

Derivation of the Fundamental Equation of Consciousness

Part 1 - Boundary Conditions

Richard L. Amoroso
Noetic Advanced Studies Institute
120 Village Square MS 49, Orinda, CA 94563-2502 USA
noeticj@mindspring.com

Abstract

This paper formally introduces the fundamental equation of consciousness in its unexpanded form. The formalism signifies the scale invariant cosmological conditions of elemental mind central to a continuous state conscious universe (CSCU) upon which all self-organized living systems and teleological action will ultimately be shown to be based when it's expansion is considered. This structural-phenomenological domain extends from the macroscopic large scale structure of the universe to the microscopic level of the prion - the most fundamental life-form known. A conscious universe is not Darwinian by definition; but one which must embody a teleological action principle that mediates it's evolution; it is the physical nature of this action principle that gives 'consciousness' to what heretofore would be considered inanimate matter.

Keywords: Consciousness, Cosmology, Elan Vital, Gravitation, Teleology

1.0 Introduction¹

Is this an important moment in the history of the study of consciousness? I would like to think it is. But some things can only be told in retrospect. Four hundred years ago when Galileo rolled cannon balls down an inclined plane at Pisa, he didn't realize that period would be marked as the birth of empirical science. Likewise if this was the early 1900's and the young Albert Einstein said to you $E=mc^2$ you might think 'who is this character'. Only in retrospect nearly 100 years later do we recognize the significance. Of course for some that is only because we see $E=mc^2$ printed on T-shirts. Because this moment might be 'that' important, I want to call attention to it. Perhaps the work we are doing - myself, Mihai Drăgănescu, Menas Kafatos, Goro Kato will be marked in a few years as the time of the discovery of consciousness. Of course consciousness already exists, but like for gravitation, we give Newton credit for the discovery because he first formalized the description so it could have utility in scientific work.

When my mentor, a great Romanian statesman, philosopher and scientist gave his reception speech to this illustrious body (The Romanian Academy)(Drăgănescu, 1991), it was the 1st time in fifteen years a new president was able to follow the historic tradition of professing his faith to the academy. Now it is 136 years since the Romanian academies inception in 1869; and the dawn of a new millennium of human endeavor. In his speech president Mihai Drăgănescu stated that "To the Romanians, all things have a cosmic face...The Romanian regards himself as a cosmic object knowing that what is '*towards himself*' is eternal, unrelated to time and space...the Romanian academy has always striven to represent a synthesis of the Romanian spirituality and being as one of the main national institutions". In keeping with his and the Romanian academies high ideals Professor Drăgănescu decided to give his speech on the question of *spirit*. This focus was prompted by Mircea Vulcănescu's work "The Romanian Dimension of Existence".

Consciousness has many apparent forms; and many still believe there is no spiritual dimension to the conscious mind. Nevertheless noetic theory is cast in a conscious universe, one therefore, that has an ubiquitous innate purpose and intelligence guiding all evolution. In keeping with the high ideals and lofty character of the Romanian people, and which I think is a fitting culmination in honor of the life-long work of Professor Drăgănescu's on orthophysics (Drăgănescu, 1985), a dream of the Romanian people and probably much of the world at large today; this has become somehow the place chosen in all the world to announce the immanent discovery of consciousness. I am a Mormon by faith; when Elder Nelson, one of our apostles, dedicated the land of Romania for the 'gospel' he was inspired to state...'Romania will become a 'light' to the nations around it...'

¹ This introduction was adapted from the prologue of a conference talk prepared for delivery to the Romanian Academy of Science.

Do not surmise that because I speak to you with an air of boldness and surety that I am not humbled by the enormity of my message, for I have done little of myself. Not only as Newton said have 'I stood on the shoulders of giants', but like Descartes I receive revelation from God which is in a sense anti-intellectual. In the spiritual tradition I follow it is stated 'that all scientific discovery comes as a revelation from God'. The question of consciousness has been called the most ancient and most difficult issue facing human epistemology. It is fitting, as you will soon see, that the formal description of consciousness should have as its unexpanded equation the very simplest of mathematical form. Many of you may not appreciate it initially because the route will not seem 'politically correct'; going against all the current models of science, saying they are incomplete and insufficient. Others might not accept the fundamental noetic equation because of the apparent simplicity if viewed superficially.

Nevertheless we begin at the beginning with the promulgation of this discovery with a quote from American president George Bush's recent inaugural address: "*Do you not think an Angel resides in the whirlwind and directs the storm?*". The original inspiration for the discovery of consciousness comes from a declaration of that angel to the American prophet Joseph Smith: "*And the light which shineth, which giveth ...light,...which is the same light that quickeneth your understandings; which light proceedeth forth from the presence of God to fill the immensity of space - The light which is in all things, which giveth life to all things, which is the law by which all things are governed...*" (Smith, 1933, 1974). This was the conceptual foundation for the original formulation of the noetic theory of the cosmology of consciousness. Because I felt I could trust those scriptural statements as they were declared by God. You can see in them insight into the law of gravitation, and that a form of physical photonic 'light' is similar to the light of the mind, which most physicists don't believe. So it was these scriptural passages that helped me begin formulating the noetic theory. Noetic Theory defines this 'light' as the formerly discarded concept of '*elan vital*' - but finally science progresses sufficiently to include it theoretically and begin to demonstrate it empirically. So now it is possible to begin a formal scientific description of the noumenon of consciousness!

2.0 Cosmology of Mind for a Conscious Universe

Conventional thinking suggests that the human mind reduces to emerges or evanesces from neural processes in the brain (Chalmers, 1995) or could be fully replicated on a conventional computer if the proper algorithm was known. This model is incorrect because it does not have sufficient degrees of freedom to describe intentionality and represents a category error for philosophy of mind (Amoroso,2000a). Mind does not reduce to brain or matter as usually described. Ironically reductionism fails; and what is usually considered the most elementary level actually becomes more complex once one breaks through the phenomenological quantum barrier of uncertainty into the Noumenon of the conscious universe (Amoroso & Martin, 2000). The existence of a teleological action principle or *elan vital* (vital force) has been traditionally discarded by this naturalistic scientific epistemology because the nature of and 'precise formulation of the site and manner of the postulated mental-neural interaction' (Eccles, 1986) has been lacking. In this introductory paper the formalism only describes the initial basis for the structural-phenomenological cosmological framework of consciousness ; the more critical description of mental action and teleological self-organization required to complete the theory comprehensively will be introduced in an ensuing paper.

2.1 Philosophy of Space in Noetic Cosmology - The Origin of Structure

In the current cosmological theory of the day, the so called 'Big Bang', one of the four contemporary standard models, all of the higher dimensions are a subspace of our reality and were compactified 15 to 20 billion years ago at the inception of the big bang. In noetic cosmology, called the Continuous State Conscious Universe (CSCU) (Amoroso, 2002), the reverse is true. Our Euclidian 3-space or Minkowskian 3(4) D space, whichever you prefer, is a subspace of a higher 12 dimensional realm; or if extrapolated to the nethermost region of the supralocal megaverse; a fundamental holonomic space without dimensionality as we now define it. This new model of the universe suggests the possibility of an infinite number of Hubble type spheres, all with potentially varied laws of physics and complete causal separation from our Hubble realm. This is very important to note because the noetic formalism introduced below in section 3 and 4 would not work or apply in a more limited naturalistic big bang universe. It is worth pointing out that scientific theory, wether popular or unpopular at any point, must ultimately be based on a description of natural law not on a creative fantasy of the scientists imagination. It is only when natural law is adequately determined that any theory can be successful.

Postulate 1: *Space is the most fundamental 'form or substance' of existence; and the origin of all structure. The demarcation and translation of which constitutes the basis of all energy or phenomenology. (This is generally known relative to our reality where forms of potential energy and also, but perhaps not as obvious, electrostatic energy which are energies of geometry or position.) This basis for energy (space and geometry) is a fundamental form of information which signifies the cosmological foundation of consciousness. This postulate also connotes the most rudimentary basis of structural- phenomenology.*

Although the concept of Absolute Space (AS) as defined by Newton is discarded in contemporary physics, a deeper more fundamental form of AS nevertheless seems to exist and is required for Noetic Cosmology. The reason Noetic Field Theory (NFT) (Amoroso, 2000) reintroduces a form of AS that is non Newtonian is that the classical Newtonian AS once considered the basis of 'our space' is only a form of fundamental Euclidian space. The AS of NFT is somewhat different but perhaps similar enough that Newton should be given some credit for his vision. Likewise the relational space of the Einstein universe is not sufficient to model consciousness and also doesn't contain the supralocal megaverse. The AS of NFT proposed by the CSCU (Amoroso, 2000, 2001)(defined in postulate 1) is the ground of all existence and 'resides' beyond the observed Hubble universe or even the infinite number of possible supralocal nested Hubble-type spheres (each potentially with its own varied laws of physics) (Kafatos, Roy & Amoroso, 2000). The ultimate nature of this Noetic AS is ineffable at the moment and therefore outside the domain of science. But we can deduce some of its properties and then empirically investigate the higher order properties these deductions suggest.

In Noetic Cosmology there is a complementarity between a classical concept of AS and the contemporary relational space suggested by Einstein. The AS just alluded to might metaphorically be compared to an artificial core of a futuristic holographic computer from which any program or virtual reality may run. Here NFT suggests our phenomenological reality (Hubble sphere, matter, perception etc) is in actuality a type of virtual reality projected from this AS, as would be any of the other supralocal possibilities of the megaverse.

A simplistic form of this is much like that described below by Jammer in (Misner et al, 1970). In the CSCU of NFT out of the fundamental AS relational space is 'created' at each instant for our minds as the familiar 'spacetime' and all the matter imbedded in it. Noetic space is more complex than Jammer's in that it is an 11(12) D spacetime that of course still reduces or makes correspondence to the Minkowski/Rieman 3(4)D spacetime of General and Special Relativity. The Absolute underlying nature of the Universe seems to be an ubiquitous 'fractal-like' medium comprising the totality of existence; appearing to embody a 'perfect order' and symmetry. But one that is somehow everything and nothing simultaneously such that it can generate or comprise anything.

Time is a complex process only just becoming addressed by physicists (Amoroso, 2000). In the absolute sense time does not exist or the universe can be called timeless. One can say that all forms of time (Amoroso, 2000) represent various types of motion and in that since time can be discounted as a concept (i.e. - not fundamental). Then geometric translation or field propagation seems to be more fundamental. Therefore space - whatever that is, is the most fundamental concept of the universe. Space with boundary conditions or energy is fundamental to all matter.

A complete discourse on this subject will be left to the forthcoming treatise on Noetic Theory (Amoroso, 2002), but suffice to say for now that the concept of Energy can be derived from space-like separation and division. So here summarizing according to the Noetic Theory it is postulated that AS and it's extension (localized extension as it becomes our spacetime reality). AS is the most fundamental entity in existence and energy is formed from it's boundary conditions. Thus we have the most fundamental philosophical conceptualization of a 'Structural - Phenomenological' Cosmology where space is synonymous with structure and Energy is the phenomenology of it's boundary conditions. This is what the first fundamental noetic equation of consciousness derived below initially describes - the boundary conditions of a conscious entity and the associated energy of these boundary conditions. So as to reduce confusion in the future I mention that the ultimate domain of AS is different from that of what will be defined in NFT as 'extension' relative to local or Einstein/Hubble spacetime. Extension is continuously created and recreated at each temporal instant for the relational domain which is our spacetime reality. This is a key critical concept which at the moment must remain beyond the scope of this introductory paper; but it is important to briefly introduce the concept now so that the meaning of the noetic equation will not be completely misconstrued.

Difficulty in defining the fundamental nature of a spacetime stems from the incompleteness of quantum and gravitational theories and the required associated new cosmology. The conceptual disparity arises in terms of correspondence to the Newtonian world view of continuous absolute space in opposition to current Einsteinian view of discreteness. This debate about the nature of space has continued at least since Aristotle. Einstein in his last published statement regarding the nature of space and time said:

“The victory over the concept of absolute space or over that of the inertial system became possible only because the concept of the material object was gradually replaced as the fundamental concept of physics by that of the field... The whole of physical reality could perhaps be represented as a field whose components depend on four space-time parameters. If the laws of this field are in general covariant, then the introduction of an independent (absolute) space is no longer necessary. That which constitutes the spatial character of reality is then simply the four-dimensionality of the field. There is then no ‘empty space’, that is, there is no space without a field.” (Jammer, 1993; Misner, Thorne & Wheeler, 1970).

Einstein’s view is a form of the *relational theory* of space developed by Leibniz and Huygens (Jammer, 1993; Sklar, 1985; Reichenbach, 1927) which is the form required by noetic theory. However it should be noted for the sake of completeness that ultimately the universe contains an inherent complementarity between the absolute and relational geometries of space. The relational model is limited to the Hubble sphere of human conscious cosmology. The supralocal HD megaverse retains an absolute character of which ‘our’ relational domain is a corresponding subspace. Relationalism is in opposition to the model of ‘substantivalism’ which gives space the ontological status of an independent reality as a kind of substance (Jammer, 1993); the Newtonian concept of absolute space being the prime example.

2.2 The Geon Concept as Substrate of the Conscious Megaverse - The Origin of Phenomenology

Wheeler (1955) developed the concept of a classical Geon; defined as a gravitational-electromagnetic body of Euclidian coordinates with sufficient size that it will self-cohere into a *kugelblitz* or ‘ball of light’. In Wheeler’s notation the Geon is described by three equations. The first (1.0) is the wave equation, followed by two field equations the first (1.2) of which gives a mass distance relationship and the second (1.3) variation of the factor Q :

$$d^2 f / d\rho^{*2} + [1 - (l^* Q / \rho)^2 (1 - 2L / \rho)] f = 0 \quad 2.0$$

with circular frequency $c\Omega$ related to the dimensionless radial coordinate $\rho = \Omega r$ such that

$d\rho^*$ is the abbreviation for

$$d\rho^* = Q^{-1} (1 - 2L / \rho)^{-1} d\rho \quad 2.1$$

$$dL / d\rho^* = (1/2Q) [f^2 + (df / d\rho^*)^2 + (l^* Q / \rho)^2 (1 - 2L / \rho)] \quad 2.2$$

$$dQ / d\rho^2 = (\rho - 2L)^{-1} [f^2 + (df / d\rho^*)^2] \quad 2.3$$

L and f are the mass and field factors respectively; and Q is a scale correction factor. The factor l relates to a family of modes with distinct frequencies that he associates with the well known completeness theorem of spherical harmonics. Modes of l in an extended view of Wheeler’s geon concept will be shown to be key elements in propagation of the noetic field; and will be discussed in great detail in future works. They are alluded to in (Amoroso, xxx, 200x; Kafatos & Drăgănescu, 2001). Wheeler states that this system of equations permits change of distance scale without change of form (Wheeler, 1955).

2.3 The Hyper-Geon of Noetic Field Theory (NFT)

The Geon as originally defined by Wheeler was a classical construct for the then standard model of spacetime. A more complex Hyper-Geon is suggested for the (Continuous State Conscious Universe CSCU) (Amoroso, 2002) of NFT. The Hyper-Geon is postulated to reside beyond the 3(4) D relational spacetime of the Einstein/Hubble Universe. It forms the Energy of the upper bound of Noetic AS. This supralocal Hyper-Geon filling the infinite domain of the megaverse is the root of the noetic field; or ‘elan vital’ that gives life and order to all things.

Postulate 2: *The Superlocal Hyper-Geon is the most fundamental energy or phenomenology of existence. This Energy arises from the ordering and translation of 'space' (i.e. information or a change of it's entropy). This fundamental Geon energy is the primary quantum of action of all existence; it fills the immensity of space (nonlocally) and controls the evolution of the large scale structure of the universe, is the origin of life (the 'elan vital') of classical philosophy and finally is the root of the 'light of consciousness'.*

3.0 Initial Formalism for a Comprehensive Noetic Theory of Consciousness

Noetic Field Theory (NFT) is a substance dualism/interactionist model of mind and consciousness with its conceptual root in Descartes concept of a *res extensa* and *res cogitans* except that *res cogitans*, the substance of mind, is a form of physical matter in NFT. This makes the distinction between mind and body less pronounced. Mind and body are complementary aspects of a deeper basis much the same metaphorically as the distinction between wave and particle in quantum theory.

In Cartesian terms the model could be simplistically formulated as $M = R_e + R_c$; however since NFT is cast in the CSCU this simple formula becomes (Amoroso, 2000).

$$|\Psi_M\rangle = |B|\Psi_b\rangle + (|\Psi_c\rangle + |\Psi_e\rangle) \quad 3.0$$

Where equation (2.0) represents the three fundamental base states described by the NFT definition of mind where represents the general wavefunction of mind and $|B|\Psi_b\rangle$ is the domain of the brain.

$|\Psi_M\rangle$ By definition in NFT the brain is not the 'seat' of consciousness. It has two functions: 1. Primarily as a naturally occurring form of conscious quantum computer (Amoroso, 2000) that processes sensory data and manages the physiology and metabolism of the body, and 2. The quantum processor acts as a transducer bringing information from the external phenomenology of reality into the *res cogitans* or true seat of the mind that resides outside of the temporal realm (Amoroso, 2000). This is the portion of the basic formulation described by the two additional base states inside the parentheses in equation (2.0) where $|\Psi_c\rangle$ represents the cosmological ordering principle or quantum of conscious action which is the noetic field mediated by it's exchange particle the Noeon (Amoroso, 2000). The third base state $|\Psi_e\rangle$ represents the boundary conditions of elemental intelligence which signifies the atemporal aspects of and individual mind (Amoroso, 2000) imbedded in the unitary realm of nonlocality (Kafatos & Nadeau, 1995).

The brain's transduction of sensory information is self organized by the cosmology of the noetic field (Amoroso, 1 2 3) through the gravitational spin exchange mechanism of continuous compactification (Amoroso et al 1998) and effects of the electro-gravitational noetic force $F_{(n)}$ which will be defined shortly. The noetic force can be ignored relative to the $|B|\Psi_b\rangle$ base state because this is not the realm of the vital field or intentional action. That is it's effect is infinitesimal in the same way the de Broglie wavefunction is considered to have a negligible effect on macroscopic material.

First we review in passing and extend the noetic formalism as it relates to the first term $|B|\Psi_b\rangle$ in the basic NFT equation (2.0) that relates to the quantum action in the brain. Quantum theory is generally described by the Schrodinger equation

$$i\hbar \frac{\partial \psi}{\partial t} = -\frac{\hbar^2}{2m} \nabla^2 \psi + V\psi \quad 3.1$$

which describes a particle moving on a manifold. However even Bohr, the main founder of the standard Copenhagen phenomenological model of quantum theory maintained that the theory does not describe biological systems. Elementary 'mind stuff' or 'brain stuff' includes more dynamical processes than the interactions described by the Schrodinger equation on the world line of inanimate particles. This assumption is the main reason the current quantum theory is deemed insufficient to describe biological systems. A second causal relationship is introduced by the de Broglie-Bohm ontological extentions to quantum theory making them more suitable for describing biological interactions. In NFT this

macroscopic activity of particles or even neural particles is not interesting to mental activity. In the future some newer form of the de Broglie/Bohm model may be more pertinent to this base state because the current equations still bear no relationship to consciousness itself. There is still a gap of missing intermediate steps.

4.0 Initial Noetic Formalism

The action of consciousness is not a 5th fundamental force but an integration of the electromagnetic and gravitational force as it is confined to the 12D HD spacetime metric of U_T , the category for the Universal sea of consciousness embodying the topological space T (Kato & Struppa, 2000).

The well known Schrodinger equation central to quantum theory has correspondence to Newton’s second law of motion $F = ma$ and it seems reasonable for the formal approach to noetic theory to begin at the same place. In the initial formalism gravitation is not involved as only the structural-phenomenological boundary of an entity and not mental dynamics is involved. Newton’s law of gravitation $F = Gm_1m_2 / r^2$ is not chosen because it is not the correct form of gravitation and also contains a constant of dimensionality not desired. Whereas $F = ma$ is dimensionless. For similar reasons Einstein’s gravity is also not chosen. This issue will be taken up in detail in the second paper.

First we substitute Einstein’s mass energy relation $E = mc^2$ into Newton’s law and obtain:

$$F_{(n)} = E / c^2 a \tag{4.1}$$

Where $F_{(N)}$ is the noetic force and E becomes the self-organized autopoietic energy related to ψ_e of the cosmology of mind as defined in the basic premise of noetic theory:

$$|\psi_M\rangle = |B|\psi_b\rangle + (|\psi_e\rangle + |\psi_c\rangle) \tag{3.0}$$

E is scale invariant through all levels of the CSCU beginning at the highest level in the supralocal Megaverse as a hyperdimensional Wheeler Geon (Wheeler, 1955). A Geon is a ball of photons of sufficient size that it will self cohere through gravitation. At the micro level the Geon becomes synonymous with the mental energy of a conscious entity, perhaps the Prion, the smallest known life form if it is correct that the prion protein is ‘animated’ by the self-organizing properties of the ‘elan vital’ of the noetic field. The E unit is comprised of a factor of *Einstein’s*, the fundamental physical quantity defined as a ‘mole or Avogadro number of photons’. Next the noetic equation is generalized for the conscious universe derived from the work of Kafatos et al, 2000.

Taking an axiomatic approach to cosmological scaling that all lengths in the universe are scale invariant, we begin with the heuristic relation that

$$c \equiv \dot{R} \quad \text{or} \quad \dot{R} = l / t = c$$

where \dot{R} represents the rate of change of scale in the universe. This corresponds to the Hubble relation for perceived expansion of the universe where

$$H_o = \dot{R} / R \quad \text{and} \quad a = \dot{R} \times H_o \quad \text{or substituting} \quad \dot{R}^2 / R$$

So returning to (1.0) for final substitution we have

$$F_{(n)} = E / c^2 a = E / c^2 \times \dot{R}^2 / R \tag{4.2}$$

Since $c \equiv \dot{R}$ The c^2 & \dot{R}^2 terms cancel and we are left with:

$$F_{(n)} = E / R \tag{4.3}$$

Which is the formalism for the fundamental case of a conscious entity in the CSCU. It should be noted that R is a complex rotational length and could also be derived in terms of angular momentum or spacetime spinors at higher levels closer to domains described by conventional theory. But the derivation above is more fundamental. The point being that the noetic formalism could be derived and related to any level of ‘conscious reality’.

The immediate simplistic relation derived from this noetic force equation is that if one entered a focused meditative state the energy of consciousness would increase or be maximized as opposed to the more dissipated energy minimized by lack of attention. While at first glimpse this fundamental equation might seem rather trivial, it is actually quite profound and upon expansion can be shown to describe any fundamental action of mind or life.

5.0 Conclusions

This is a major step; but still only preliminary. This fundamental structural-phenomenological equation of consciousness will not have any real utility until it is expanded to derive the modes of intentional action on the topology of space. This requires the integration of gravity and electromagnetism (Vigier & Amoroso, 2002; Amoroso & Vigier, 2002). This can be described by a topological quantum field theory, which is related to category theory. Because the noetic theory is physical and comprehensive it is falsifiable. Experimental work is about to begin to isolate the noetic field and its bosonic exchange particle the *noeon* - a quadrupole like photon-graviton complex.

Figure 1A. The figure below conceptualizes the scale-invariant structural-phenomenological domain described by the noetic equation. Each rectangle in the lower portion of the figure represents a progressively scaled unit sphere in the hierarchy of reality like the one shown on top. The sphere(s) which in reality would be a hypersphere represents the boundary conditions of one macroscopic scale invariant domain in the superposed hierarchy. But because of fundamental complementarity would not be possible to be isolated as shown here for descriptive purposes. The central tube shown as the sphere’s diameter represents the momentary creation of extension (if representing the spacetime locus in the dimensional hierarchy) or the coherence length for a moment of mental action or resting potential of background energy for a particular psychosphere. This and the sphere boundary is representative of structure. The ellipses represent energy or phenomenology. The locus of extension would be a ‘standing wave’ representing some present moment created by rotation (at the speed of light c) of the 2 counter propagating ellipses, one oriented towards the future and the other toward the past. This is for the benefit of stabilizing our observed reality, as the noumenon itself that gives rise to it is a timeless domain. In honor of Descartes’ historic work, each looped curve is described by a mathematical formula called the ‘folium of Descartes’.

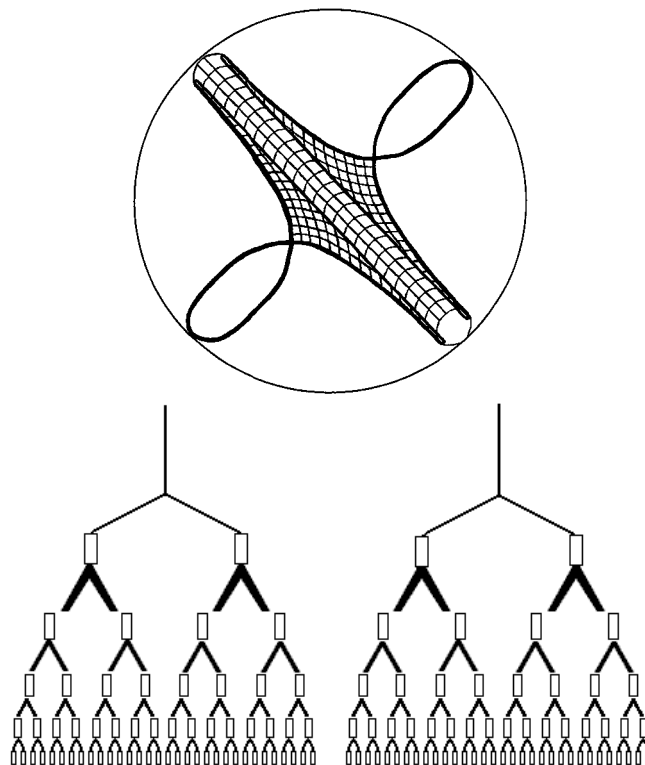
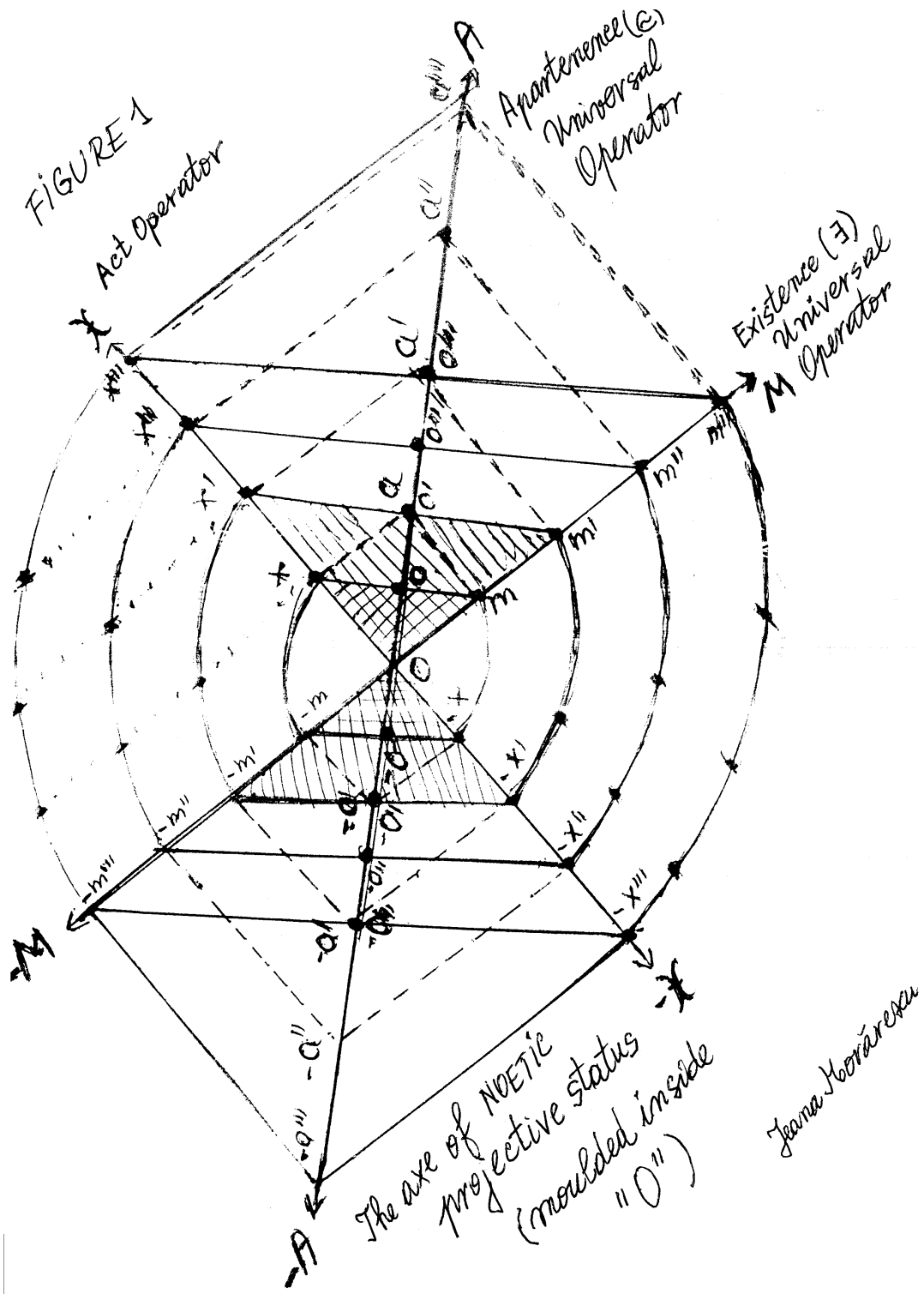


Figure 1B. Another conceptualization of the noetic equation showing structural-phenomenological action and existence operators was drawn courtesy of Jeana Morărescu of the Romanian Academy of Science.



References and Bibliography

- Amoroso, R.L., 1999, Introduction to noetic field theory: The quantization of mind, *Noetic Journal*, 2:1, pp 28-37.
- Amoroso, R.L., 2000, Noetic field theory: The cosmology of mind, in R.L. Amoroso, M. Farias (eds.), *Science and the Primacy of Consciousness*, Orinda: Noetic Press.
- Amoroso, R.L., 1997, The theoretical foundations for engineering a conscious quantum computer, in M. Gams, M. Paprzycki & X. Wu (eds.) *Mind Versus Computer*, Amsterdam: IOS Press.
- Amoroso, R.L. 1995. The extracellular containment of natural intelligence: A new direction for strong AI, *Informatica* 19 (1995) pp. 585-90.
- Amoroso, R.L. 2000, The parameters of temporal correspondence in a continuous state conscious universe, in L. Buccheri & M. Saniga (eds.) *Studies on the Structure of Time: From Physics to Psycho(patho)logy*, London: Plenum.
- Amoroso, R.L., The continuous state universe, in R.L. Amoroso, G. Hunter, S. Jeffers & M. Kafatos, (eds.), 2002, *Gravitation & Cosmology: From the Hubble Radius to the Planck Scale*, in press, Dordrecht: Kluwer Academic.
- Amoroso, R. L., Kafatos, M., & Ecimovic, P. 1998, Nonzero rest mass photon anisotropy, in G. Hunter, S. Jeffers, & J-P Vigier Eds. *Causality and Locality in Modern Physics*, p. 23-28, Kluwer: Dordrecht.
- Amoroso, R.L. & Martin, B., 2000, *Consciousness: A Thousand Points of Light; Biophoton Emergence form the Noumenon of the Conscious Universe*, *Noetic Journal*, 3:2
- Beck, F., and Eccles, J.C. 1992. Quantum aspects of brain activity and the role Consciousness. *Proc. Natl. Acad. Sci.* 89: 11357- 11361.
- Bohm, D., A suggested interpretation of the quantum theory in terms of "hidden variables", I & II. *Physical Review* 85 (1952), pp. 166-179 and 180-193.
- Chalmers, D. 1996. *The Conscious Mind*. New York: Oxford Univ. Press.
- Chalmers, D. Facing up to the problem of consciousness. *J. Consciousness Studies*, 1995, 2:3, 200-19.
- Drăgănescu, M. 1985, *Ortofizica (Orthophysics)*, Bucharest, 1985.
- Drăgănescu, M. 1991, *Inception Speech, Noesis, The Romanian Academy*, Bucharest.
- Eccles, J.C., 1986, Do mental events cause neural events analogously to the probability fields of quantum mechanics, *Proc. R. Soc. Lond.* B227, pp. 411-428.
- Feynman, R. 1966. *Feynman Lectures on Physics*. Menlo Park: Addison-Wesley.
- Feynman, R., Quantum mechanical computers, *Foundations of Physics* 6 (1986) pp. 507-531.
- Frohlich, H. 1983. Evidence for coherent excitation in biological systems. *Int. J. Quantum Chem.* 23: 1589- 1595.
- Frohlich, H., Long-range coherence and energy storage in biological systems. *Int J Q Chem.* 2 (1968) p 641-9.
- Horgan, J. Can science explain consciousness? *Scientific American*, July 1994, 88-94.
- Kafatos, M. & Drăgănescu, M., About the integrative science, communication at the Vth Conference on structural-phenomenological modeling: categories and functors for modeling reality; inductive reasoning, Romanian Academy, Bucharest, June 14-15, 2001.
- Kafatos, M. and Nadeau, R. 1990. *The Conscious Universe*, New York: Springer-Verlag.
- Kafatos, M. 1998, Nonlocality, complementarity and cosmology, , in G. Hunter, S. Jeffers, & J-P Vigier Eds. *Causality and Locality in Modern Physics*, p. 23-28, Kluwer: Dordrecht.
- Milburn, G.J., 1998, *The Feynman Processor*, Reading: Persius Books.
- Physica D*, 120:1-2, pp. 82-101.
- Osoroma, D., 2000, *The Scientific Origins of Sexual Preference*, Orinda: The Noetic Press.
- Penrose, R. 1994. *Shadows of the Mind*. London: Oxford Univ Press.
- Penrose, Roger. 1989. *The Emperor's New Mind*. Oxford: Oxford University Press.
- Pribram, K.H. 1971. *Languages of the Brain*. Englewood Cliffs: Prentice Hall.
- Pribram, K.H. 1991. *Brain and Perception*. Hillsdale: Lawrence Erlbaum.
- Smith, J. 1833. *The Doctrine and Covenants*, 88:11-13, Salt Lake City: The Church of Jesus Christ of Latter-Day Saints.
- Vigier, J-P & Amoroso, R.L. 2002, *Can One Unify Gravity and Electromagnetic Fields?* In press.
- Wheeler, J. A., 1955, Geons, *Physical Review*, 97:2, pp. 511-536.