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Space-Time-Event-Motion (STEM): A New Metaphor for a New Concept Based on a Triadic Model and Process Philosophy

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SPACE-TIME-EVENT-MOTION (STEM): A NEW METAPHOR FOR A NEW CONCEPT BASED ON A TRIADIC MODEL AND PROCESS PHILOSOPHY

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The disciplinary enterprises engaged in the study of consciousness now extend beyond their original paradigms providing additional knowledge toward an overall understanding of the fundamental meaning and scope of consciousness. A new transdisciplinary domain has resulted from the syncretism of several approaches bringing about a new paradigm. The background for this overarching enterprise draws from a variety of traditions. In this paper however elaboration is restricted to the quantum-mechanical account in David Bohm's theoretical work in relation to his ideas about "active information", "protointelligence", and "non-locality". This leads to an adapted version of Bohm's thesis concerning the implicate order and explicate order of the Universe - the Impression Order and the Expression Order, respectively. On this view, the Universe is formed on an actual-material level, the apparent properties of things, and a potential-material level, a constant process of becoming that exerts an attractive force on the present.

The central thesis emerges from a radical reformulation of certain core concepts that transforms many ontological assumptions about the material basis of consciousness. That is, the above platform inclusively connects to a hypothesis that the concepts of 'space', 'time', 'event', and 'motion' (STEM) can be unified to capture the notion of simultaneous activity at reducing levels to the Impression order. This notion coheres with a physical-theoretical model of Signature-Energy-Frequency (SEF) (paralleled to Planck's Constant) which has been well demonstrated in the atomic, chemical, and information fields.

This study embraces a holistic and creative worldview based on a triadic model wherein consciousness itself is postulated as the most basic, primordial stratum. Importantly, both orders are constantly conjoined since the Impression Order exists as potential energy of

the quantum vacuum. The physical realm is formed by the proposed Triangulate-Three conditions as a principle of animation and 'being': Consciousness, Body-of-Experience and Intellect-Reflective in the Expression Order, one aspect of which emerge as lifelike properties. This Triangulate-Three principle (i.e. metaphysical principle) inheres in every particle and organism to which it guides its development, adaptation, and survival. The conscious being thus possesses (or manifests) all three conditions in Expression Order through STEM-interactions via SEF transmissions, as a self-organising organism.

Bohm's Implicate and Explicate Orders and Quantum Theory

The most important feature of David Bohm's work rests upon the concept that the whole Universe is somehow enfolded in everything and that each thing is enfolded in the whole. Bohm's idea for this evidently came from a science demonstration he saw on television circa 1960 that immediately fired his imagination. As Bohm tells the story:

> This device consisted of two concentric glass cylinders, with a highly viscous fluid (e.g. glycerine) between them, …arranged in such a way that the outer cylinder can be turned very slowly, so that there is negligible diffusion of the viscous fluid. A droplet of insoluble ink is placed in the fluid, and the outer cylinder is then turned, with the result that the droplet is drawn out into a fine thread-like form that eventually becomes invisible. When the cylinder is turned in the opposite direction the thread-like form draws back and suddenly becomes visible, as a droplet essentially the same as the one that was there originally (Bohm, 1980:179).

Importantly, the quantity of ink irrespective of its spatial size has a concentration that is equipotential throughout the glycerin. From a holography perspective that something so small as a drop of ink can occupy the whole space of the container of glycerin invokes a rather interesting question. What then is the substance of space?

The implicate order is primarily dynamic in nature, in "a constant process of change and development" to which its most general form Bohm called the holomovement (1990:273). For Bohm this enfoldment relationship between the implicate order and explicate order is not merely passive or superficial. There is indeed an active aspect of

enfoldment, which is essential to the very nature of what each thing is. In this sense, all phenomena arising in the unfolded, explicate order emerge from the holomovement in which "they are enfolded as potentialities and ultimately they fall back into it" (Bohm, 1990:273).

In Bohm's view, subatomic particles such as electrons are highly complex dynamic entities not just simple, structure-less particles. From Bohm's interpretation of quantum theory particles follow a precise path - one which is determined not only by conventional physical forces but also by a more subtle force which he called the *quantum potential*. The quantum potential guides the motion of particles by providing "active information" with respect to the whole environment. One of the main differences between Bohm's and the Copenhagen interpretation is that in Bohm's account the electron, for example, (or any particle) is always accompanied by a new kind of field. Describing the quantum field, however, has certain new qualitative features. Fields can be generally represented mathematically by certain expressions called potentials. In physics, a potential describes a field in terms of a possibility or potentiality present at each point in space for giving rise to action on a particle at that point. What is crucial in classical physics is that the effect of the potential on a "particle is always proportional to the intensity of the field" (Bohm, 1990: 275). As Bohm explains, one can visualise this by thinking of the effect of water waves on a bobbing cork, which gets weaker as the waves spread out. As with electric and magnetic fields, likewise the quantum field can be represented in terms of a potential - the quantum potential (Bohm, 1990:275).

Unlike what happens with the electric and magnetic potentials, however, the quantum potential depends only on the 'form', and not the intensity of the quantum field. Thus, the quantum potential can strongly affect the particle even when the wave intensity is weak (Bohm, 1990:275). Hence, Bohm's interpretation incorporates the feature of non-locality, that is, the ability for distant parts of the environment to affect the motion of the particle in a significant way.

Bohm's notion of "active information" is taken literally so that the word 'in-form' means 'to put into' (Bohm, 1990:278). For example, when we listen to music or speech emanating from a radio it is the form of radio waves broadcast from a station conveying the form of music or speech. The energy of the sound heard comes from the relatively unformed energy in the power point; however, its form comes from the activity of the frequency and amplitude (form) of the radio wave. By extension, the information at the quantum level is potentially active everywhere, but actually active only where the particle is (as the radio wave is active where the receiver happens to be). In addition, Bohm suggests that there is "protointelligence" in matter, so that new evolutionary developments do not emerge in a random fashion but creatively as relatively integrated wholes from the implicate levels of reality.

Space-Time-Event-Motion (STEM)

Perhaps the most significant consequence of the modification of space and time in relativity theory is the realisation that *mass* is just a *form of energy*. Even an object at rest is said to have energy stored in its mass, and the relation between energy and mass is given by Einstein's equation $E = mc^2$. One important implication of this is that the space around massive objects like stars and planets is curved and the degree of curvature depends on the mass of the object. Time as well then is affected by the presence of matter, consequently flowing at different rates in different parts of the Universe. All measurements involving space and time are relative and the very structure of space-time depends on the distribution of matter in the Universe.

Now according to quantum theory potential matter or virtual particles exist in the quantum-vacuum, which is said to occupy all of space. The term Expression and its adjective Expressive are technical terms, partly to denote 'energy-motion' of the manifested Universe akin to that of David Bohm's terminology and the sense given to his *Explicate Order.* The term Impression and its adjective Impressive denotes an amorphous 'potential' yet primary order from which the Expressive physical Universe unfolds similarly akin to Bohm's notion of the *Implicate Order,* used here to describe the

quantum-vacuum. On the very smallest scales over distances commensurable to the Planck length [1] space and time lose their identity to the 'quantum vacuum' here stated as the Impression order. At the subatomic level, the solid material objects of classical physics dissolve into wave-like patterns of probabilities, and these patterns, ultimately, represent probabilities of interconnections rather than things in themselves. Accordingly, the Universe is completely interconnected revealing itself as a whole.

The first two STEM ontological concepts, space and time have been outlined above by their intrinsic unifying relation i.e. spacetime as developed by Einstein's Theory of Relativity. To reiterate, the concept of time is associated with the mass of an object, which is the measure of inertia whose influence is directly responsible for physically effecting the curvature of space-time as defined in relativity theory. Significantly, the degree of curvature of spacetime is thus proportionally related to the inherent energy (mass) of the object of association. The concept of motion as I am employing it derives in its approximation to countless interpretations of the ancient notion 'All is in Flux' attributed to Heraclitus – 'everything is a process'. That is to say, there is no absolute stillness or in contemporary terms no zero-point energy [2]. Now, then, the concept of 'event' according to the Oxford English Dictionary (1989) has its origins in the Latin word *e'vene*, [ad. L. *even-ire* to come out, happen) (OED, 1989:456). An earlier rendition of the word *'evene* was 'material', *pl*. 'ability'. The word 'event' came to mean, "issue…come out, happen, result" (OED, 1989:459). A.N. Whitehead said of the term 'event': "The 'constants of externality' are those characteristics of a perceptual experience, which it possesses … when we apprehend it. A fact, which possesses these characteristics, namely these constants of externality, is what we call an 'event'" (Whitehead quoted in OED, 1989:459). In establishing the redefined ontology of STEM as an absolute concept I am using the term 'event' as 'material', 'to issue', giving 'form or shape' analogous to Whitehead's 'constants of externality'.

Moreover, within the philosophy of organism, Whitehead (1978) provides two meanings of potentiality (1) the 'general' potentiality, described as the "bundles of possibilities mutually consistent or alternative provided by the multiplicity of eternal objects". (2)

'Real' potentiality described as what is "conditioned by the data provided by the actual world" (1978:65). For Whitehead the 'general potentiality' is absolute (i.e. Impression order) and the 'real potentiality' is "relative to some actual entity, taken as a standpoint whereby the actual world is defined" (1978:65) (i.e. Expression order).

Energy in STEM

The concept STEM metaphorically extends beyond the particular when employed as an intransitive verb, (i.e. not governing an object). STEM expands upon our current understanding of causality of linear cause to effect progression to embrace non-local simultaneous energy-events. STEM also retains the common usage to 'stem from' as 'originate from' or to be 'derived from'. STEM represents the physical features of the Universe effectively integrating the objective and subjective realms of experience with the coexisting orders of Impression and Expression (Naimo, 2002). That is to say, life emerges from the inside out, and living organisms are sustained synergistically by mutual exchange between external conditions and internal conditions to which all organisms' trade as interdependent environments. Living organisms are an Expression of manifestation as are all phenomena of the physical world.

Diachronic activity, in particular evolution, pertains not to time *per se* as something external by which reality is measured against. Time arguably relates directly to the processes of the elements, that of the inherent energetic properties generally associated with an 'energy-event', as they unfold in and from the Expressive Universe (Naimo, 2002). One need only consider the basic principle of the atomic clock, currently the most precise measure of time, to understand this point. The spectrum of caesium includes a "feature corresponding to radiation with a very precise frequency – 9,192,631,770 cycles per second" (Gribbin, 1998:29). One second is subsequently defined as that amount of oscillations of radiation. Further, in physics, Planck's Constant is described as the constant proportionality between the energy emitted or absorbed by an atom and the frequency of emitted or absorbed light as an electromagnetic wave (Jibu & Yasue, 1995). Planck's Constant suggests that energy and frequency and consequently 'time', as far as

measurement is concerned, are all interrelated concepts. Accordingly, energy is indeed the fundamental substance of the Universe definable in terms of frequency.

Signature-Energy-Frequency (SEF)

SEF is an adjunct concept to describe the invariant properties of the neurochemistry and related structures that constitute a self-organising system's functional structures i.e. the internal mechanisation of thoughts and feelings defined as SEF's. This idea embraces the core parametres of quantum electrodynamics and is derived from Planck's constant. From a philosophical perspective, SEF symbolises the phenomenological nature of existence as the 'raw feel' to life ordinarily equated with consciousness. The cognitive capacities as assigned by nouns describing the various mental faculties such as thought, imagination, memory, reason, attention, awareness, intelligence and the like, are not single, stand-alone entities. Instead each aspect refers to processes that incorporate the other aspects too greater or lesser extents and which have no doubt evolved as part of the whole self-organising system. These abilities are arguably energy-related events that make a person who he/she happens to be. Each event whatever duration evidence and theory support is signature related though not just in a linear fashion of specific molecular composition, but also STEM non-linear (simultaneous/non-local) encompassing the entire holographic self-organising system. In human beings the coordinated motion of the four limbs whilst running, for example, is accompanied by patterns of activity in the motor centres of the brain so that limbs and motor centres are in phase. As with olfactory experience, slow oscillations in the olfactory bulb in the brain are in phase with the motion of the lungs (Ho, 1997).

Contrary to popular belief, qualia, it would seem are the products of cognition (sensory-knowing) and should not strictly speaking be associated with consciousness *per se*. There is a long history among Western thinkers concerning the conflation of consciousness with mind. SEF metaphorically depicts mental phenomena such as thoughts that putatively emerge or are indeed the product of several interconnected (concurrent participation), although functionally distinct spatially distributed anatomical regions or neural coalitions

of the brain and CNS in coherence. A co-evolving environment in a trilateral relationship of subject, object and information all of which form one thing, matter, has necessarily influenced the living organism as a whole. The necessary evolutionary condition to be described termed the Triangulate-Three Principle requires the adjunct SEF to facilitate an understanding of the continual qualitative aspect defined as subjective experience. Phenomena are by their very nature different but essentially, they are made from the same basic material, STEM.

Triangulate-Three Principle (TTP)

Life is a process and living is the interactive existence of systems and orders. Consciousness forms the first of the triadic concepts as an animating principle, which can be considered as either manifest or unmanifest. The unmanifest is primary, amorphous, and content-less; the manifest is secondary, ordered, and holoinformational. The second condition/aspect is termed Body-of-Experience which refers to the entity of experience i.e. the containment-field, form. The entity of experience here is such that the system intact with all its subsystems, such as a human being acts as the embodiment of subsystems and processes and is not just the integument. A human being is a containment-field of organs, brain, nervous and endocrine systems as well as the host to colonies of microorganisms which synergistically exists as a homeodynamic [3] environment. Please note that this is an open-ended concept and can equally be used to express the notion of the embodied Universe of Expressive physical matter (Classical). The third condition/aspect is termed Intellect-Reflective and refers to the cognitive faculties in conjunction with the primary process of Body-of-Experience. The primary influence of Consciousness as extended in Body-of-Experience embraces multiple levels of intelligence. Cognitive processes it is extremely important to remember entail the matrix of sensory acquired information. The claim made here is that consciousness, which one generally associates with qualia type experiences does not simply reside inside the individual as some mere emergent property – it resides throughout the Universe non-locally. Consciousness is not the product of qualia type experiences; indeed, it underlies, as an animating principle, all living organisms' capacity to have experiences at varying

degrees consonant with organisational complexity. Intellect-Reflective is the aspect best described as the interpreter of experience, the system of experience as the observer, an intermediary 'I' as in a semi-Freudian sense of ego. In other words, the TTP is a triple aspect theory and the relations between the aspects are interdependent and should not be construed as separate mechanisms.

The relationship between human beings and the environment is one of reciprocity, that is autonomous organisms are in themselves environments - interconnected. Our sensory faculties have putatively emerged in accordance with the evolutionary processes of Nature. The concept of Nature (i.e. evolution) explicitly embodies the notion of teleology, and implicitly a rather broad notion of intelligence. The concept of Nature, however, is arguably incomplete as it stands and requires further elaboration. In a very special sense, Nature herself has experiences as is evidenced by her activity and reaction expressed through notions such as 'threshold' and 'critical states'. Two forms of intelligence are in operation in the reciprocal and quasi-sentient (not restricted to sense organs) process of evolution. The first pertains to the very embodiment of an entity and the second to the influencing evolutionary process that has guided certain physical attributes of mutual benefit to the entity and in the environment. All species of living organisms have at least these two forms of intelligence. By extension, there are at least two orders of reciprocal existence. To recognise and make use for its own maintenance from the environment and in the act of recognition/perception identifies difference, process and dependency upon the reciprocating proto-intelligent environment. Life identifies life – consciousness recognises consciousness. Consciousness at this level is primary – it is more than an emergent property of a single entity, or the particular as presumed in the brain sciences. Consciousness in this sense underlies the evolutionary activity of the extended Universe according to the speculations advanced earlier.

The Triangulate-Three Principle embraces Bohm's notion of active information to form a new understanding of matter incorporating the fundamental redefined ontological parametres of STEM. A parallel mechanism currently exists, namely natural selection: however, the Darwinian mechanism is not fully coherent, indeed incomplete requiring

some desideratum to overcome its inherent explanatory problems. Natural selection concerns change and transformation of species through time but alone will not produce new species; it will merely modify and preserve old ones. Natural selection brings about differential survival (survival of the fittest) or, conversely, differential extinction. By definition, a 'more favoured variety' is one, which is favoured *under current circumstances* (Rose, 1997:196). Evolution by natural selection can respond *only* to the current situation, 'it cannot predict the future'. Hence, environmental change occurs, and natural selection as it stands trails along behind, following, responding, but never leading nor predicting (Rose, 1997:196).

The process of evolution, however, is one of recognition, learning and adaptation; the notion of natural selection requires a mechanism to provide the means to maintain the species life and guide or influence new forms. The Triangulate-Three Principle is one such mechanism employed to broaden our understanding of natural selection. Bohm's idea of the quantum potential can now be expanded to incorporate the Triangulate-Three Principle as an animating metaphysical principle of matter. Hence, the reciprocal relationships between environments (living systems) are interconnected via STEM activity and evolved Triangulate-Three Principle pathways and forms transmitted as Signature-Energy-Frequencies. Autonomous environments such as human beings, as is evident in our species enjoy uniquely advanced SEF evolved processes that inhere in TTP which underlie our cognitive capacities as experienced within the consubstantial orders of existence (i.e. Impression and Expression).

Notes

1. The quantum length, commonly known as the Planck length named after physicists Max Planck (1858-1947) refers to the length scale at which classical ideas about gravity and space-time cease to be valid, and quantum effects dominate. It is roughly 10^{-33}cm, about 10^{-20} times the size of a proton (Gribbin, 1998).
2. Zero-point energy is the minimum energy associated with a particle or system over and above it mass-energy at the absolute zero of temperature, OK. It refers to a level of energy, which is not exactly zero due to quantum uncertainty with regards to quantum fluctuations i.e. the quantum vacuum.
3. Homeodynamics is a metaphor developed by Steven Rose (1997) to replace the impoverished biological notion of homeostasis. "Organisms are active players in their

own fate and not simply the playthings of the gods, nature or the inevitable workings-out of replicator-driven natural selection" (Rose, 1997:17).

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