory](#)".) The language spoken in the conversion of light into matter is the language of conservation, which has three major modes, spoken simultaneously like the notes of a musical chord. These three conservation modes are 1) raw energy conservation (mass - momentum); 2) symmetry conservation (charge - inertia); 3) entropy conservation (time - gravity). Light's primal form is simply pure energy, symmetry, and entropy - free electromagnetic radiation - manifesting as undifferentiated energetic photons which create a hot, expanding and cooling metric space due to their intrinsic (entropic) motion and symmetric (non-local) energy state. This is not (at first) a language but a primordial roar of raw power. The conversion of this primal thunder into atomic matter (via the symmetric template of spacetime and the asymmetric mediation of the weak force) produces a conserved set of elementary particles (quarks and leptons, identical and invariant within type) which combine with one another to form an alphabet of 92 letters, the natural elements of the periodic table. These letters then combine into the words of molecular chemistry and eventually create the poetic language of life, with carbon and DNA as the connecting linkage between the biotic and abiotic realms. The 4x3 universal fractal algorithm regulates the formation and development of every level of natural organization, from its inception in the spacetime metric and the 4 conservation laws of energy, symmetry, entropy, and causality-information, to the majestic galaxies and the evolution of life. (See: "[The Tetrahedron Model](#)".)

The periodic table is an abstraction, not a physical analog of DNA; so is the nucleosynthetic pathway, which we might also name. The physical object that creates the elements is of course a star, so apparently it is the stars (and the actions of the nuclear strong and weak forces) which are the abiotic physical analogs of biological DNA. Antecedent to the creation of the elements (and the stars) is the "Big Bang" itself, in which elementary particles, including the first baryons (protons and neutrons) are created via the mediation of the

weak force and the asymmetric decay of leptoquarks (see: "[The Higgs Boson and the Weak Force IVBs](#)"; and: "[The Origin of Matter and Information](#)".) In this abiotic part of the analogy, identical nucleons in different combinations create 92 distinctly different letters (the elements); these letters are then strung together in meaningful molecular words by DNA - "genes" coding for amino acids and proteins.

Hence the conservation "word", which begins as light (pure electromagnetic energy), passes through (at least) three major stages: 1) the "Big Bang", where light is transformed to baryons via the template of spacetime and the asymmetric action of the weak force (see: "[The Higgs Cascade](#)"; 2) stars (in galaxies), where baryons (hydrogen gas) are converted to the 92 natural elements via the actions of all the forces, but especially the strong and weak forces (the nucleosynthetic pathway, including supernova explosions necessary to create and disperse elements heavier than iron); 3) the creation of DNA (on planets orbiting stars in galaxies) via the organic chemistry of carbon. The 4x3 universal fractal algorithm is active at all levels (see: "[Nature's Fractal Pathway](#)".)

The charges of matter are the symmetry debts of light ("Noether's Theorem"), and it is the charges (electric, color, flavor, spin) that give the atomic letters and molecular words their distinctive character and form. "In the beginning was the word", and the word was a conserved form of light - an atomic word which eventually became the flesh of Man, filling his mind with wonder. In this context I also recall the story of Aslan, the magical lion of C. S. Lewis' imagination, singing the world of Narnia into existence. This, I submit, is the physical interpretation of Terence McKenna's inspired assertion that the cosmos is constructed of language.

References

Terence McKenna (*True Hallucinations* (1993) and *The Archaic Revival* (1991) MJF Books)
James Gleick *Chaos: Making a New Science*, Viking Penguin Inc., 1987.
James Gleick *The Information* Pantheon books, 2011.

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