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THEORY OF CONSCIOUSNESS AND COGNITION

Dhanjoo N. Ghista and Vladimir V. Kulish

***Abstract*—Consciousness is the fundamental entity (incorporating cognitive and operative principles) that is continually devolving into the cosmic mind (under the qualification of the operative principle), and thence into microvita and the fundamental factors of the universe. Due to these expanding and contracting factorial waves, the solid factors explodes as a 'big-band', and gives rise to the fundamental particles, structures and galaxies. Following the big-bang, the primordial energy (due to ongoing devolution of the cosmic mind) gets expressed into radiation (or extroversive) energy and gravitational (or introversive) energy, giving rise to the space-time effect and the fundamental constants of Plank's mass, length and time. In the wave-corpuscular framework, the more condensed phases of matter are shown to have shorter lengths wave.**

The microvita, ingrained within the matter, can cause a phase-change of the inorganic matter into organic matter and even to extoplasmic matter or the primitive mind, having a self-regularity potential. This unit mind now evolves, by an increase in its ectoplasmic density (under influence of the cosmic mind), and eventually develops into a human mind and a physical body corresponding to the ectoplasmic density of the mind. In this evolutionary journey, the mental energy development is associated with a depletion of its physical energy. This constitutes evolution. In this evolutionary journey, the mental energy development is associated with a depletion of its physical energy. Now, the natural law of the introversive phase of creation is for its entropy to decrease. This constitutes the cardinal principle of human behavior, whereby actions that cause environmental entropy to decrease are deemed to be benevolent, and vice versa.

Now, at any point in time, the cognitive potential of a unit mind or an individual comprises of its intrinsic potential to merge with Consciousness, the potential due to its interactions with people and the environment, and its inherent potential due to its past behavior (or mental momenta). A persona's prime task is to enhance this total cognitive potential to a stage from where it can be attracted by Consciousness to merge within it. Finally, we deal with the distribution of the psychic states of individuals in a society, and shows that the normal distribution is optimal for a human-rights centered progressive society.

***Index Terms*—consciousness, cosmic mind, devolution, Plank's constants, unit mind, evolution, ectoplasmic matter, cognition, mind entropy, progressive society.**

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1. INTRODUCTION

The development of Science, catalyzed by the industrial revolution, has imparted a materialistic stance and institutionalization to Natural Sciences. This has resulted in resistance to opening up parapsychic avenues and channels for Natural Science investigations. On the other hand, science culture has promoted critical faculty, but locked up the human mind in the narrow confines of materialism. This has resulted in psychic illnesses, because of the materialistic stance of science and its failure to supply the master key to unlock the doors of higher states of mind.

Behavioral medicine has identified psychosomatic factors associated with certain diseases, such as coronary heart diseases and cancer. For example, mental stress has a significant bearing on the incidence of myocardial infarction and death from coronary heart disease (CHD). Cancer is another killer disease, whose incidence has a strong psychological correlation. It is deemed that negative emotions of despondency and despair weaken our immune system and make us susceptible to cancer.

Present-day science is not equipped to deal with emotional and mental factors in the etiology and treatment processes of psycho-somatic ailments, associated with behavioral qualities (of, for instance, love and hate, hope and despair) of the mind. We therefore need a new science paradigm, in order to understand mind-function and behavior, and how this affects physical health and onset of disease. For this purpose, we need the development, acceptance and application of a new Paradigm of the Science of Consciousness, Matter and Mind. This science paradigm will then help us to analyze mind function for modulating behavior, so as to develop psycho therapy and endocrine therapy for mental and psychosomatic ailments.

For application of this science paradigm, for analyzing and modulating individual behavior, for integration of body and mind in behavior and holistic medical management, we need to attempt to understand mind origin, mind states and mind dynamics. This will help us to understand the innate nature of human beings, their innate tendency. What is it that drives human beings-what is the primary quest of human beings? What is it that gives them fulfillment.

2. PARADIGM OF CONSCIOUSNESS, MATTER, MIND AND BEHAVIORISM

In the new paradigm of Science [1], **first and foremost is the idea of Absolute consciousness** (or Consciousness). The postulated **second idea** is that Consciousness devolves into the **Cosmic Mind**, propounded (by Max Plank and other physicists) to be the mental entity behind our physical universe, and the **Operative Principle** which then qualifies the Cosmic Mind to produce the Fundamental factors, the constituents of our physical universe. The material world is deemed to be composed of five categories of substances or 'elements', known as the Five Fundamental Factors (5FFs). In fact, these 5FFs are a spectrum of wave forms described as ethereal, aerial, luminous, liquid and solid Factors (in order of decreasing wavelength).

The subtler waves (of longer wave length) surround and pervade cruder waves (of shorter wavelength), but not vice versa. For example, the Ethereal Factor pervades all the other factors but the Liquid Factor can only pervade the Solid Factor. These 5FFs are known to us through their sensory attributes. For example, the Ethereal factor carries the 'sound' sensory attribute, **the origin of the primordial sound**. The Luminous factor carries the 'sound' and 'touch' attributes. The Luminous factor carries the sound, touch and light sensory attributes; the Liquid factor carries sound, touch and light attributes. The Solid factor carries the sound, touch, light, taste and smell attributes.

All these factorial waves are expanding and contracting. As a result, interial and exterial forces come to act on solid factor. In the contracting phase, a portion of the solid factor can become subtler than all the five factors, and give rise to ectoplasmic matter. On the other hand, in the expansion phase there can be an explosion as a big bang, whereby the solid factor returns to the other factors, while manifesting as heat and light.

The birth of the Universe: Following this explosion (big bang), nuclear matter (protons, neutrons, electrons and other heavier particles) comes into existence as the universe cooled with expansion. Hydrogen and helium nuclei were formed, and later complete atoms, eventually resulting in stars and galaxies. Thus the universe exploded into existence from a space-time singularity.

Mind as a phase change of matter: Now, associated with these sensory attributes of 5FF, as fundamental units of consciousness, are subtle emanations from the Cosmic Mind, referred to as microvita. The ectoplasmic matter generated by the contraction phase as well as the fundamental particles emerging following the big bang, then also contain microvita, deemed to have both subjectivity(consciousness) and objectivity (energy)). The properties expressed by these different states of matter depend on the different kinds of microvita and the coordinated cooperation of their constituent microvita.

Thus, traces of consciousness and primitive mind are in fact present in matter through microvita, but only recognizably manifest when there is coordinated cooperation among the microvita on a large scale. A synthetic reaction, generating mind from matter, may be represented as follows (**Fig. 1**).

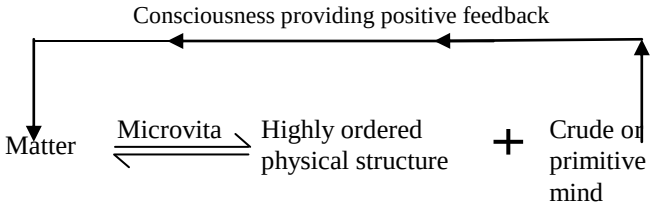

Figure 1. Generative of primitive (ectoplasmic) mind and life structure

The physical structure needs nourishment for its continuing generation and survival, and the consciousness of the primitive mind assists this function. In other words, the mind provides a positive feedback for sustaining the synthetic reaction. In the process of adaptation of the organism to an external environment, positive microvita augment the biopsychic field of the mind, and by the process of positive feedback increase the complexity of the physical structure.

Hence, **the third idea** is that of the development of primitive mind [2]. In this stage of the cosmological cycle, microvita emanated by Consciousness energize matter to form the primitive (ectoplasmic) mind. Matter is deemed to evolve into subtler structures by means of synthetic reactions, thereby providing the templates of primitive life structures, represented by primitive states of mind (and consciousness). From this point onwards, under the influence of Consciousness, the process of organic evolution begins, and constitutes the **fourth fundamental idea**, whereby primitive unicellular organisms and bacteria give rise to simple plants and animals, and eventually to self-conscious human beings. At this stage, behaviorism manifests as a psychic phenomenon, due to the influence of the environment on the mind, and the vulnerability of the mind to cope with its environment. Eventually, human mind becomes subtle enough to merge back into Consciousness. Most simply expressed, the cosmological cycle begins and ends with Consciousness (**Fig. 2**). The stage from Consciousness to the manifestation of the primitive mind is known as the extroversive phase, while the following phase of evolution of the primitive mind to Consciousness is the introversive phase.

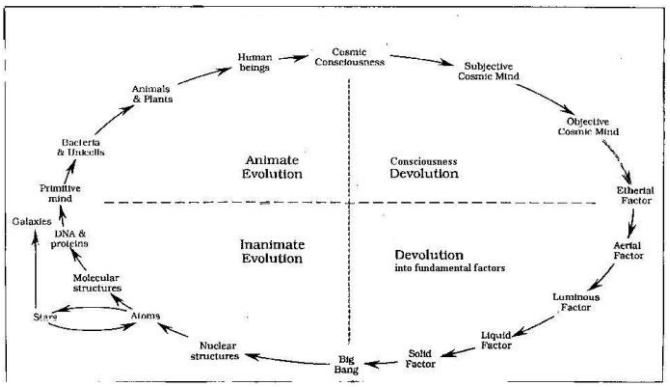

Figure 2. Cosmological cycle

3. NULL PRINCIPLE AND THE MANIFESTED UNIVERSE

In this section, we postulate the main principle governing the manifested Universe. Simply expressed, this fundamental principle asserts that nothing can be created out of Nothing, the Null state persists. It means that the process of manifestation is not arbitrary, it must go on so that ***the total state of the manifested Universe remains the Null state*** (we shall call it **the Null principle**).

According to the Null principle, as soon as some quality becomes manifested, its opposite becomes manifested at the same time and the quantitative measure of that opposite quality is exactly equal to the quantitative measure of the manifested quality. We shall call this as a ***separation*** process.

Symbolically, the process of separation can be represented by the following equation:

$$0 \equiv Q_e - Q_o \tag{1}$$

where Q_e represents the quantitative measure of a certain expressed quality, and $-Q_o$ is the quantitative measure of the opposite quality. Even the devolution of Consciousness into the Cosmic mind (CMD) and the Operative Principle (OPE) can be seen in the light of the Null principle, with the CMD being the "positive energy" and OPE (which qualifies or crudifies the CMD) being the "negative energy". Following the so-called "big bang", the separation process leading to the phenomenal (elemental) Universe can be thus given by

$$0 \equiv E_m - E_i \tag{2}$$

where E_m is the amount of manifested energy (matter) or mass energy and $-E_i$ is the same amount of negative energy or imploding matter (or black holes).

3.1. Primordial Energy to manifest the Universe

Let us illustrate the aforementioned concept in terms of the manifestation of extroversive radiant energy E_r, expressed by Einstein's famous equation.

$$E_r = mc^2 \tag{3}$$

where *c* is the speed of light in vacuum.

The corresponding introversive gravitational energy E_g, is expressed as:

$$E_g = \frac{GM_U^2}{R_U} \tag{4}$$

where *G* is the universal gravitational constant, M_U and R_U are the mass and the size of the manifested Universe respectively.

The process of manifesting the Universe, therefore, is, in one aspect, equivalent to the process of separation between radiation ("light") and mass ("dimness")[1]. In other words, this process is associated with the radiating of light and binding of mass.

We can also consider the speed of light to represent the rate of manifesting space, expressed in terms of the space-time effect:

$$c = \frac{\ell_0}{\tau_0} \tag{5}$$

where ℓ_0 is the *quantum of space* and τ_0 is the *quantum of time*. This radiative manifestation of space is followed by the complimentary energy (E_g) imploding this created matter.

3.2. Plank's Space and Time Constants

In light of equation (5), the quantum of action required to manifest the energy *E* as mc^2 can be written as:

$$E\tau_0 + (mc)\ell_0 = h \tag{6}$$

Since both the terms in the left side of (6) are equal (the Null principle), the equation can be written as $E\tau_0 + (mc)\ell_0 = h/2 + h/2$, so that,

$$E\tau_0 = \frac{h}{2} \tag{7a}$$

[1] *The word 'dimness' has been chosen because it stems from the common Indo-European stem [compare 'tamas' (Sanskrit) and 'temen' (Russian)] denoting 'darkness'.*

$$p\ell_0 = \frac{h}{2} \qquad (7b)$$

where $p = mc$ is momentum. Equations (7) represent the famous Heisenberg uncertainty principle written for the separation condition. Thus, ***the Heisenberg uncertainty principle is a direct consequence of the Null principle***. Rephrased for the separation condition, the uncertainty principle states: *the amount of action, necessary to manifest amount of energy E, is not less than the half of the action quantum*.

We now wish to estimate values of the space-time quanta. This can be done by writing the critical condition for the persistence of separation, namely:

$$\ell_0 = \frac{2GM_U}{c^2} \qquad (8)$$

which is a simple balance between the gravitational and radiation energies manifested. In fact, equation (8) is equivalent to the well-known expression for the Schwarzschield radius. We recall that $\ell_0 = c\tau_0$ and $M_U = E_U / c^2$. Upon substituting this into (8), we obtain

$$\tau_0 = \frac{2GE_U}{c^5} \qquad (9)$$

Finally, it follows from (7a) that $E_U = h/(2\tau_0)$. Therefore,

$$\tau_0 = \sqrt{\frac{Gh}{c^5}} \qquad (10)$$

which establishes a relationship between the time quantum and the three fundamental constants. Thus, the time quantum $\tau_0 = 1.35\times10^{-43}$s, which equals to **Plank's time**. Consequently, for the space quantum, we obtain

$$\ell_0 = \sqrt{\frac{Gh}{c^3}} \qquad (11)$$

with the quantitative estimate $\ell_0 = 4.05\times10^{-35}$ m, which equals to **Plank's length**. Equations (10) and (11) establish the relation between the space-time quanta and the three fundamental constants and, together with the expression for Plank's mass, represent the **natural universal system of units**. It is worth mentioning here that the expressions for Plank's quanta and the Heisenberg uncertainty principle naturally follow (are derived from) the Null principle, postulated previously.

Further, equations (10) and (11) provide us with the constrains on space-time. *No physical process can take place below these scales. The manifested Universe itself becomes not existent below these scales*.

Another important conclusion, which can be drawn from our results, is:

> *In order for the Universe to be physically manifested (to separate), its space-time must possess the quantum structure. Values of the space-time quanta are determined by the values of universal constants governing the process of separation. The values of the latter, in their turn, are determined by the Null principle.*

3.3. Frequency and wavelength of phases of matter

Finally, let us discuss another type of duality appearing in the course of separation. This is a duality of matter known as the *wave-corpuscular duality*. In other words, there is a wave associated with any mass *m*. It follows from equation (4) that the frequency value of this wave is:

$$\nu = \frac{2mc^2}{h} \qquad (12)$$

such that the wavelength associated with mass *m* is

$$\lambda\!\!\!^{-} = \frac{2h}{mc} \qquad (13)$$

In comparison with the de Broglie waves, whose lengths are relative, because they depend on the momentum, the wavelength just introduced is absolute, for absolute is the speed of light, *c*. It is obvious from (13) that *longer wavelengths correspond to a smaller mass*. We shall call $\lambda\!\!\!^{-}$ the *absolute wavelength*.

Consider now a certain fixed volume of matter, *V*. The value of mass in that volume is $m = \rho V$. Thus, equation (13) becomes

$$\lambda\!\!\!^{-} = \frac{2h}{\rho Vc} = \frac{K}{\rho} \qquad (14)$$

where $K = 2h/(Vc) = const$. It follows then that different phases of the same substance have different absolute wavelengths. Further, *more condensed phases have shorter absolute wavelengths than less condensed phases of the same matter*. Thus, the solid phase has its absolute wavelength shorter (higher frequency) than the corresponding liquid phase. The absolute wavelength of the liquid phase is, in turn, shorter

than the absolute wavelength of the corresponding gaseous phase, and so on.

4. LAW OF CORRESPONDENCE

As soon as different systems (objects) become manifest in the course of separation, they begin to interact with each other by means of energy exchange. For a certain chosen system, its state is constantly changing due to the impact of all other systems (environment). This ability to undergo changes being immersed in the environment can be seen as the ability of the system (object) to *reflect* its environment. This process, however, is not one-way. According to the Null principle, changes in the object must cause changes in the environment in such a way that the state of the Universe remains Zero (see **Fig. 3**). *Not only an object reflects the Universe in itself, but also the Universe reflects itself through its objects.* Thus, ability to reflect is a universal property of matter, its attribute. No matter can exist without ability to reflect.

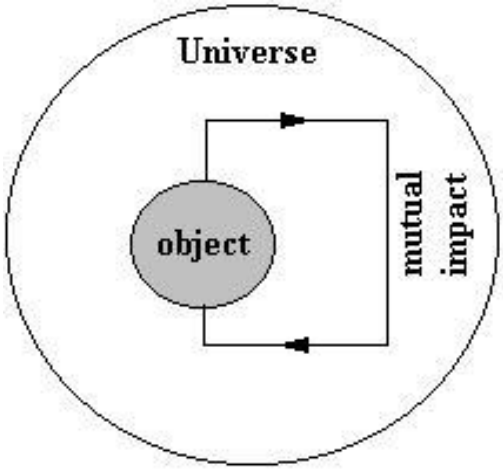

Figure 3. Impact of the environment (the Universe) causes an object to change; this leads to such a change of the whole Universe that its state remains Null.

We come now to a very important issue: any object, manifested in the Universe, changes ("behaves") according to its ability to reflect the Universe. The behavior of the object, however, is not arbitrary, but is in accord with the Null principle – any change in the state of the object corresponds to a change in the Universe, such that the total energy change in the Universe remains zero.

Since the ability to reflect is a universal attribute, even very primitive objects possess this ability (we shall discuss what we understand by being primitive in following sections). As objects become more complex, their ability to reflect the Universe becomes more complex as well, such that the mind develops. Thus, primitive objects can be viewed as possessing a primitive mind – their ability to respond to external changes ('behave'). We shall develop these ideas in following sections. Here, we just postulate the ***principle of mentality***:

> *The expressed Universe is mental, while the Cosmic Mind is supra-mental, i.e., beyond the scope of our mental perception. Since the ability to reflect is a universal attribute, mind can be seen as a universal attribute as well. There is a correspondence between the organizational complexity of a system and its ability to reflect (be mental) – a higher level of development corresponds to a higher degree of mentality.*

It has been mentioned above that the primordial (non-manifest) state of the Universe can be termed as the Absolute Consciousness. No separation between objects and subjects exists. In that state, everything is *reflected on itself* and no duality is existent. The analogy between the state of deep sleep and the primordial state can be drawn.

As soon as the Universe manifests itself step by step, division between object and subject becomes possible and reflection between different parts of the Universe comes into play. Using the same analogy as before, one can compare this state to the state of dreaming. It is as if the Universe dreams of itself. A dreamer appears separate from the images in his dream, yet they all exist in dreamer's imagination and, in fact, are one with the dreamer. The same can be said about the Universe – all objects appear to be separate; however, all of them are one with the Universe and their behavior is uniquely determined by the state of the Universe that must remain Zero at all times. Keeping on the dreamer's analogy, one can clearly see the difference between these two states though. In the state of dreaming, one begins knowing oneself by perceiving dreams. This is not possible in the state of deep sleep, when and where no difference between object and subject exists. In the same way, the Universe begins to know itself by manifesting different forms.

The following conclusion can be drawn:

> *The ability to reflect is a universal attribute. By means of it, the Universe develops itself, increasing its knowledge of itself. The logical purpose of the Universe to come into manifested state is self-knowledge. Likewise, the prime purpose of a human being is self-knowledge or self-realization, i.e., the realization of Consciousness within the core of the mind.*

5. ENVIRONMENTAL ENTROPY AND INFORMATION, ORDER AND COMPLEXITY.

Entropy is usually defined as a quantitative measure of macroscopic disorder. Systems, which are more ordered,

possess less amount of entropy. Disorder is characterized by a number of possible states, *N*. Therefore, the more possible states a system has, the more disordered the system is It has to be emphasized here that different states of the system are not necessarily associated with the amount of energy in that system. Having a fixed amount of energy, the system can however be in different states. Rather we talk here about *energy quality*, not about its quantity. Hence, entropy can be seen as a quantitative measure of energy quality in a certain system.

Let the space of possible states of a system be $\Omega = \{\omega_1, \omega_2, \ldots, \omega_N\}$ with the probability function $P(\Omega) = \{p_1, p_2, \ldots, p_N\}$. Then, the entropy of the system is given by

$$S = -\sum_{i=1}^{N} p_i \log p_i \qquad (15)$$

For a continuous probability distribution, $p(x)$, its entropy is

$$S = -\int_{-\infty}^{+\infty} p(x) \log p(x)\, dx \qquad (16)$$

In light of our neo-paradigm of cosmology and evolution, the extroversive part of the cosmological cycle is characterized by an increase in entropy, while in the introversive stage decreasing. Consider now a system, which evolves from state 1 to state 2 in such a way that its entropy decreases, that is, $S_2 < S_1$. It is said that this system has an *information gain*, $I = \Delta S = S_1 - S_2 > 0$. The amount of information, contained by a system, is a quantitative measure of the *organization* (*order*) of that system. In this case, the information gain corresponds to a higher level of consciousness, enhanced density of the mind, increased reflectivity of Consciousness on the unit mind, and a higher mental (or ectoplasmic) potential.

According to the Null principle, there is one state of the Universe only, namely the state of Consciousness. Hence, it follows from (15), that *the total entropy of the Universe is zero*. In other words, the Universe remains the same for ever, none of its attributes can be lost, and if something is destroyed in the Universe, it inevitably appears anew in another point of space-time [3].

The Second law of Thermodynamics requires no spontaneous decrease of entropy in closed systems, that is,

$$\frac{\partial S}{\partial t} \geq 0 \qquad (17)$$

It follows from the Null principle, however, that, for the Universe,

$$\frac{\partial S_U}{\partial t} = 0 \qquad (18)$$

must hold. Since the total entropy of the Universe is zero, its time derivative is zero as well. In other words, the Universe as a whole is reversible. In other words, it can retreat or fold into itself, if the Cosmic Mind decides to no longer express, but withdraw into Consciousness.

In order to achieve (18), the Universe could be assumed to be subdivided into two classes of systems. The first class consists of those systems whose entropy increases with time, and the system of the second class decrease their entropy in the course of evolution. That is,

$$\frac{\partial (S_I + S_{II})}{\partial t} = 0 \qquad (19)$$

Such that for the first class of systems

$$\frac{\partial S_I}{\partial t} \geq 0 \qquad (20a)$$

and for the second class

$$\frac{\partial S_{II}}{\partial t} \leq 0 \qquad (20b)$$

We shall call those two classes of systems – the *systems of the first kind* and the *systems of the second kind* respectively. The main feature of micro-systems of the second kind is that they are able to extract information from the environment. This, however, is achieved by destruction taking place in other parts of the environment – this is the price to be paid for some local developments. Now, the introversive phase of the cosmological cycle represents the macro-system of the second kind in that it is gaining information or increasing in knowledge state of mind potential or in consciousness. Hence, at a macro-level, the Universe is gaining information about itself from its parent Consciousness environment. However, this environment is self-enhancing and hence never depleting. This may be deemed to be a paradox, but then our thermodynamics of matter and hitherto undeveloped thermodynamics of the mind is only applicable to the macro-systems of the second kind and not to macro-systems which are supra-mental.

The following conclusion can be drawn:

> *At the micro-level, an increase of entropy in some parts of the Universe is balanced by the equal decrease of entropy in its other parts. This leads to local development of*

complex organized systems, by extracting information from their environment.

We end this section by stating the "basic law of environmental entropy": the entropy of living entities and of the environment needs to decrease, in order that the microcosm can eventually merge with the macrocosm; hence, the guideline for mental peace is that decision-making needs to be in conformity with this basic law.

6. COGNITION

Let us now attempt to define life. The state of life can be defined as a state of *organized complexity*. To be alive, it is not enough to be organized (ordered) – crystals possess a highly ordered structure, yet they are too simple to be alive. On the other hand, it is not enough to be merely complex (or to consist of many components possessing different properties) – ocean water contains all components constituting the blood plasma, yet it is not alive.

We propose *to consider transition from non-living to living as a phase change*. Thus, for instance, liquid helium consists of the same atoms whether it is super-conducting or not. Similarly with life – living systems consist of the same atoms and molecules as non-living things. Yet it is not the constituents that determine the phase state of a system, but the way those constituents are organized. Therefore, life comes into being as soon as some critical level of ordered complexity has been achieved in a certain point of space-time. Hence, when a structure or system becomes alive, a phase change takes place such that systems of the first kind become systems of the second kind.

At this point one has to clearly understand that it is not possible to draw a clear boundary between living and non-living systems. In a certain sense, life is dormant in all manifested systems of the Universe – all objects in the manifested Universe are to a certain degree complex and organized. Indeed, as was said elsewhere above, all objects possess the ability to reflect. This reflection is nothing else as energy exchange between an object and its environments. But any energy transfer is always transfer of information at the same time (waves are always a coded message after all). Therefore, all objects of the Universe exchange information. When it comes to life, however, not only quantity of information, but also its quality has to be taken into account. In other words, not only are truly living things able to perceive information, but they are also able to recognize its *meaning* to the extend of their own development.

A prime endeavor of human beings is decision-making. This is a risky process because of repercussions of one's decision. This is in consonance of our assertion (Section 4) that an entity and its environment are interactive and reflective. Also, as per the karmic law, this reflectivity varies in space and time. In our day-to-day interactions with people and environment, we may receive inimical reflections, which can be stressful and even painful. Hence the ideal modality of interactions is to not elicit painful reactions to one's decisions and actions. How can we do that?

In the previous section, we enunciated the principle of entropy, that in the introversive phase of the cosmological cycle the basic cosmic law is decrease in entropy. In other words, if our actions and decisions are in accordance with this basic cosmic law, then the reactions will be pleasant or even soothing. This brings us to the concept of risk in decision-making. We can minimize this risk by having our decisions decrease the environmental entropy. This is the prime tenet of human behavior. Let us hence consider a notion of *risk*.

Suppose a system can make decisions (or behave according to a situation). The space of possible decisions, *D*, can (for simplicity) be represented by means of two components, as $D = \{d, \bar{d}\}$, where *d* is the event of making decision *d* and $\bar{d}$ represents not making decision *d*. Let us consider the space of external events to be $\Omega = \{\omega, \bar{\omega}\}$, where ω is a certain event of interest and $\bar{\omega}$ represents all other events. The probability function, associated with the space of external events, is $P(\Omega) = \{p, 1-p\}$. Let now $L(d, \omega)$ denote losses or painful reactions in the case of making decision *d* and the event ω taking place (losses are considered negative in the case of a gain). Also, let $L(d, \bar{\omega})$ be the losses in the case of making decision *d* when the event ω does not occur. Then, by definition, the risk of making decision *d* is

$$\rho(d) = pL(d, \omega) + (1-p)L(d, \bar{\omega}) \qquad (21a)$$

which is, in fact, an estimate of the expectation of losses in the case of making decision *d*. Obviously, the risk of not making decision *d* is

$$\rho(\bar{d}) = pL(\bar{d}, \omega) + (1-p)L(\bar{d}, \bar{\omega}) \qquad (21b)$$

Spontaneously, that decision is made (and/or accepted) whose risk is the less.

Now, when making decisions, it is important to estimate the probability function and the matrix of losses as correctly as possible; otherwise, the risk estimates can be far from adequate. Assume now that neither the exact values of the probability function nor the matrix of losses are known, but only their subjective estimates, that is, $\tilde{P}(\Omega) = \{\tilde{p}, 1-\tilde{p}\}$ and $\tilde{L}$. In other words, $\tilde{p}$ represents the estimated probability of risking a reactive decision caused by an enhancement of the environmental or recipient entropy. The risks, computed based on such estimates, will be

$$\tilde{\rho}(d) = \tilde{p}\tilde{L}(d, \omega) + (1-\tilde{p})\tilde{L}(d, \bar{\omega}) \qquad (22a)$$

and

$$\tilde{\rho}(\bar{d}) = \tilde{p}\tilde{L}(\bar{d}, \omega) + (1-\tilde{p})\tilde{L}(\bar{d}, \bar{\omega}) \qquad (22b)$$

respectively. In general, they will not be equal to the actual values given by (21). It is possible, at least in principle, to compute the amount of information necessary to make the estimates, given by (22), equal to their actual values. The ***meaning*** (*importance* and *cost*), ***M*, of this information, *I*, for making decision *d*** can be defined as the distance between the risk estimate before the message was obtained and the risk estimate after receiving the message,

$$M_s(d \mid I) = \left|\tilde{\rho}(d) - \tilde{\rho}(d \mid I)\right| \qquad (23)$$

The measure just introduced is a *subjective* measure, for it solely depends on the subjective estimates of the risks involved. The *objective* measure can be introduced similarly as the distance between the estimated risk after the message has been received and the objective value of the same risk, that is,

$$M_o(d \mid I) = \left|\rho(d) - \tilde{\rho}(d \mid I)\right| \qquad (24)$$

It can be noticed that if $M_o(d \mid I) > \left|\rho(d) - \tilde{\rho}(d)\right|$, the information *I* worsens the ability of the system to make a correct decision. Therefore, such message can be called *desinformation* (information of negative quality; "lies"). In the final analysis, that we are recommending is that the risk $\rho(d)$ of a decision (*d*) can be minimized by obtaining a fairly accurate estimate of the probability of invoking a $-\Delta S$ entropy change in the recipient or environment (so that the decision *d* conforms to the basic law of environmental entropy), i.e.,

We can remark that a measure of risk is a quantitative measure of *fear*. Actually, the higher the estimate of risk of a decision the entity has, the greater the fear felt. Since, owing to the lack of knowledge, the risk estimates are always inadequate, such that whatever decision has been made, fear (risk) is always present. Imagine, however, the situation in which the system or the decision-maker estimates its losses as always being zero. Then, according to (22), the risk estimate will be zero, regardless of what event happens. Making decisions in such a state can be termed as an ***unattached action***. Indeed, by making decisions, the system acts; but, because it always estimates its losses as zero, the system acts being unattached to the results of its action. This state of action is free of fear, since no risk is involved.

Looking from the universal point of view, according to the Null principle, no losses can be manifest at the universal scale, because energy is neither created nor destroyed. Then, objectively, whatever happens in or as part of the Universe bears no risk. Therefore, fear is experienced in the state when the system perceives itself as an entity separate from the Universe. As soon as a system or entity perceives itself to be one with the Universe and does not expect to gain or benefit from its decision, then its decision will tend to be in harmony with the basic law of entropy.

One can argue that the system must tend to make such decisions whose risk of an adverse reaction or of causing an entropy increase is minimal or preferably zero. It was mentioned above, however, that *any* risk estimate is subjective due to the lack of knowledge or the information. Hence, a system will *never* reach the state of absolutely knowing the risk of the decision-making. Thus, *desire* to reach a state of gain will *never* be fully satisfied. This discrepancy between what is desired and what is really achieved is the ever existing cognitive driving potential of an entity, of every human being. Yet, by the same token, an entity ever dwells in the state of *dissatisfaction* or *anger* or *sadness*, whose quantitative measure is the distance between what is desired and what has been achieved.

In general, a measure of *happiness* (*satisfaction*) can be introduced. It is defined as the difference between the risk estimate $\tilde{\rho}(d)$ and the actual losses *L*(*d*) occurring when the decision *d* is made:

$$H(d) = \tilde{\rho}(d) - L(d) \qquad (25)$$

It is clear that if H(d) *> 0, the entity loses less than was expected. If, on the other hand,* H(d) *< 0, then the actual losses are larger than those expected.* Equation (25) may be termed as the ***basic law of cognition*** (or ***cognizance***).

7. PHYSICAL AND PSYCHIC ENERGY STATES

A look at the reconstructed pictorials of the Neanderthal people indicates that they were physically bigger (and probably stronger) than today's people. The Neanderthal brain was, on average, 100 g heavier than the brain of *Homo sapiens* (Cro-Magnon). However, there is no doubt that today's people are psychically and mentally more advanced than the Neanderthal people who became extinct because of their having less psychic capacity (compared to *Homo sapiens*) adapt to the changing environment. It is deemed that aliens in UFOs have their spindly arms and legs, but are of course more psychically developed than humans are; they can supposedly communicate with humans telepathically. Regardless of whether one believes or not in UFOs, it is not difficult to project that as human beings develop psychically they will be utilizing their limbs less and less, and the limbs will become thinner. Thus mental energy development occurs with a depletion of physical energy.

Since duality is always present in the manifested state, the existential state must be characterized by two components –

say, the physical (or real) energy content, ε_p, and the mental (or psychic) energy content, ε_m. The best way to represent this mathematically is by means of complex numbers, that is,

$$\varepsilon(t) = \varepsilon_p(t) + i\varepsilon_m(t) \tag{26}$$

Now, if the system is in equilibrium, that is, its net energy exchange with the environment equals to zero, then it follows that such a system's state

$$s(t) = \sqrt{\varepsilon_p^2 + \varepsilon_m^2} = const \tag{27}$$

In other words, the system remains on a circle of radius *s*, distanced from the Null state. The energy state of the system is determined by its interaction with the environment, such that the potential energy of the system is

$$U = C\frac{\left(\varepsilon_{ps}\varepsilon_{pe} - \varepsilon_{ms}\varepsilon_{me}\right) + i\left(\varepsilon_{ms}\varepsilon_{pe} + \varepsilon_{ps}\varepsilon_{me}\right)}{\sqrt{\varepsilon_{ps}^2 + \varepsilon_{ms}^2}} \tag{28}$$

where indices *s* and *e* refer to the system and its environment respectively, and *C* is a constant. As an illustration, we can state that necessary physical interaction with the environment causes the prehistoric people to have a strong physique. By the same token, the present-day psychic interaction of human beings with their environment forces them to be more psychically developed, with less accent on physical development. Hence, based on the Null principle, it follows that

$$\varepsilon_{ps} + \varepsilon_{pe} = 0 \text{ and } \varepsilon_{ms} + \varepsilon_{me} = 0 \tag{29}$$

Therefore, from equations (28) and (29)

$$U = \frac{\left(\varepsilon_p^2 - \varepsilon_m^2\right) + 2i\varepsilon_p\varepsilon_m}{\sqrt{\varepsilon_p^2 + \varepsilon_m^2}} \tag{30}$$

It follows from (30) that in the framework of constant *U*, enhancement of ε_m is associated with a decrease in ε_p.

8. THE COGNITIVE POTENTIAL OF THE INDIVIDUAL (UNIT) MIND

Consciousness may be perceived to have an ectoplasmic (psychic force) field (shown in **Figure 4**), which can influence unit minds in its field (if they concentrate on it) by attracting positive microvita. This, in turn, can induce genetic transformations and facilitate the centripetal movement of the unit mind towards the Cosmic nucleus. On the other hand, negative microvita, attracted by static and/or mutative micro-psychic longings, can produce the opposite effect.

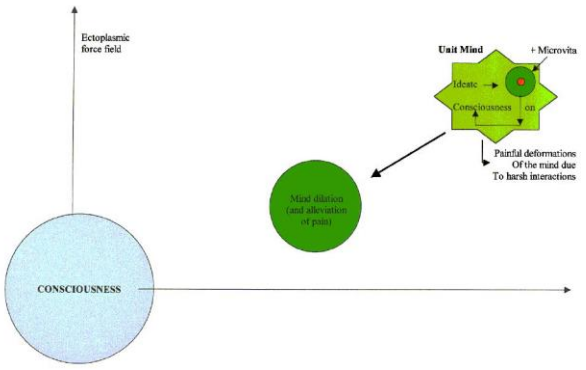

Figure 4. An individual (unit) mind in the ectoplasmic potential field of Consciousness

A developed *individual mind* (*consciousness*) has *the ability to reflect upon itself*. In other words, a conscious system is able to differentiate itself among other systems and perceive itself as a separate entity. Likewise an individual also has the intrinsic capability to reflect on the cosmic mind, and thereby gain more knowledge – both objective and subjective. At a macro-level, this cosmic mind can be viewed as a super-conscious entity, because it reflects on itself and is able to increase its knowledge of itself.

Let us say that we have an entity ($\in_0$) or a unit mind in the field of the cosmic mind. Let the evolved state of the entity (in the field of the cosmic mind) be represented by its ectoplasmic density (D_0) and its mental distance from the cosmic mind be r_0. Then we define the ectoplasmic potential (Φ_0) of this unit mind as

$$\Phi_0 = \frac{D_0}{r_0} \tag{31}$$

wherein D_0 reflects the intrinsic state of the unit mind. In so defining Φ_0, D_0 may be said to represent the intrinsic cognitive quantum of the mind, while the distance r_0 (inversely proportional to its evolutionary state) may not reflect this intrinsic capability. Hence, the potential of that individual mind is D_0 qualified by r_0, as given by (31).

We can likewise define the ectoplasmic potentials Φ_j of its neighbors ($\in_j$) in the environment, as

$$\Phi_j = \frac{D_j}{r_j} \tag{32}$$

Now if the entity $\in_0$ were alone in the environment, then its ectoplasmic potential would be given by (31). However, the neighbors $\in_j$ influence $\in_0$. Let the reactive potential between $\in_0$ and $\in_j$ be given as:

$$\Phi_{0j} = \sum_{j=1}^{N} \frac{\left(D_j^2 - D_0^2\right)}{\left|r_j^2 - r_0^2\right|} \tag{33}$$

What this equation tells us is that an individual with a different intrinsic cognitive capability and evolutionary state can affect the potential state of $\in_0$ positively or negatively.

Now, among these individuals $\in_j$, let one of them be very evolved (say, a spiritual master) whose *D* is very high and *r* is very low, then that neighboring entity will heighten the cognitive potential of $\in_0$. On the other hand, a malevolent person with a low cognitive capacity D_j and a high value of r_j will adversely influence the cognitive potential of $\in_0$.

Now to this potential state given by (33), we need to add representing the influence of the entity $\in_0$'s past behavior or mental momenta (or *karma*). In this regard, let us assume that $\in_0$ was subjected a reactive (positive or negative) stimulus $f(\tau)d\tau$ at a certain past time τ. Then let us represent the effect of this past stimulus on the rate of change of the potential (Φ_p) of the entity $\in_0$, after the elapsed time $t-\tau$, as $f(\tau)g(t-\tau)d\tau$, where $g(t-\tau)$ is the proportionality factor. Then the total effect (positive or negative) of the entity $\in_0$'s past history can be represented by the convolution integral:

$$\frac{\partial \Phi_p}{\partial t} = \int_0^t g(t-\tau) f(\tau) d\tau \tag{34}$$

The lower limit here is zero, because the stimulus began to act at time *t* = 0, that is, $f(\tau) = 0,\ \tau < 0$. Convolution integrals are often called memory integrals, because they are quantitative expressions of the system's past states. Therefore, the state of the system can be written as

$$\frac{\partial \Phi_p}{\partial t} = \int_0^t K(t-\tau)\Phi_p(\tau) d\tau \tag{35}$$

that corresponds to the case when the present state of the system is influenced by all the past states of the same system. In this case, the function *K* in (35) is called the *memory kernel*. There are three major cases of past behavior:

Case 1. Present effect of a single major past event.

If the memory kernel is proportional to the Dirac delta function, $K(t) = K_0\delta(t)$, the memory equation (35) reduces to $\partial\Phi_p / \partial t = K_0\Phi_p$, whose solution is $\Phi_p(t) = \Phi_p(0)e^{K_0 t}$. This indicates that the effect of a past action is augmented with time.

Case 2. Present effect of an ongoing past situation (or constant memory)

Assume the memory kernel is constant, $K(t) = K_0$. In this case, the effect of the past is given by $\Phi_p(t) = \Phi_p(0)\cos(\sqrt{K_0}t)$.

Case 3. A power-law past happening (or memory).
The most important case of memory behavior is the so-called *power-law memory*. It represents memory of a linear system whose memory kernel is given by a power-law in time, that is, $K(t-\tau) = K_0(t-\tau)^\alpha$. Power laws, however, are very often met in nature. The reason is power laws are scale invariant, that is, they do not change from scale to scale. Let $f(t) = t^\alpha$, then $f(\lambda t) = (\lambda t)^\alpha = \lambda^\alpha f(t)$. In other words, the law $f(t)$ is not altered by changing scales. The scale invariance is the cause for the *stability of systems following power laws*. As exterior disturbances usually are of a single scale (e.g., a given wavelength), they cannot significantly affect the system.

Upon substituting the power-law kernel into (35), we naturally arrive at

$$\frac{\partial \Phi_p}{\partial t} = K_0 \int_0^t \Phi_p(\tau)(t-\tau)^\alpha d\tau \tag{36}$$

where the exponent α is usually positive. This corresponds to the fact that, normally, a karmic effect increases with the course of time; hence it is in the best interests of a person to have it expressed and dissipated as soon as possible. The smaller the value of the exponent, the stronger the past influence is. Now, the total potential of an individual is given by $\Phi_T = \Phi_0 + \Phi_{0j} + \Phi_p$. One's prime endeavor is to enhance one's total potential to a stage, wherefrom it can allow itself to be attracted by Consciousness to merge into it.

9. INTERACTION OF INTELLIGENCE AND EMOTIONAL QUOTIENTS

Often, we find certain individuals (such as schizophrenics) are very intelligent but because of their emotional instability are unable to profitably express their intelligence. How do we portray their mental states? In this regard, we propose an equation that models behavior of a mental (conscious) system in the field of a complex potential $\Phi = \Phi_e + i\Phi_i$, where Φ_e and Φ_i denote emotional and intelligence potentials respectively. The equation, describing individual wave function ψ, becomes

$$\frac{\partial \psi}{\partial t} = (D_e + iD_i)\nabla^2\psi + (\Phi_e + i\Phi_i)\psi \qquad (37)$$

where D_e and D_i are emotional and intelligence coefficients respectively. Note that equation (37) is the modified Schrödinger equation. The probability wave ψ is, in general, a complex value, such that $|\psi|^2$ is the probability of finding the system in a given state.

Since the wave function is a complex function, we can write $\psi = \psi_e + i\psi_i$. Upon substituting this into (37) and collecting real and imaginary terms, we get

$$\frac{\partial \psi_e}{\partial t} = D_e\nabla^2\psi_e - D_i\nabla^2\psi_i + (\Phi_e\psi_e - \Phi_i\psi_i) \qquad (38a)$$

and

$$\frac{\partial \psi_i}{\partial t} = D_e\nabla^2\psi_i + D_i\nabla^2\psi_e + (\Phi_e\psi_i - \Phi_i\psi_e) \qquad (38b)$$

with the normalizing condition

$$\int (\psi_e^2 + \psi_i^2)dV = 1 \qquad (38c)$$

Note that equations (38) show that emotional and intelligence states of the system are not independent. Changes in the emotional state cause changes in the intelligence state and vice versa, as occurs in schizophrenia.

10. SOCIETY: PROGRESSIVENESS IN DIVERSITY

Finally, let us study the effect of more or less diversity in the mind-set of psychology of the inhabitants on the society. For this purpose, let the probability distribution $p(x)$, corresponding to psychology be given by normal (Gaussian) distribution,

$$p(x) = \frac{1}{\sqrt{\pi\sigma}}\exp\left[-\frac{\left(x - \langle x\rangle\right)^2}{\sigma}\right] \qquad (39)$$

where σ is the variance and $\langle x\rangle$ is the mean of the distribution. Here x denotes the quantitative measure of the psychological state. It is clear that, for the given society, the variance is the measure of diversity with respect to the quantity of interest. The larger variance, the flatter distribution and, therefore, more diversity it possesses. On the other hand, consider now entropy of the distribution (39),

$$S = -\int_{-\infty}^{+\infty} p(x)\log p(x)dx = \frac{1}{2\ln 2}\left[\ln(\pi\sigma) + \frac{1}{\sqrt{\sigma}}\right] \qquad (40)$$

Being the measure of disorder, a larger entropy corresponds to a more chaotic society, where members have a big spread in their psychological states. A lower entropy value, in turn, characterizes societies with less psychological diversity. Such societies are more ordered, but freedom of their members is the price to be paid. Clearly, an optimal value of entropy – and hence variance – must exist for a society with balance between freedom of its members and order.

Usually, the value of variance σ is not constant but is a function of time. Since, as a rule, complexity increases with time, the value of variance also increases, i.e., $d\sigma/dt > 0$. It follows from (40) that time variation of entropy is

$$\frac{dS}{dt} = \frac{1}{\sigma}\frac{d\sigma}{dt} > 0 \qquad (41)$$

Again, more freedom corresponds to higher variance, but chaos (entropy) increases with the freedom increase as well. We can now write the equation to determine the optimal value of variance. Indeed, diversity (freedom in thinking) is proportional to the variance. At the same time, the inverse of the variance is the measure of social organization, opposite of chaos. Hence, the optimal value of the variance can be found from

$$\frac{d}{d\sigma}\left[\sigma - \frac{1}{\sigma}\right] = 0 \qquad (42)$$

It follows from (42) that the optimal balance between freedom and organization is established in the societies with $\sigma_{opt} = 1$.

In other words, we have shown that the normal distribution is the optimal distribution in the class of Gaussian distributions, for a civilian human-rights centered progressive society.

11. CONCLUSIONS: DEVOLUTION, EVOLUTION AND MYSTICISM

Cognitive Science is based on the neo-science paradigm that:

(i) Consciousness is the fundamental entity, incorporating the cognitive and operative principles.
(ii) Consciousness expresses itself, through its operative principle, into the five fundamental (ethereal, aerial, luminous, liquid and solid) factors, providing the constituents of the physical universe.

(iii) Consciousness emanates microvita, which organize energy into matter to form ectoplasmic (mind) material and physical life structures. In other words, matter is energized into mind material as a phase change.

(iv) From primitive organisms to complex organisms, there is an unfolding of Consciousness due to increasing reflection of Consciousness , with a corresponding increase in psychic dilation of the mind and concomitant increase in complexity of the nervous and anatomical structures. This provides a new version of evolution (different from the Darwinian concept), namely that evolution entails mind dilation (or increase in ectoplasmic density) under the influence of Consciousness and in interaction with the environment. The physical transformation then occurs to conform to the developed mind state.

(v) Increasing psychic dilation of the unit mind leads to intellectual and eventually to parapsychic and intuition development.

(vi) The psychic dilation of the unit mind eventually culminates in its achieving mental liberation (from its psychic propensities), and merger into Consciousness.

In the manifested Universe, **radiation and gravitational energies** come into play as complimentary energies. As a result, its space-time effect must possess space and time quanta (ℓ_0 and τ_0, respectively) related by $c = \ell_0 / \tau_0$, wherein both ℓ_0 and τ_0 are expressed in terms of the universal constants (*G*, *c*, and *h*), by equations (10) and (11). These concepts lead us to derive expressions (12 and 14) for radiation frequency (ν) and the absolute wave length (λ), to indicate that more condensed phase of matter has shorter wavelengths and higher frequencies.

Then, we dealt with the concept of **entropy**. We discussed that during the creation of the Universe (or during the extroversive phase of the cosmological cycle, or creation), the entropy increases. Conversely, the evolutionary phase (or the introversive phase of the cosmological cycle) involves entropy decrease. Thus the net change of entropy is zero. Our awareness of this concept of entropy causes us to develop a sense of "conscience" of the risks associated with making decisions that cause positive changes in entropy among the people who we interact with. This can also constitute the basis of **cardinal principles** of law, namely that actions that cause increase in entropy or chaos among individuals and disorderliness in society are deemed to be malevolent. Conversely, decisions that bring about enhancement of the cognitive state (or intrinsic knowledge) in society are termed as benevolent. Going one step further, this would also constitute the cardinal basis of public-policy formulations.
Next, we considered that **human existence is both physical and psychic**. During evolution and interaction with the environment, the physical proportion of our energy state has declined while the psychic quantum of our energy state has enhanced. This presents another way at **defining evolution**, namely that evolution essentially constitutes mental transformation in an attempt to deal with the environment. Then, physical metamorphosis is a consequence of this mental transformation, such that the physical structure bears conformity with the mental state.

Having arrived at the stage of human evolution late in the evening of the cosmological (24-hour) day, we now place ourselves in the ectoplasmic field of consciousness. Therein every human mind deemed to possess:

(i) a certain intrinsic cognitive potential, based on the intrinsic capacity of their individual mind to evolve, i.e., decrease in entropy state and proceed towards Consciousness perfection;

(ii) a certain potential to correspond to interactions with other unit minds, which could be positive or negative depending on the intrinsic cognitive potentials of these unit minds;

(iii) psychic potential based on one's past decisions or actions, which could be termed as one's karmic potential.

This makes us aware that the prime purpose of our existence is to enhance our cognitive potential, by reflecting on Consciousness and by "learning" from evolved mind. Human existence can, hence, be looked upon as an eternal journey along the cosmic causeway of mysticism – the inherent endeavor of the finite to be one with the infinite.

Finally, we address the **concept of society**, as comprising of a set of unit minds attempting to move in cohesion from imperfection to perfection, along the trail of mysticism. It is seen that a society's collective psyche is normally distributed. This distribution affects the best potential for its progress. Hence, public policies should preserve this distribution. This provides a cognitive definition of democracy, in which a normally distributed spectrum of human psyche is accepted and included.

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