

## Article

## Interactions among Minds/Brains: Individual Consciousness and Inter-subjectivity in Dual-Aspect Framework

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### Abstract

Previously in (Vimal, 2010a), we argued that: (i) it is necessary to link *experience* and *function* aspect of consciousness with the related *structure* or neural correlate(s) of consciousness (NCC); and (ii) non-conscious experiences are equivalent to relevant proto-experiences at various levels because both are precursors of conscious subjective experiences aspect of consciousness. Here, in terms of dual-aspect dual-mode PE-SE (proto-experience/subjective experience) framework (Vimal, 2008b, 2010d), we argue as follows: **(I)** Non-experiential consciousness is a part of *functional* aspect of consciousness and consciousness is more fundamental than experience because experiences and functions are two aspects of consciousness.<sup>1</sup> **(II)** Therefore, one could argue for the continuum of consciousness, *experience*, and *function*. **(III)** The origin of individual consciousness could be a ‘universal background of awareness’ that is equivalent to *virtual reservoir* (where *potential SEs* are stored in superposed form, and a specific SE is selected via matching process) in the PE-SE framework. The interaction between zombies is relational but it would not lead to an individual consciousness in each zombie.<sup>1</sup> The origin of intersubjective consciousness is the interaction between individual consciousnesses, i.e., interaction between ‘I’, ‘you’, and ‘she/he/it’, i.e., interactions between minds/brains and their environments. **(IV)** A specific SE is selected during matching process and conscious experience constructs the perception or SE of external objects. **(V)** The dual-aspect dual-mode PE-SE framework is consistent with classical double-aspectism in the sense of inseparability of mental and physical aspect, whereas it is consistent with double-perspectivism in the sense that the mental aspect is known via first person perspective and the physical aspect is known via third person perspective. **(VI)** Our conventional reality is subject inclusive or mind dependent reality (MDR), whereas the subject exclusive or mind independent reality (MIR) remains always unknown even in so called *samadhi* state of mind that claims to have *direct* perception (or consciousness *as such*), which may or may not be close to MIR.<sup>2</sup> **(VII)** The hard problems are Types 1-3

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<sup>1</sup> It should be noted that interactions between zombies (molecule-by molecule like humans but have no SEs) would not lead to SEs aspect of consciousness although all instinctual impulses are relational and zombies may have *functions*.

<sup>2</sup> In other words, a MIR is literally inconceivable (since to conceive takes a mind) though this is a major delusion of almost all symbolic cultures (Nixon, 2010a). (Kant, 1787/1996) distinguished two worlds or realities (Sion, 2008): (1) *Noumena*, things in themselves (also called mind independent reality (MIR) or subject exclusive reality), which constitutes a transcendental reality that is unknowable because we have no empirical access. (2) *Phenomena* or things as they appear (also called mind dependent reality (MDR) or subject inclusive reality), which constitutes the immanent world of common experience and is *maya* or illusion. I do not suggest that a transcendental reality or MIR can be known by the human mind because mind will be involved in the process of *knowing*. According to (Vimal,

explanatory gaps: Type-1 explanatory gap is how can SEs *emerge* from non-experiential matter (emergentism) or *identical with* respective neural states (identity hypothesis of Type-B materialism)? Type-2 is how can SEs pre-exist? And Type-3 is how can physicists claim that MDR is MIR? The hard problem of panexperientialism is how can experiences create the matter of mind independent reality? **(VIII)** The *predictive behavior* (developmental rhythmic call and response behavior) and then *existential crisis* contribute towards the emergence of consciousness. On the basis of evolution, (a) individual consciousness in *rudimentary form* might have occurred about 540 mya during Cambrian explosion,<sup>3</sup> (b) symbolic, language-using, Homo sapiens (tribal-centric consciousness<sup>4</sup>) emerged at around 150 kya, and (iii) self-centric or object-centric consciousness might have emerged at around 10 kya. **(IX)** (a) The *existential crisis*, *biological crisis*, and *predictive behavior* can be interpreted as the motivation/cause of the formation of appropriate neural-networks, and (b) self (SE of subject) occurred in brain when self-related neural-network were formed and necessary ingredients of consciousness were satisfied. (c) The co-evolution and co-development (*neural Darwinism*) of mind and brain<sup>5</sup> and the dual-aspect-dual-mode PE-SE framework are necessary in a complementary manner for physicalism and panexperientialism.<sup>6</sup>

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2010d), “What is independent of subject? It is the external world, i.e., mind-independent reality (MIR: the world as it is, in-itself) that is brain-independent, but it is unknowable. According to (Kant, 1787/1996), thing comes to us only in appearance. One could argue that the MIR is the reality [or one could guess MIR] based on conjecture, an inference, or statement of belief. Whatever is known always involves brain. Thus, our daily conventional reality is mind-dependent reality (MDR: the world as it appears to us).” In *samadhi* state, the reality appears to be different from our daily usual *conventional reality* and is called *ultimate reality*, where mind is still involved so reality is still MDR.

<sup>3</sup> mya: million years ago; kya: thousand years ago. (Nixon, 2010a) commented that the emergence of “individual consciousness” in the Cambrian explosion may not be correct, perhaps species awareness might be true. One should note that (i) the amoebae came first, (ii) all instinctual impulsion is relational, (iii) no need for individuals, and (iv) individuals who may resist species instincts are very late on the scene, since we are them.

My meaning of the term ‘individual consciousness’ is ‘experiences and/or functions of an individual organism interacting with environment’; which implies ‘relational’ concept because interaction is mandatory for co-evolution and co-development (*neural Darwinism*). My meaning of ‘intersubjective’ or ‘social’ consciousness is interaction between individual consciousnesses as discussed above. I rely on (Hameroff, 1998) for the emergence of consciousness during Cambrian explosion.

<sup>4</sup> (Nixon, 2010a) commented that how the individual can be place before the tribe.

It appears that individual consciousness in *rudimentary form* might have occurred before intersubjective or social consciousness, which in turn might sharpen the individual consciousness. This is because for the interaction between two subjects such as I and You, ‘You’ and ‘I’ must exist before they can interact. In other words, ‘complete’ individual consciousness might have developed in two stages: (i) initial or rudimentary individual consciousness (which requires organism-environment interaction) and (ii) then sharpened or full-blown individual consciousness.

<sup>5</sup> (Nixon, 2010a) commented that it sounds good but he does not think co-evolution Deacon-style (Deacon, 1997) is related to the intra-cerebral *neural Darwinism* of (Edelman, 1989, 1993), though they could be made to relate.

In the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d), the theory of brain/language co-evolution Deacon-style (Deacon, 1997) emphasizes the significance of behavioral innovations, which modifies the human environment; this leads to successive genetic adaptation, i.e., it is related to the co-evolution of brain and mind (including language). This is different from the developmental *neural Darwinism* (Edelman, 1989, 1993) in a sense that the latter is related to the co-development of new born because it involves co-tuning via sensorimotor interaction until adulthood.

<sup>6</sup> The dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d) (a) is somewhat similar to Type-B materialism in terms of physical aspect but is complementary in the sense of providing information related to mental

Inter-subjectivity can modulate the attributes of already created/occurred individual-self in self-related neural-network.

**Keywords:** consciousness, dual-aspect dual-mode framework; experiences; conscious experiences; non-conscious experiences; non-experiential consciousness; functions; conscious functions; non-conscious functions; proto-experiences; subjective experiences; conventional reality; subject inclusive or mind dependent reality (MDR); ultimate reality, subject exclusive or mind independent reality (MIR); self; mind; awareness; panexperientialism; individual consciousness; intersubjectivity; social consciousness; universal background; virtual reservoir; physicalism; constructivism; existential crisis; predictive behavior; chaotic process; emergence of consciousness; double-aspectism; double-perspectivism.

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## 1. Introduction

In (Vimal, 2010a, 2010d), we proposed that *structure*, *function*, and *experience* must be appropriately linked. In (Vimal, 2009e, 2010e), we proposed that *function* and *experience* are mental entities and are the two aspects of consciousness. For example, there is a *structure* ‘V4/V8/VO’ color neural-network,<sup>7</sup> which has a *function* of detection and discrimination of wavelengths of light and the *experiences* related to color vision.<sup>III</sup>

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aspect and (b) is somewhat similar to panexperientialism in terms of mental aspect but is complementary in the sense of providing information related to physical aspect.

<sup>7</sup> The color area ‘V8/V4/VO’ refers to visual area V8 of Tootell group (Hadjikhani, Liu, Dale, Cavanagh, & Tootell, 1998; Tootell, Tsao, & Vanduffel, 2003), visual area V4 of Zeki group (Bartels & Zeki, 2000), and VO of Wandell group (Wandell, 1999); they are the same human color area (Tootell et al., 2003). VO stands for ventral-occipital cortex. “A neural-network may be composed of all those cells (including receptors for signal transduction and deeper ‘lower’ parts of the brain) that are involved directly or indirectly in awareness. [...] A neural-network consists of at the least (i) areas involved in stimulus dependent feed forward signals (such as LGN-V1-V2-V4/V8/VO for color), (ii) areas related to cognitive and attentional feedback signals (such as fronto-parietal areas), (iii) self related areas (such as cortical midline structures (Northoff & Bermpohl, 2004)), and areas involved in wakefulness (ascending reticular activating system (ARAS) system)” (Vimal, 2010d).

There are over 40 different meanings attributed to the term ‘consciousness’, which were categorized in two general aspects: experience and function (Vimal, 2009e). In addition, some more aspects of consciousness are suggested by (de Quincey, 2010): (i) *sentience*, which is a “primitive capacity for feeling and self-motion in any individual organism”; (ii) *awake/awareness* that is the “higher form of sentience where organism can be either conscious or unconscious, awake or asleep”; (iii) *interpersonal*, which is (a) “knowing or sharing the knowledge of something together with an other” (Hunt, 1995), (b) “gateway to transpersonal consciousness”, and (c) “involving awareness not only of personal identity, but also of deep intersubjective foundation of all consciousness”; (iv) *personal* that is “individualized awareness with a sense of self identity”; (v) *reflective*, which is the “capacity for self to be ‘aware that I am aware’ -- the gateway to altered states of consciousness: ‘aware that I am aware that I am aware ...’ ”; (vi) *unitive*, which “integrates all prior forms of consciousness into experienced unity”; and (vii) *dissociative* that is the “pathological failure to integrate prior forms of consciousness”. In addition, (viii) another aspect of consciousness is *intersubjective* that is “primordial condition and foundation for consciousness shared between all intersubjects”, which is *spirit* as per many traditions. These seems to be experiential aspects of consciousness, which can be added to the 20 experiential aspects listed in (Vimal, 2009e).

In this article, in terms of dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d), my goal is to address: (i) conscious experience, non-conscious experience, and non-experiential consciousness, (ii) continuum of consciousness, experience and function, (iii) origin of experiences and consciousness, (iv) physicalism versus constructivism, (iv) dual-aspectism versus double-perspectivism, (vi) mind-dependent reality (MDR) and mind-independent reality (MIR), (vii) hard problems, (viii) existential crisis, predictive behavior, and chaotic process for the emergence of consciousness, and (ix) interaction between brains, inter-subjectivity, social consciousness, and origin of individual consciousness.

## **2. Conscious experience, non-conscious experience, and non-experiential consciousness**

In (Vimal, 2009e), we proposed that the meanings attributed to the term ‘consciousness’ can be categorized in two aspects, namely, experiences and functions. Therefore, one can argue for the possibilities of (i) non-functional experience aspect of consciousness where a subject has experience without function (such as experiencing spandrels that have no known function) and (ii) non-experiential function aspect of consciousness or ‘non-experiential consciousness’ such as a zombie/robot can have function but no experience; for example, it can detect and discriminate red from green but cannot have SEs redness and greenness. Thus, one could argue that it is the consciousness which is more fundamental rather than experiences; this hypothesis is based on the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d). This may be somewhat appear contrary to the hypothesis ‘experience is more fundamental rather than consciousness’ (Nixon, 2010b, 2010c), which is based on panexperientialism. This apparent contradiction may be due to the fact that functions are part of experiences in panexperientialism, whereas functions

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and experiences are two aspects of consciousness in the dual-aspect dual-mode PE-SE framework. Furthermore, Nixon's *hollows of experience* seems equivalent to *virtual reservoir* in the PE-SE framework (Vimal, 2008b, 2010d), where proto-experiences (PEs) are close to non-conscious experiences because both are precursors of subjective experiences (SEs).<sup>8</sup>

According to (Nixon, 2010c), "all that is outside of language is non-conscious experience [but see his 21 indicators in (Nixon, 2010b)] in a *reality* that is largely a construction of our biological human sensory and memory systems relating to the things in themselves" [p.261]. If language implies reportable entities, then it is *access* consciousness (Block, 2005); however, the experiential aspect of *phenomenal* consciousness (which is not reportable) is conscious experience such as in experiments related to (Sperling, 1960), where stimuli were presented for less than 50 msec unless non-verbal language could have been used mentally.<sup>9</sup>

(Rosen, 2010) elaborates further and critiques (Nixon, 2010b): "Nixon effectively challenges the Cartesian paradigm of consciousness by demonstrating that experience is not limited to the reflective self-consciousness of human beings but pervades nature at every level [panexperientialism]. [...] Nixon suggests that the current controversy essentially boils down to those thinkers who contend that all experience is conscious but distinguish reflective or self-consciousness from other forms of consciousness, and those who identify conscious experience with reflectiveness, all other experience being taken as non-conscious. The author appears to favor the latter view, as is consistent with his goal of demonstrating that the terms 'consciousness' and 'experience' are not interchangeable. [...] To me it seems the underlying issue is indeed largely a semantic one revolving around the question of how broadly one defines the term 'consciousness.' [...] I see no reason why the internalized sensations he refers to could not be considered rudimentary forms of consciousness, rather than as purely nonconscious experience. [...] the two terms [consciousness and experience] are not interchangeable is rooted in a semantic predilection to equate all consciousness with fully reflective human consciousness, thereby disallowing the possibility of degrees of consciousness<sup>10</sup>."

(Nixon, 2010h) replied to (Rosen, 2010) as: "For me, however, semantics, the meaning we apply to words, matters. In the essay I suggest that we change our common usage to better illustrate the way non-human animals and perhaps even plants experience their world. [...] if experience

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<sup>8</sup> It is useful to differentiate subjective experience (SE, such as redness) and its content (such as ripe red tomato). To clarify further, another example is: I have conscious subjective experience of my room and the contents of this experience are laptop, table, phone, printer, file cabinet, and so on.

<sup>9</sup> (Nixon, 2010a) commented that if such stimuli were reportable later, they were conscious experiences. If they were not even conceivable, they are experience without consciousness.

<sup>10</sup> (Nixon, 2010a) commented, "sure there are degrees of consciousness, but ALL human consciousness is framed by the primacy of self; that is, all human consciousness is self-consciousness, as philosophical phenomenology has taught us. (See (Zahavi, 2005)) That's why other forms of 'selfless' experience should not really be called consciousness: *we do not know what it is like to be a bat!*"

Since there is no consensus on the meanings attributed to the term 'consciousness', it is useful to define which aspect or meaning an author is addressing to, for minimizing confusion. Some authors, such as Block, propose non-reportable experience as *phenomenal* consciousness.

[internalized sensations] leads to more complex experience and finally to conscious experience, such momentary sensations are indeed ‘rudimentary forms of consciousness’. But I emphasize that such experience is best considered non-conscious because it is not aware of itself and has no conceivable means of becoming aware of itself. [...] When we become aware of such experiencing, the experience achieves a conscious quality.”

Furthermore, (Monteiro, 2010).p373 commented (Nixon, 2010b) as: “a relevant point not mentioned by Nixon is the existence of ‘consciousness without experience’. This is the domain of the emergence of the primary mind or ‘cognition’. [...] You can’t witness or experience your own birth at that very moment of birth, they don’t coincide.<sup>IV</sup> One can think to the ‘mind set’ or person’s cognitive process of ‘I’ unaware to him/herself but consciously perceived as immediate experience by another person (mind-reading). Formally we can put this in a causal frame of ‘1st person cognition as cause’<sup>V</sup> and ‘2nd person perception (subjective conscious experience) as effect’ (Monteiro, 2009)”.

In my view, (Nixon, 2010b; Nixon, 2010h), (Rosen, 2010), and (Monteiro, 2009; Monteiro, 2010) can be bridged using the dual-aspect-dual-mode PE-SE framework (Vimal, 2008b, 2010d), where (i) consciousness has two aspects experience and function,<sup>11</sup> (ii) both non-experiential<sup>12</sup> (i.e. functional aspect such as in zombies/robots)<sup>VI</sup> consciousness and non-conscious experience are entertained, and (iii) there is a continuum of experience, function, and consciousness.

Rosen commented (personal communication in May 2010) as follows: “I understand what you mean by ‘non-experiential consciousness’ but, if ‘non-conscious experience’ doesn’t simply mean non-waking experience and doesn’t mean non-reflective experience (as it does in Nixon’s article), can you tell me what it does mean?”

<sup>11</sup> (Adams, 2010a) commented, “Vimal’s central proposition is that ‘consciousness has two aspects, experience and function.’ Superficially, I would agree. Consciousness entails the aspect of experience, and consciousness has functional efficacy. The two qualities sometimes seem to be independent, as has been demonstrated for various forms of implicit cognition such as blindsight and perceptual priming. Nevertheless, that does not imply that the two qualities must be, or usually are, independent. Most of the time, conscious experience is entirely congruent with its functionality.”

As discussed in (Vimal, 2010e), there is an *optimal* definition of consciousness, which has the least number of problems and is AND type: *optimal* consciousness = conscious experience and conscious function. In addition, there is a *general* definition of consciousness, which accommodates most views and is AND/OR type: *general* consciousness = conscious experience and/or conscious function. Thus, the latter *general* definition encompasses the above Adams’ view.

<sup>12</sup> (Nixon, 2010a) commented that he cannot see how experience [function] can be non-experiential — or neither conscious or non-conscious.

As noted above, Nixon seems to consider the *functions* (non-experiential aspect of consciousness) as a part of experiences in panexperientialism because *only experience permeates the universe*. However, in our dual-aspect dual-mode PE-SE framework, *function* and *experience* are two aspects of consciousness. Therefore, function can be non-experiential, such as functions of structure retina, zombies, hand, leg, and so on. The apparent problem is the different definitions of the terms; otherwise we do not seem to contradict that much. My definitions are derived from the meanings attributed to the term ‘consciousness’ by various authors in literature; see (Vimal, 2009e) and also (Vimal, 2010e).

The term ‘non-conscious experience’ is defined in (Vimal, 2010e). To avoid circular definition, I need to define conscious experience first and then non-conscious experience: “*Conscious experiences* include all types of subjective or first person [waking] experiences including such as: (i) sensory experiences as *redness* (Vimal, 2009f); (ii) ‘what exists when there is something that it is like to be that thing’ (Nagel, 1974); (iii) phenomenal experience (Chalmers, 1996); (iv) *reportable* content experienced by living individuals (the ‘*referential nucleus*’ of the concept of consciousness, according to (Pereira Jr. & Ricke, 2009)), emotional experiences such as happiness, experiences related to thoughts (such as imagination/creative thinking), the experience of *nothingness*<sup>13</sup> in meditation, experiences as the result of dynamical processes in the *embodied and embedded* view of cognition, experiences related to social interactions (Pereira Jr. & Ricke, 2009); (v) experiences related to *self* (Bruzzo & Vimal, 2007) and self-awareness (Perrett, 2003), and perhaps higher-order awareness (Carruthers, 2007; Rosenthal, 2009); (vi) experiences related to phenomenal time (Vimal & Davia, 2008); and (vii) *inner/ outer* experiences, *hidden (other’s)* experiences via a process of theorization or simulation or both, *singular-detachable-individual* experiences, and *shared* experiences (Torrance, 2009), and so on. *Non-conscious experiences* are those experiences that are not conscious experiences; for example, experiences related to pre-conscious, subconscious and unconscious domains, slow-wave dreamless deep-sleep, coma, vegetative, and anesthetized state. Non-conscious experiences can include experiences related to paradoxical awareness or awareness without being aware, such as subliminal perception and *blindsight*” (Vimal, 2010e).

In addition, (Nixon, 2010b) has enumerated 21 indicators of non-conscious experiences. Since the term ‘consciousness’ has over 40 meanings, which includes waking, non-waking and other experiences, and many kinds of functions; therefore, authors are encouraged to specify which aspect/meaning of consciousness they are addressing to avoid contradictions and confusions (Vimal, 2009e) as Rosen has also pointed out. However, (Nixon, 2010a) maintains that much of psyche (much of experience) is unconscious.

Moreover, one could argue that all those experiences, which are not in a wakeful state, are regarded as non-conscious. From EEG point of view, (a) alpha (7-13Hz), beta (13-30 Hz) and gamma (30-70 Hz) waves are associated with wakefulness, (b) theta (4-7 Hz) waves with dreams and hypnosis, and delta (1-4 Hz) with deep dreamless sleep. However, meditative states may involve all brainwaves: delta, theta, alpha, beta, and gamma waves depending on meditation techniques and levels of meditation (Eklavya, 2010).<sup>14</sup>

<sup>13</sup> (Nixon, 2010a) commented that if there is no witness (only unity with void) then how this could be conscious experience. Is the self not left behind?

Presumably, in *samadhi state*, the self (SE of subject) merges with the SE of object, i.e., there is no difference between subject and object. Thus, self is not left behind; rather it is merged/unified with the SE of object. In other words, if a *yogi* is in *samadhi* state and his object is his enemy, the feeling of enmity disappears because *yogi* experiences that his enemy and he are the same person in terms of mental aspect such as feelings.

<sup>14</sup> (Nixon, 2010a) commented, (Warren, 2007) claims that early on in meditation alpha waves predominate, but, as the meditation advances and awareness spreads, gamma waves predominate.

This may be true because it all depends on meditation techniques and levels of meditation. **Alpha waves** are usually associated with “relaxed wakefulness, and creative thought where attention may wander and free association is favored. They are also correlated with a generally tranquil, pleasant, almost floating feeling”. Alpha waves are

Furthermore, one could argue for the following to minimize the semantic and circularity problems: (i) *Conscious experiences* might best be identified with waking experiences<sup>15</sup>, *non-conscious experiences* be associated with non-waking experiences such as dreams, and, in addition, there would be non-conscious states that would not necessarily even be experiential (e.g. comas). (ii) Since meditative states include waking state brainwaves, meditative states might be classified as conscious states for brevity. And (iii) the experiences related to controversial ‘paradoxical awareness or awareness without being aware’ might be classified as ‘combined-state experiences’ (Rosen, personal communication) that are both conscious and non-conscious experiences.

In (Vimal, 2010a), the non-conscious experiences and non-conscious functions are considered as a part of the definition of mind (= experiences and/or functions: (Vimal, 2010e)) and/or awareness. However, the suggestion of (Nixon, 2010i), the term ‘psyche’ in place of ‘mind’ may be correct if psyche = experiences and/or functions. Furthermore, I agree with (Nixon, 2010i)’s suggestion that conscious transcendence (or, better, *transcendent awareness*) which is a higher state of consciousness (Vimal, 2010e) can be considered as part of conscious experience. Furthermore, in our dual-aspect dual-mode PE-SE framework, “A subjective experience (SE) is an *expressed* first person conscious experience [...] In general, PEs [proto-experiences] are precursors of SEs” (Vimal, 2010e). In other words, any experience that is not SE is PE. Therefore, a non-conscious experience is equivalent to a PE.

To sum up, in the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d), consciousness has two aspects: experience and function. The non-experiential or functional aspect of consciousness is indeed possible such as in (i) the functions related to the detection and discrimination of stimuli without experience, and (ii) the domain of the (weak) emergence<sup>16</sup> of the primary mind or ‘cognition’. The non-conscious processing in cognitive brain leads to

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considered as “the brainwaves of meditation” and “an integral part of the relaxation process before sleep” (Eklavya, 2010). **Beta waves** are usually associated with “attentiveness, selective attention, concentration & anticipation. They have been related to concentrated mental activity such as solving math problems, anxiety, and apprehension [...] In meditation, beta waves have been noticed only in very experienced practitioners that too in a state of ecstasy and concentration” (Eklavya, 2010). **Gamma waves** are usually associated with (i) the processing of “various attended stimuli (visual, auditory, touch) and the grouping of the various features of a given stimulus, particularly visual, into a coherent whole” and (ii) “Buddhist meditation of compassion & music listening experiments” (Eklavya, 2010).

<sup>15</sup> As per (Nixon, 2010a), remembered dreams are conscious; only external sensory input is left out.

<sup>16</sup> According to (Chalmers, 2010), “We can say that a high-level phenomenon is weakly emergent with respect to a low-level domain when the high-level phenomenon arises from the low-level domain, but truths concerning that phenomenon are unexpected given the principles governing the low-level domain. Weak emergence is the notion of emergence that is most common in recent scientific discussions of emergence, and is the notion that is typically invoked by proponents of emergence in complex systems theory. [...] It often happens that a high-level phenomenon is unexpected given principles of a low-level domain, but is nevertheless deducible in principle from truths concerning that domain.” This is interesting, but how can we deduce SE such as redness from non-experiential physical aspect? This is the emergentism’s explanatory gap that one needs to address. However, some functional aspects of mind could be weakly emergent.

conscious experience, which in turn constructs the individual MDR via organism-environment interaction; here both *phenomenal* (non-reportable, where attentional feedback signal is not needed) and *access* (reportable, where feedback attentional signal is necessary) consciousness can be entertained. The same processes among many brains leads to social consciousness<sup>17</sup> (inter-subjectivity), where *access* (reportable) consciousness (Vimal, 2009f) is necessary.

### 3. Continuum of consciousness, experience and function

According to (Nixon, 2010b), “If this continuum of experience — from non-conscious, to conscious, to self-transcending awareness — can be understood and accepted, radical constructivism (the ‘outside’ world as a construct of experience) will gain a firmer foundation, panexperientialism (a living universe) may gain credibility, and psi will find its medium [p217]. [...] [Experience is viewed as really consisting of] a continuum from momentary flashes into existence of ‘occasions of experience’ (probably related to quantum fluctuations) to the boundaryless experience which blossoms into transpersonal awareness” (p.223).

(Pereira Jr., 2010) has a little different view: “I take ‘conscious episodes’ to refer to content experienced by a subject in present time, and ‘experience’ as the interaction of the individual’s body, brain and environment (Pereira Jr. & Ricke, 2009).<sup>18</sup> In this view, what conscious activity does is to individualize episodes in time, making them available to subjective experiences, which are then conceived as embodied (in the individual’s material structure) and embedded (in the environment). ... Instead of thinking of consciousness as ‘the arbiter of all realities’, I view it as a sequence of snapshots in a sea of unconscious experiences. [...] I find Nixon attributing the origin of human and non-human creativity to unconscious experiences, not to the conscious tip of the iceberg.”<sup>19</sup>

<sup>17</sup> (Nixon, 2010a) commented that this is reversed: Individual minds are intersubjectively drawn into pre-existing linguistic communities, and only after group mimesis & identification can minds become individualized (and this does not always happen!).

In my view, this needs qualification: “full blown individual mind/consciousness” is intersubjective phenomenon, but “rudimentary mind or consciousness” (that is also relational and is usually based on organism-environment interactions) can be independent of another subject as discussed before.

<sup>18</sup> (Nixon, 2010a) objects the use of (Pereira Jr. & Ricke, 2009)’s terminology. In my view, it is just different meaning attributed to the same term, which is common; for example, the term ‘consciousness’ has over 40 different meanings (Vimal, 2009e). (Pereira Jr. & Ricke, 2009) have different view, which potentiates the hypothesis that consciousness has two aspects (function and experience) and hence it is more fundamental than experience.

<sup>19</sup> Pereira Jr. commented (personal communication in May 2010), “... for me conscious experiences are not co-extensive with brain functions, since the experiences are made of information contents from the world, not from the brain (this position is similar to Max Velmans' Dual-Aspect Monism).” In (Vimal, 2010e), I have given two definitions: “the *optimal* definition of consciousness is ‘consciousness is a mental aspect of a system or a process, which has two sub-aspects: conscious experience and conscious function.’ A more *general* definition is: ‘consciousness is a mental aspect of a system or a process, which is a conscious experience, a conscious function, or both depending on the context and particular bias (e.g. metaphysical assumptions)’ where *experiences* can be conscious experiences and/or non-conscious experiences and *functions* can be conscious functions and/or non-conscious functions that include qualities of objects.” Thus, conscious experiences AND conscious functions are coextensive for the *optimal* definition. The *general* definition accommodates most views including the views of

(Adams, 2010b) critiques (Nixon, 2010c) as: “Nixon believes that all organisms, even the lowly nematode, are capable of experience, and what they experience is change in the environment. Whenever there is any change in the relationship between an organism and its environment, experience is the result. [...] sensory change is prerequisite for sensory experience. But it seems a bit much to attribute all experience to environmental change. Memories, thoughts, ideas, hopes, plans, regrets, questions, feelings, confusion, and much more, are all mental experiences, none of which necessarily depends on an environmental change.” (Adams, 2010a) commented further, “I would like to express skepticism about the notion, held by (Nixon, 2010c) and Vimal that proto-self-awareness (as I call it) exists simply in-itself, free-floating in the universe, disembodied, not necessarily attached to any living thing. That seems quite an arbitrary postulate, not supported by reason or evidence, and not confirmable or disconfirmable.”

In my dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d), (i) *potential* SEs pre-exist in *superposed* form in the mental aspect of each entity (hypothesis H<sub>1</sub>) (Vimal, 2010d) or SEs can be derived from a PE and 3 *gunas* (hypothesis H<sub>2</sub>) (Vimal, 2009b), (ii) all things are *carriers* of *potential* SEs in *superposed* latent unexpressed form, which is different from ‘all things have experience’, and (iii) mental and material aspects never get separated. In other words, SEs do NOT exist simply in-itself and free-floating in the universe; SEs are NOT disembodied; they are necessarily attached to each living thing. *Potential* SEs are superposed in the mental aspect, which is permanently ‘glued’ with physical aspect of each entity. Thus, my framework is not panexperientialism, where *only experience permeates the universe*; rather the mental aspect of my framework is somewhat similar to panexperientialism, and the physical aspect of my framework is complementary to panexperientialism. In my view, matter (thing-in-itself) is the property of unknowable mind independent reality (MIR); experiences construct the *appearance* of matter, which is consistent with my framework.

According to Monteiro (personal communication in May 2010): “I make a distinction between (i) external environment and through the recording process of internalization stored in memory and (ii) internal environment. A change in the ‘internal environment’ is for example when an individual is in ‘imbalanced state’ (shortage/surplus) striving for a ‘balanced state’ (no shortage/surplus). An imbalanced state somewhere in the body generates ‘interaction’ between relative ‘energy shortage’ and ‘energy surplus’ starting unconsciously at physical-biological level. A bodily shortage (e.g. nutrients, trace elements) fires a signal to a stored surplus element in the brain (e.g. from previously stored rewarded element). Through ‘interaction’ between shortage-surplus elements in the body-brain, motivation (or e-motion=energy motion) transporting a ‘need’ is aroused. Motivation, however, is a preconscious process (tacit knowing, fringe- proto- or sub-consciousness), and through trespassing a ‘threshold’ can be attendant by a preconscious but functional mental process, called cognition (‘I’). Though cognition is preconscious (‘I’ cannot capture ‘I’ simultaneously), it is functional trying to bridge the cleft between ‘I’ and ‘You’ and this can spontaneously, accidentally or randomly happen (outside

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Pereira Jr. and Velmans. In addition, *potential* subjective experiences are *superposed* in the mental aspect of all entities including experiences that are made of information contents from the world; and information is a dual-aspect entity in the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d).

conscious control and steering) in the phenomenon of ‘mental interaction’ or ‘cognitive interaction’, a mental quantum event of which both persons are not aware. It goes too far to treat this extensively, but it is postulated and concluded that interaction at all levels is mental interaction, the highest functionality in nature and culture.”

(Nixon, 2010j) states, “I have previously stated somewhere that having a living body ties us in with all other living bodies and living material in general. I contain DNA and genetic codes that have evolved through my ancestors and, before them, from prehuman life forms and the earliest cellular structures. The body that I am is a microcosmic focus of all life on a particular genetic pathway. The inborn experience that comes with being a living physical body is part of my life (make me, in turn, a part of all life) and is further the foundation of the culturally reflected consciousness that makes intersubjectivity and self-identity possible. At the bodily level, experiential interactions take place without my learned self-identity reflecting upon them, so *experience without consciousness certainly does take place*. [...] consciousness does not just ride like a boat upon a sea of unconscious experience. It interacts with it in a circle of mutual creativity. Our minds are part of the future evolution of our bodies and of living nature itself.” In addition, “Our self is the ‘bag of memories,’ as Ken Wilber once put it, through which we consciously experience, and nothing is but what is not” (Nixon, 2010g).

Monteiro commented, (personal communication in May 2010): “continuum must be specified. One can claim consciousness whether subjectively experienced or not, in the light of pan-experientialism. From a material (physical-biological-cultural) perspective, a ‘gap’ (non-causal transition) in development or evolution exists. That’s to say one cannot postulate a ‘continuum’ between the emergence of material elements (e.g. quantum leap) and between species (e.g. missing link). This also holds for the mental unfolding and development (mentalization) culminated in human beings. One can speak of ‘material-mental discontinuity’. This has to do with the mental cognitive quantum collapse (through 1<sup>st</sup>-2<sup>nd</sup> person mental interference) or with other words man can never know in absolute sense the genesis of mind and matter or as conclusion ‘man can never escape his own body and mind’ (even in OBE [out-of-body experience]). This does not imply that in a formal descriptive model one can postulate as an ‘axiom’, matter as the primary initiating stimulus-object ‘to interact’ with a referential stimulus-object (1<sup>st</sup>-2<sup>nd</sup> object) and from here deduct the primary initiating mental process of cognition to ‘interact’ with a referential process of cognition (1<sup>st</sup>-2<sup>nd</sup> person) to feedback for the emergence of new matter (e.g. normative behaviour, new matter). What happens in the ‘gap’ (mind→matter) between persons is the crux of the whole issue to account for perception. The ratio why this is the case, is extensively treated in my publication (with the tools of finality [goal] and causality [cause-effect] [between stimulus-need, norm-value and cognition-perception]) (Monteiro, 2009).”

To sum up, in dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d), *experiences* and *functions* are two aspects of consciousness; these two aspects (experience and function) must be linked to related *structure*, i.e., the neural-correlates of consciousness (NCC).<sup>20</sup> If experience is

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<sup>20</sup> (Adams, 2010a) commented, “But why ‘must’ this be so? It is not obvious to me, so I take this simply as one of his [Vimal’s] hypotheses. The ‘linkage’ he refers to is unspecified. Vimal seems to agree that under normal

in continuum then related function must also in continuum and hence consciousness must also be in continuum: from unconscious to subconscious to conscious states. In other words, one could argue for continuum of consciousness, experience, and function rather than just only the continuum of experience because experience and function are the two aspects of consciousness; and non-experiential consciousness can be non-experiential functional aspect of consciousness (Vimal, 2009e, 2010e). Moreover, as Monteiro commented, one must address the ‘gap’ (mind→matter) between persons to account for perception. However, in this article, the continuum of consciousness and its two aspects is related to individual consciousness, where it is hypothesized that the rudimentary individual consciousness occurs before inter-subjectivity and is modified later by the interactions between persons. I argue that ‘consciousness’ is a more general mental entity; conscious experience and non-conscious experiences are subsets of experience; and experiential aspect of consciousness and non-experiential aspect (i.e., functional aspect) of consciousness are subsets of consciousness<sup>21</sup>.

#### 4. Origin of experiences and consciousness: universal background and virtual reservoir

(Nixon, 2010c) proposes that experiences, which undergird consciousness, emerge from a universal background of awareness: “language not only describes but constructs the object being observed. Awareness observed is reduced to consciousness created, that is, it conforms to its concept. Consciousness then proceeds as an autopoietic manifestation of itself. I will later submit that experience in itself is the result of sensations generated at the point where minute entities like cells or even atomic or subatomic systems interact, but for this birth of sensation in interactive friction to be possible, there must be some sort of awareness-in-itself, a universal background of awareness out of which such primordial experiencing can emerge. This background may be aware but aware *of* nothing, as though in deep, dreamless sleep, a field of infinite potential, waiting, so to speak, for time to begin. How else can we account for raw experiential sensations without falling into infinite regress? [...] Perhaps the experience that

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circumstances, conscious experience is usually (always?) tightly linked to its functional quality and both of those are linked to neural structure. (But we don’t know what ‘linked’ means).”

The linkage is very tight because the mental aspect and the material aspect are ‘glued’ together permanently; they cannot be separated in dual-aspect view, in analogy to two sides of the same coin, as discussed in (Vimal, 2008b, 2010d, 2010e), in the sense of *optimal* definition of consciousness; but ‘not necessarily’ in the sense of *general* definition of consciousness. The term ‘link’ is borrowed from neuroscience. Identity theory says ‘identical’, meaning exactly the same, at least statistically. But, here, ‘link’ means mostly correlation; for example, fMRI activity in the structure (physical aspect of) color neural-network is ‘linked’ or ‘correlated’ to the color-experience aspect (mental aspect) of consciousness, which is ‘linked’ or ‘correlated’ with color discrimination function aspect (mental aspect) of consciousness.

<sup>21</sup> (Nixon, 2010a) commented that it is interesting, but it really does not communicate to him. Experience is either conscious or non-conscious or on the border. There is no third kind of experience.

I agree with that experience is either conscious or non-conscious or on the border in panexperientialism. In dual-aspect dual-mode PE-SE framework, function is not experience, rather function is an aspect of consciousness, and other aspect of consciousness is experience.

undergirts consciousness is unthinkable. I foreshadow my purpose here: What if awareness or experience is as all-pervasive and foundational as universal background radiation?" (p.246)

The origin of consciousness,<sup>22</sup> according to Nixon is 'a universal background of awareness', which is like a plenum or *virtual reservoir* (such as the mental aspect of each entity, where our *potential* SEs are stored in superposed form and a specific SE is selected via matching process) as in hypothesis H<sub>1</sub> of our dual-aspect-dual-mode PE-SE framework.

## 5. Physicalism (brain creates experience) versus constructivism (experience constructs brain)

According to (Nixon, 2010c), "The fundamental division in approaches to the question of consciousness is whether the brain creates experience or experience [creates] the brain. Obviously the sciences lean toward the former, though the neuroscientific proposal of the dynamic brain that changes as a result of experience softens this stance. Experiential practices that accept any sort of transcendence of bodily limitations, such as *psi* or meditation, assume the latter in the sense that the origin of awareness beyond the brain may change neural processing within the brain [p242]. [...] When experience becomes conscious, it has itself become an object. No longer one with the environment, we now feel ourselves as distinct from it, opposed to it. In the same way, we become aware of ourselves in the world and self itself is objectified" (p.243).

(Adams, 2010b) elaborates the above further as: "question of whether or not the brain creates the mind. Most neuroscientists are sure that it does [...] we have merely correlations between brain function and mental function; there is no proven causal connection. [...] Another possibility, equally logical, is that the mind creates the brain. In other words, the brain is an intellectual construct we use to account for the varieties of our experience ... no basis on which to choose".

According to (Monteiro, 2010), "To answer Greg Nixon's question 'how does any material entity create mind, consciousness, or even just experience?' is not a matter of creation, but mental unfolding what is already present in matter from the beginning (from strong force in the nucleus of atoms till strong love bond in persons)" (p.374). It seems that (Monteiro, 2010) is using Bohm's implicate-explicate order or enfolded-unfolded view; Bohm's view is a dual-aspect, consistent with the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d).

According to (Jarvilehto, 2010), in constructivism, "it is often unclear (at least to me) if reality is seen only as a result of construction of conscious experience, nonconscious processing playing

<sup>22</sup> (Adams, 2010a) raised a question: From where could such proto-self-awareness arise?

(Nixon, 2010c) proposes that proto-self-awareness arises from the universal background of awareness. In our dual-aspect dual-mode PE-SE framework, all *potential* SEs are in *superposed* form in *virtual reservoir* (such as in the mental aspect of elementary particles) as in hypothesis H<sub>1</sub> (Vimal, 2010d); a specific SE is selected via matching process; in hypothesis H<sub>2</sub>, a SE can be derived from the interaction between one PE and three *gunas* (qualities) (Vimal, 2009b) and/or (ii) downward causation (Vimal, 2010b). I am assuming that the *virtual reservoir* might be somewhat equivalent to Nixon's *universal background of awareness*.

no role.” In cognitive brain research, “the processing in the brain is endowed with some magical powers that make some of the brain processes conscious, whereas the rest of these processes stay at the nonconscious level.”

In the dual-aspect dual-mode PE-SE framework, consciousness has two aspects: experience and function (Vimal, 2009e, 2010e). In hypothesis H<sub>1</sub>, *potential* SEs are stored in superposed form in *virtual reservoir* (such as every elementary particle). In hypothesis H<sub>2</sub>, a PE interacts with 3 *gunas* to result SEs depending on the kinds of 3-*gunas*.<sup>VII</sup> In both hypotheses, a specific SE is selected during matching process as discussed in (Vimal, 2010d). On the other hand, the SEs aspect of consciousness constructs the mind-dependent reality (MDR), i.e., conscious experience constructs the *appearance* or SE of external objects and to some extent can affect the processing of brain; however, experiences do not create/construct physical brain. Thus, Nixon’s constructivism/panexperientialism framework (Nixon, 2010b, 2010c, 2010d) and (Pereira Jr., 2010; Pereira Jr. & Ricke, 2009)’s framework (consciousness as a sequence of snapshots in a sea of unconscious experiences) can be bridged via the dual-aspect dual-mode PE-SE framework.<sup>23</sup>

## 6. Dual-aspect dual-mode PE-SE framework versus double-perspectivism

There is a minor but important difference between these two views: the double aspects in dual-aspect dual-mode PE-SE framework are inseparable (and hence bypass many problems) whereas the two perspectives in double-perspectivism can be independent and are separable (hence has problems of substance dualism (Vimal, 2010e)).

### 6.1. Dual-aspect dual-mode PE-SE framework and double-perspectivism

(Adams, 2010a) commented on double-aspectism versus double-perspectivism: “When Vimal finally does get around to explaining his double-aspect theory of mentality, deep into the essay, it is hard to follow the reasoning, and I think that is because it is really a ‘double perspective’ theory, not a ‘double aspect’ theory. In traditional double aspect theory it is proposed that there is one fundamental entity, call it mind-brain, that has multiple, apparently incompatible aspects, such as mentality and physicality. Thus, the apparently incommensurate properties of *res extensa* and *res cogitans* are really just two descriptions of the same thing, similar perhaps to how we identify Venus, when it is low on the horizon, as either ‘the morning star’ or ‘the evening star.’ It is the same planet, but we ‘see it’ under differing aspects.

The trouble with double-aspectism is that it simply displaces the problem without solving it or even addressing it. What is the nature of the thing-in-itself that constitutes the single underlying entity of which we have two aspects? Unfortunately, that cannot be known, as

<sup>23</sup> (Nixon, 2010a) commented that it is still not clear how you imagine this “bridge” to simply explain away all differences.

It can be bridged because we all three groups agree that there are conscious experiences and there are non-consciousness experiences. There are some differences: such as, function aspect of consciousness in our (Vimal and Pereira Jr. & Ricke) frameworks is separate from experience aspect, but functions seem combined with experiences in the pan-experiential framework.

Vimal, Nixon, and I agree (along with Kant). There is no secretive person we can point to and say, ‘Aha! That guy is both Clark Kent and Superman!’ We can only know the two aspects as they present themselves to us, but rest assured, the theory goes, there is no metaphysical problem here, because the underlying entity is a single, unified whole. But that is just child’s play. [...]

However, Vimal’s version (to the extent that I understand it) is perhaps better called ‘double perspectivism’ because it does not make overt ontological claims about what is ‘really’ out there. Instead, it focuses on the epistemological side of the question, and says something like ‘we see and understand mentality when we are in X state of mind (or mode of being) and we see and understand physicality when we are in Y state of mind.’ What is really out there we cannot know, and maybe there is actually nothing out there, it wouldn’t matter. What matters is how we describe the world according to what state of mind we are in.

In this formulation, Vimal’s approach is similar to Husserl’s. Husserl described two modes of understanding, which he called the natural attitude and the phenomenological attitude, similar in some ways to the distinction between ordinary cognition and metacognition. In the first case, a person is simply aware of the world. In the second case, the person is aware of the world and simultaneously, aware of being aware of it. I think that Vimal’s epistemological approach is a more fruitful avenue of exploration than traditional, ontologically based double-aspectism could be.”

In dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d), the reality is still the mind dependent reality (MDR) for both aspects of the same entity say mind-brain because mind is involved in both aspects. The mental aspect is first person perspective and its physical aspect is third person perspective. Here, the ‘perspective’ refers to first person subjective experience for the mental aspect and third person measurements (such as fMRI) for the physical aspect; both are mind dependent reality. These two aspects can never be separated: they are permanently ‘glued’ together (the *brute fact*: that’s the way it is!) and they are not independent, in analogy to two sides of a coin. The evidence is from electrophysiological and clinical lesion experiments; if a certain area is lesioned then related function and experience are compromised.<sup>24</sup> In addition, there are two modes, and hence the dual-aspect dual-mode PE-SE framework is extended form of old double-aspectism.

This dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d) is concisely summarized in Section 1.2 of (Vimal, 2010e). Briefly, “There are three entities that need to be linked in a theory of consciousness: *structure*, *function*, and *experience*. Several materialistic neuroscientific models link *structure* with *function* well, but fail to link them with *experience*, leading to the explanatory gap [The dual-aspect-dual-mode PE-SE framework is complementary to neuroscience models; it complements them because it closely depends on them for linking *structure* with *function* including *global broadcasting* (Baars, 1988) and because it provides information related to mental aspect.] [...] Addressing the explanatory gap mentioned above, (Vimal, 2008b) hypothesized that elementary particles (fermions and bosons) have two aspects: (i) material aspect by mass, spin, charge, force, quanta, and space-time, and (ii) mental aspect. Its

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<sup>24</sup> “For example, a subject with visual form agnosia (e.g. Milner and Goodale’s patient D.F. [(Milner & Goodale, 1995)]) cannot consciously identify a vertical slot, but can “post” an envelope through it without problem; while subjects with optic ataxia (e.g. those with Balint’s (1909) syndrome [(Balint., 1909)]) can identify an object but cannot act appropriately toward it. The dissociations here appear to go along with damage to the ventral and dorsal pathways respectively” (Chalmers, 2000).

components (the mental aspects of elementary particles and inert matter) are considered as the carriers of superimposed fundamental *potential* experiences in unexpressed form” (Vimal, 2010e). The superposition of *potential* experiences is based on the dual aspects of matter (wave/particle), where the mental aspect of the wave aspect is a wave-like function of experience. “These possibilities are actualized when neural-networks are formed via neural Darwinism, and a specific SE is selected by a *matching* process. [...] Under [hypothesis]  $H_1$ , a specific SE arises in a neural-net as follows: (i) there exists a virtual reservoir that stores all possible fundamental SEs/PEs, (ii) the interaction of stimulus-dependent feed-forward and feedback signals in the neural net creates a specific neural net state, (iii) this specific state is assigned to a specific SE from the virtual reservoir due to neural Darwinism, (iv) this specific SE is embedded as a memory trace of a neural net PE, and (v) when a specific stimulus is presented to the neural net, the associated specific SE is selected by the matching and selection process and experienced by this net. [...] A subjective experience (SE) is an *expressed* first person conscious experience that occurs, arises, or emerges due to the interaction between feed-forward signals and feedback signals in a neural-net. This requires that the interaction satisfies the necessary ingredients of consciousness (Vimal, 2009f) such as the formation of neural networks, wakefulness, re-entry, attention, working memory (Rowlatt, 2009), stimulus at above threshold, and neural-net PEs. [...] PEs are precursors of SEs [and are non-conscious experiences (Vimal, 2010a, 2010c)]. [...] The dual-mode concept was originally formulated in the framework of dissipative thermofield quantum brain dynamics (Globus, 2006; Vitiello, 1995) and explicitly incorporated into the PE-SE framework by (Vimal, 2010d). [...] The non-tilde mode is interpreted as the material and mental aspect of cognition (memory and attention) related feedback signals in a neural-network. Since memory contains past information, the non-tilde mode represents the cognitively nearest past approaching towards the present. The tilde mode is interpreted as the material and mental aspect of the feed-forward signals due to external environmental input or internal endogenous input. Since input signals contain information related to the near future, the tilde mode represents the nearest future approaching towards the present. It is a time-reversed, or entropy-reversed, representation of the non-tilde mode. [There are two types of matching mechanisms: (a) the matching mechanism for the quantum dendritic-dendritic MT pathway, and (b) the matching mechanism for classical pathways, such as classical axonal-dendritic neural sub-pathway]. [...] In all cases, a specific SE is selected under two conditions: (a) the tilde mode (the material and mental aspect of feed-forward input signals) interacts with the non-tilde mode (the material and mental aspect of cognitive feedback signals) to match for a specific SE; and (b) the necessary ingredients of SEs are satisfied. When the match is made between the two modes, the *world-presence (Now)* is disclosed. Its content is the SE of subject (self), the SE of objects, and the content of SEs. The material aspects in the tilde mode and in the non-tilde mode are matched to link structure with function, whereas the mental aspects in the tilde mode and in the non-tilde mode are matched to link experience with structure and function” (Vimal, 2010e).

Thus, the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d) does not displace the problem of MDR vs. MIR (thing-in-itself) without solving it, rather it does not even touch the unknowable MIR. What it (my framework) addresses is the linkage problem of MDR: how to link *structure, function, and experience* in MDR. This is because, as Adam noted, “we can only know the two aspects as they present themselves to us”. In other words, mental

aspect is known via first person subjective experiences and the physical aspect via third person objective measurements; both are MDR.

According to (Nietzsche, 1968), “In so far as the word ‘knowledge’ has any meaning, the world is knowable; but it is interpretable otherwise, it has no meaning behind it, but countless.— ‘Perspectivism.’ [...] It is our needs that interpret the world [...] each one has its perspective”. “Perspectivism<sup>25</sup> is the philosophical view developed by Friedrich Nietzsche that all ideations take place from particular perspectives. This means that there are many possible conceptual schemes, or perspectives in which judgment of truth or value can be made.” In double-perspectivism, the two aspects can be separated; they can be independent, interdependent, or dependent; therefore, double-perspectivism is closer to Cartesian substance dualism that has many problems (Vimal, 2010e). The double-perspective interpretation of my framework is incorrect in the above sense because it seems to lead to many problems, such as association problem, how do you associate a specific SE to a specific neural-net when there are two different states of mind (or more precisely the states of neural-network), whereas there are no such problems in my framework. In other words, my dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d) is not double-perspectivism in this sense; but it is, in the sense of first person perspective (for mental aspect) and third person perspective (for physical aspect) in MDR domain. Perhaps, *Trika Kashmir Shaivism* (TKS) approach is somewhat close to double perspectivism. My framework is more fruitful because it is *optimal* (in the sense that it has the least number of problems) and I have inserted dual-mode in dual-aspect view; therefore it is called dual-aspect dual-mode PE-SE framework.

## 6.2. Incommensurability of mental and physical entities

(Adams, 2010a) commented on incommensurable mental and physical entities: “The fundamental question of why there *seem to be* two incommensurate entities is no easier to deal with than the presumption that there are, *in fact*, two incommensurate entities.”

One can ask that on what ground we justify that mental aspect is incommensurable entity with respect to related physical (which is composed of material fermions and force carrier bosons) aspect? Is that because of (Feigl, 1967)'s category mistake that mind and matter are two different categories? If so, then this is related more to the problems in materialism that mind/SE is *identical with* related neural state or mind somehow *emerges* from brain.

(Adams, 2010a) replied (personal communication in June 2010): “For me, the answer is, introspective ground. It is only because of introspection that we are aware of any mental aspect in the universe. If there were no such thing as introspection, there would be no scientific evidence in the physical world of the existence of mentality. It simply does not ‘show up.’ Mentality is only known to us through self-awareness, a phenomenon that is not susceptible to scientific detection. Those methodological grounds alone, I believe, are sufficient to distinguish the mental and physical as incommensurable domains. However there are other grounds, arising from philosophy of science, as you note, as well as linguistics, philosophy, phenomenology, and

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<sup>25</sup> Adapted from <http://en.wikipedia.org/wiki/Perspectivism> .

intellectual history. [...] I would like to know your explanation of how, exactly, mental and material are ‘permanently glued together.’ There is no scientific evidence of that, so you must have some reasoned basis for that speculation. Personally, I do not think it is ontologically possible, as the two domains are incommensurable, to use Thomas Kuhn’s phrase. However, I do think it is possible for a person to change mental perspectives and thus view an entity in various modes of understanding. For example, we can see a woman as a mother, a child, and a spouse, depending on the current ‘perspective’ or mode of understanding. These different understandings do not make any claims about qualities or aspects of the woman herself, only differing attitudes or perspectives of the person making the judgment. That is why I suggested that double-aspectism, for which you make unsupportable ontological claims, could profitably be replaced by a ‘double-perspectivism’, which makes only epistemological claims.”

In my view, there are at least two methods to know the conventional (or mind-dependent) reality: (i) introspection (first person perspective) that is responsible for our SEs (the mental aspect) and (ii) third person scientific measurements such as fMRI, electrophysiology, and so on that are responsible for the neural correlates of SEs or NCC (physical aspect). The SE and its NCC are correlated, which has its own problems. True, that these two aspects belong to incommensurable domains and lead to category mistake. In spite of this, in my view, there is no reason that they cannot be the two perspectives and/or two aspects of the same entity. Double-perspectivism leads to substance dualism in a sense that the one perspective can exist without other (motherhood can exist independent of sisterhood or wifeness); whereas in double-aspectism, an aspect cannot exist without other aspect, i.e., they cannot be separated. There is no evidence that a SE can exist independently with respect to its NCC. The evidence of both methods entails that they cannot be separated. Therefore, incommensurability and the category mistake cannot argue against inseparability of mental aspect from its physical aspect and hence against dual-aspect dual-mode PE-SE framework. Further details are given in Section 3.7 of (Vimal, 2010d).

Furthermore, in MDR domain: “When the long-wavelength light from red-ball is presented to this [color related V4/V8/VO] network, the matching (between stimulus-SEs and neural-network-SEs that is also called neural-net-PEs) and selection mechanisms during the interaction between stimulus-dependent feed forward signals and cognition/attention/memory related feedback signals create a state, call it *red-state*. This *red-state* has two aspects: The mental/experiential-aspect is *redness* and the material-aspect is the material-aspect of the *redness*-related neural-network and its activity. [...] When the *red-state* is created, its two aspects are observed depending on the observation. If observed subjectively then the network experiences *redness*. If observed objectively such as in fMRI we see activity in V4/V8/VO visual area. The relationship between the mental/experiential and material aspects could be 1-1. In other words, it all depends on how we perform an experiment on it. If a subjective experiment (first person experiment such as simply looking at the stimulus) is performed then the *red-state* (the state of the Red-Green psychophysical channel) is SE *redness*. If we perform objective experiment (such as an fMRI third person experiment) then the *red-state* is the V4/V8/VO-network and its activity. This is in analogy to wave-particle duality: if we perform wave-type (such as slit-interference-type) experiment, an electron is a wave; if we perform particle-type (such as in photoelectric effect), the electron is a particle; in other words, the electron has two material aspects: wave and particle” (Vimal, 2010d). In the sense of first person and third person

perspectives/measurements, this appears as double perspectivism. However, in sense of inseparability of the double aspects, it is dual-aspect dual-mode view.

Furthermore, the double aspects cannot be separated; in this sense, they are permanently ‘glued’; perhaps one can interpret identity theory similarly: the two aspects are identical and cannot be separated. For example, in a limited analogy of coin, no matter what do, the two sides of the coin cannot be separated such as slicing between sides will lead to another set of two sides again. However, how can they be identical: one is physical and other is mental? Perhaps, the term ‘link’ or ‘correlate’ is more appropriate. By the term ‘glued’, I mean that both aspects will always be together; they cannot independently exist and cannot be separated.

### 6.3. Discussion with Adams

The author (RV) had email discussion with Adams (WA) (personal communication in June 2010) as follows:

#### 6.3.1. The *brute fact* problem

WA: (Adams, 2010a) commented on double aspectism: “No problem is solved and no progress is made with double aspectism.”

RV: If the problem is MDR vs. MIR, then it is not solved because I have not addressed it, as MIR is unknown. If the problem is how to link to *structure*, *function* and *experience* and how SEs occur, then it is rigorously solved in (Vimal, 2010d). Our dual-aspect dual-mode PE-SE framework is *optimal* because it has the least number of problems compared to all other views including panexperientialism. The only problem is the justifiable *brute fact* (that’s just the way it is!) of dual-aspect in every entity.

WA: I do not see that dual-aspectism is a ‘brute fact’ and it is incumbent upon you to explain why you think it is. I think dual-aspectism is a species of identity theory, and I did explain why I believe that. Identity theory is insupportable, in my view. Two sides of a coin have a simple transformation the converts one aspect into the other, namely the operation of ‘flipping.’ Alas, there is no such transformation known between mind and brain and therefore the analogy is insufficient.

RV: The brute fact problem is addressed in (Vimal, 2010d): “One could critique that the PE-SE framework also has a ‘brute fact’ of the mental aspect that has superposed SEs. [The *brute fact* is that an aspect is experiential.] That an aspect is ‘mental’ is a ‘brute fact’ feature of universe in the PE-SE framework, a way that reality is not derivable from anything else. Though this is true, but I argue that it is also the ‘real fact’ that SEs, such as *redness*, are fundamental and irreducible and hence must inherently exist [in conventional reality, but not in ultimate reality of *samadhi* state]. [...] Furthermore, the brute fact of ‘[*potential*] PEs/SEs superposed (unexpressed) in the mental aspect of strings or elementary particles, inert matter as their *carrier*, and a specific SE is expressed/selected when neural-network is formed’ can be further unpacked. Since our SEs are fundamental and irreducible, they are the inherent facts [in conventional reality]; one could argue

that they are neither brute facts nor fundamental assumption. In other words, this brute fact is the real fact as mass, spin, charge, space-time, force, and quanta are facts. [...] All theories have a brute fact somewhere — the issue is plausibility and a parsimony that generates richness of explanation, and the PE-SE framework passes this litmus test. [...] All metaphysical views have fundamental assumptions that still need to be addressed, for example, the PE-SE framework assumes dual-aspect entities, materialism/emergentalism assumes that SE emerges in neural-network, dualism assumes substance-dualism, and *holoworld* framework assumes its own ‘brute fact’, and so on. However, so far, the dual-aspect-dual-mode PE-SE framework is the most optimum framework because it is parsimoniously optimized and the problems of other frameworks are addressed. [...] the ‘brute fact’ of dual-aspect (mental and material aspects) is justified on the ground that SEs are fundamental, irreducible, and inherent [in conventional reality]”. The analogy of two sides of the same coin is in the sense that these two sides are inseparable.

### 6.3.2. The definition of mind

WA: I refer to “mind” as the mental entity known to all normal, adult humans through simple reflection. I find your definition, ‘mind’ = experiences and/or functions to be ambiguous. While “experience,” cannot properly be defined in any non-mental way, the term “functions” can be defined in common sense, or in physicalistic terms and is thus ambiguous. I have explained my objection to the ambiguity inherent in functionalism. Thus, your definition of mind as experience/function is, in my view, potentially self-contradictory.

RV: Our definitions of the terms ‘mind’ and ‘function’ appear different. My definitions (Vimal, 2010e) were derived from the over 40 different meanings attributed by various authors to the term ‘consciousness’, which were categorized into experiences and functions (Vimal, 2009e). My definition of mind encompasses most views as does the *general* definition of consciousness = ‘(conscious experiences) and/or (conscious functions)’, which includes panpsychism, materialism, dualism, dual-aspectism, dual-perspectivism, panexperientialism, and so on; however the *optimal* definition of consciousness = ‘(conscious experiences) and (conscious functions)’ is limited to the dual-aspect dual-mode PE-SE framework (Vimal, 2010e). Thus, my definitions are not self-contradictory.

### 6.3.3. The association problem

WA: “You ask how I can associate a specific experience to a specific neural net. The answer is that I can only point to correlations found between activity in a neural net and a conscious human’s report of mental experience. Such correlations (the NCC) are suggestive but at this time there no explanation, not even a plausible hypothesis, to support any sort of causal explanation. All we can say is that there appear to be correlated events. (And even that statement depends on a mountain of assumptions, such as that a person’s report of mental experience is accurate, complete, infallible, fully communicable, understandable, and so on). In my view, you do not have a problem associating a neural state with a mental experience because you have tacitly assumed a causal relationship that is not supported by the evidence.”

RV: The two perspectives in double-perspectivism could be independent/inter-dependent, leading to the problem of association (such as how a system can associate redness with red-green cells over billions of cells in less than 50-500 msec, which is the same problem for substance dualism). As you say, correlation does not imply causality and depends on many other assumptions. However, one could argue that the problem of associating a neural state with a mental experience can be addressed by co-evolution (adaptation and natural selection) and co-developmental *neural Darwinism*, as detailed in (Vimal, 2008b, 2010d). The dual-aspect dual-mode PE-SE framework does not have association problem because the two aspects are inseparable.

## 7. Mind-dependent reality (MDR) and mind-independent reality (MIR)

(Nixon, 2010c) critiques materialism and classical science that assumes  $MIR \sim MDR$  as: “we do not and cannot know of anything outside of our conscious experiencing. [...] To objectify a mind independent reality [MIR], then to look for mind in that mind-independent reality, is a bizarre sort of logic to say the least. [...] On the other hand, the materialist would reply that, *obviously*, it is external reality that continually changes our conscious experience, but with the added assertion that consciousness itself is created by – is a product of – the material world and its interactions. [...] It all begins with the established laws of science, which its adherents claim have validity beyond any conscious awareness of them. In other words, the laws of science are ‘the things in themselves’ or at least a part of them. [...] To imagine mind in a mindless nowhere is magical thinking indeed. We see that, to begin with, science assumes a worldview, a perspective outside of conscious experience, which is impossible and, finally, a fantasy. [...] The only choices for materialism are to quantify, measure, and examine the neural correlates and declare them to be the thing in itself, as in eliminative materialism, or to quantify, measure, and examine the qualitative effects and declare them to be the phenomenon itself, as in experimental psychology.” Moreover, (Nixon, 2010c) uses language framework for constructivism: “language not only describes but constructs the object being observed”, which seems to be consistent with MDR.

(Adams, 2010b) elaborates and critiques (Nixon, 2010c) as: “language is the crowbar that levers conceptualized experience from ‘raw,’ unconceptualized experience. Language lets us (actually requires us to) objectify our experience into the idea of a mind-independent reality [MIR] that can be studied by science. [...] Invoking Immanuel Kant, Nixon reminds us that if there really is a reality ‘out there’ beyond the mind, the mind could never know it. We know only our own interpretations of what we think we perceive and understand. What is really out there, in-itself, regardless of what we know or think about it, is simply not accessible. We know what we know and we don’t know what we don’t know. [...] A more serious implication of Nixon’s point of view is that if all we know and can know is our own conceptualization of the world, then science is a waste of time. [...] We simply cannot know what the world is really like. We can only know our own experience<sup>26</sup>, which is itself highly constrained by language, culture, and prior conceptualization.”

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<sup>26</sup> (Nixon, 2010a) objected this: An important part of conscious experience is the construction of symbolic knowledge. The symbolic means that it is always our construction but what is referred to by the term knowledge

MIR according to (Kant, 1787/1996)(I.§8.i) is: “What might be said of the things in themselves, separated from relationships to our senses, remains for us absolutely unknown”.

Commenting on subject-exclusive reality or MIR, (Nixon, 2010d) argues: “The perspective from the subject-excluding objectivity of mind-independent reality is in fact an attempt to see ourselves and our experienced reality from a god’s eye view, that is, from the beyondness first conceivable through the creation/discovery of the greater, all-pervasive reality experienced as the sacred. In this view, speech as narrative (and concept as image) was the vehicle that conveyed our ancestors across the symbolic threshold into a new, consciously-apprehended reality beyond the merely sensory or biologic (a reality that in our times has largely become desacralized and *despirited* as ‘objective’).”

One could argue that the mind independent reality (MIR) is always unknown no matter what we do because ‘to know’ means we need to use our minds and then it becomes the mind dependent reality (MDR), not MIR; although, physics assumes that when measured objectively<sup>27</sup> MDR is MIR, which is debatable.

The following texts related to MDR and MIR are somewhat modified from (Vimal, 2009b):

[1] Constructivism proposes that the ‘outside’ world as a construct of experience. According to (Müller, 2008), “Matter is a structure that crystallizes within mind”, which seems consistent with “‘matter’ is a mental construct of such a substance” (Wilberg, personal communication in (Vimal, 2009b)). This is a mind-dependent or subject-inclusive reality (MDR/SIR). There is also mind-independent or subject-exclusive reality (MIR/SER) that cannot be known, which is consistent with (Kant, 1787/1996). Thus, there is a serious explanatory gap between MDR and MIR that we need to address: the fact is that my car parked in my parking lot exists whether I see/experience/perceive it or not; moon exists whether we observe it or not.<sup>28</sup> In my view,

MDR = MIR  $\oplus$  SEs of objects and/or subject in first person perspective  $\oplus$  third person measurement such as NCC of SE  $\oplus$  other factors that are not yet known (1)

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may be more or less correct. We cannot just make things up! Yes, science is a human construction. What else could it be? It is not reality in itself. All our concepts, tools, & measuring devices are human constructions. But science is still best approximation of reality that we have available. It is like a net we create to throw over Reality. By looking at the shapes of what we capture in that net, we may come to a reasonably close approximation of the things-in-themselves. After all, science works! (And advancing technology has proven that.)

I agree with Nixon. However, there are explanatory gaps in panexperientialism, such as, how function, mind, cognition, and material entities arise from experiences. In panexperientialism, experiences are the only entities that permeate universe. Panexperientialists need to address this gap. There is no such gap in the dual-aspect dual-mode PE-SE framework.

<sup>27</sup> (Nixon, 2010a) questioned: can there be total objectivity when all the measuring devices and their conceptual interpretation are subjective (or, better, intersubjective) human creations?

Total objectivity is impossible but in physics we assume MIR ~ MDR.

<sup>28</sup> Einstein asked “*whether I really believed that the moon exists only when I look at it.*” (<http://decartes-einstein.blogspot.com/>).

where  $\oplus$  indicates ‘and/or’. In other words, my use of the term ‘matter’ or Wilberg’s use of the term ‘substance’ (Vimal, 2009b) is MIR but it is unknown; MDR is SE of matter/substance; physics is based on the debatable assumption  $MIR \sim MDR$ , which may or may not be correct. MDR vs. MIR is further discussed in (Vimal, 2009j).

[2] Since MIR is unknown in our daily life, the reality is conventional MDR for both mental and physical aspects. MDR can be in first, second, and/or third perspectives. In the first person perspective, SE (such as *redness* of ripe tomato) is a part of mental aspect. In the third person perspective, the related neural representation of the ripe tomato in the V4/V8/VO-color-neural-network and the network structure together (such as anatomical grey and white matter and neural activities) can be considered as its physical aspect. In other words, the physical aspect is the related material structure such as neural-network and its neuronal firing activities. One could argue that the related MIR may be approximately close to this physical aspect (third person perspective entity) *without mental construction*; but strictly speaking MIR is unknown. In other words, physicists may argue that MIR may be close to third person measured anatomical structure and physiological (such as fMRI or single unit) recorded ‘neural firing’ (spikes) activities (Vimal, 2009b). In other word, MIR is unknown, but physics assumes  $MIR \sim MDR$ , which is debatable.

[3] Furthermore, SEs are part of MDR, whereas the physical properties (P) of matter (such as physical properties of water, salt, and reflectance of red-rose) *without mental construction* might be close to MIR (Vimal, 2009b). For example, consider the hypothesis  $H_2$  of the PE-SE framework: the ‘three mental-*gunas*’<sup>29</sup> for each kind of SEs (for example, 3 primaries for color; 3 *gunas*, namely *sattva*, *rajas*, and *tamas* for emotion; and so on) and the PE can be hypothesized to be in *superposed* form in the mental aspect of an entity until the interaction between them is needed for SEs (such as *redness*) and thoughts. In MDR, a trichromat and an achromat have different SEs for color-related stimuli; as a matter of fact SEs are personal; emotions are different for different subjects. Therefore, *gunas* seem to be the properties of neural-networks. However, external objects provide information (such as reflectance) for SEs as well. If this is correct then physical *gunas* are related to the physical properties of physical objects (external objects and also internal neural-networks), which can be considered as close to the attributes of unknowable MIR. One could ask then: do SEs-related physical *gunas* appear only when neural-networks are formed? And precisely how does this happen? For example, the formation of 3 visual channels (Red-Green, Yellow-Blue, and luminance/achromatic channels) involves 3 types of cones (long, middle and short wavelength sensitive cones) related to 3 primaries (red, green, and blue) in trichromats. In this manner, we can link *structure* (such as redness related V4/V8/VO-neural-network), *function* (such as detection, and discrimination of red from its background), and *experience* (such as *redness*). In hypothesis  $H_2$ , one PE and 3 *gunas* for each

<sup>29</sup> *Gunas* (Sanskrit term) are qualities; this term is borrowed from Vedic system. This implies that we can hypothesize that SEs can be derived from the interaction one PE and 3 relevant *gunas* (as in hypothesis  $H_2$  of our dual-aspect dual-mode PE-SE framework) discussed in (Vimal, 2009b). In that way, we do not need to hypothesize innumerable and intractable *potential* SEs in superposed form in the mental aspect of each entity (*virtual reservoir* in hypothesis  $H_1$  of our framework); *virtual reservoir* is equivalent to *universal background of awareness*.

*kind* of SEs reduce the innumerable SEs to countable and tractable number; they are in *superposed* form in the mental aspect of each entity until they interact, integrate, stored, and then lead to specific SEs for matching and selection mechanisms; further details are given in (Vimal, 2009b).

(Vimal, 2010d) elaborates MDR and MIR further: Although one can still critique that the assumption of mental aspect in dual-aspect view is a ‘brute-fact’, one cannot deny the real-fact that SEs are fundamental and irreducible in the mind-dependent reality (MDR), subject-inclusive reality (SIR), or our daily conventional reality in the dual-aspect dual-mode PE-SE framework. “This is the rationale for hypothesizing that [potential] SEs are in superposed form in the mental aspect of fundamental particles and a specific SE is selected during matching and then the relevant specific neural-network experiences it. In the [unknowable] mind-independent reality (MIR) or subject-exclusive reality (SER), [potential] SEs are still in superposed form in the mental aspect of entities, but ‘what it’s like’ can only be experienced in MDR. [...] What is independent of subject? It is the external world, i.e., mind-independent reality (MIR: the world as it is, in-itself) that is brain-independent, but it is unknowable. According to Kant (Kant, 1950), thing comes to us only in appearance. One could argue that the MIR is the reality [or one could guess MIR] based on conjecture, an inference, or statement of belief. Whatever is known always involves brain [and mind]. Thus, our daily conventional reality is mind-dependent reality (MDR: the world as it appears to us).”

(Vimal, 2009a) uses Nāgārjuna’s dependent co-origination<sup>30</sup>, and conventional and ultimate realities to elaborate MDR and MIR further: “Our daily reality is based on our minds and hence it is mind-dependent reality (MDR) or subject-inclusive reality (SIR). Mind-independent reality (MIR) or subject-exclusive reality (SER) is not known. Even then physics assumes that MIR = MDR because physicists assume that laws although derived from human mind are independent of mind. If somehow we understand MIR and its relationship with MDR, we can get insight into subjectivity (subjective experiences or SEs, intentionality, and so on) because subjectivity = MDR – MIR [(minus NCC and other factors, see Eq. (1)]. [...] According to Nāgārjuna, there are two types of realities: conventional and ultimate;<sup>VIII</sup> each has existence and nonexistence. The Nāgārjuna’s conventional reality is basically mind-dependent reality (MDR), and his ultimate reality seems to be the reality experienced at the state of *Nirvāṇa* (detailed later).<sup>31</sup> Ultimate reality may not be MIR. The conventional reality of external objects is structured by an individual-mind, so it is MDR. When the mind/subject is excluded from the reality, then that reality is MIR. For example, the falling of tree in a forest, where there is nobody to witness or hear, is MIR. This is because the falling tree generates sound vibration in air, but nobody hears

<sup>30</sup> (Nixon, 2010a) commented that but this goes all the way into idealism, does it not — indicating that matter-energy and space-time themselves are illusions and all is mind (that is, the mind of G.O.D.)?

Nāgārjuna’s dependent co-origination is organism-environment interaction, consistent with our (dual-aspect dual-mode PE-SE and panexperientialism) frameworks.

<sup>31</sup> Nāgārjuna hypothesizes two kinds of reality: conventional and ultimate. I interpret his conventional reality as MDR. I guess, his ultimate reality is knowable at *Nirvāṇa/Samadhi* state attained usually via Buddhist meditation. I am not sure if his ultimate reality is MIR because MIR is unknowable, as per Kant. Therefore, MIR may be or may not be close to ultimate reality.

it, and hence there is no subjectivity and this will come under MIR. [...] The conventional reality (or MDR) entails that conventional/mind-dependent entities lack inherent existence and hence lack causal power. For Nāgārjuna, ‘Effects lacking inherent existence depend precisely upon conditions that themselves lack inherent existence’ (Nāgārjuna & Garfield, 1995)-page 121. This entails dependent co-origination (or interdependent arising) for conventional reality (or MDR), which lacks inherent existence. In other words, phenomena in MDR are conventionally existent, but empty of inherent existence.<sup>IX</sup> Nāgārjuna asserts that ‘a thing is empty or that it is dependently, one is not contrasting their status with the status of some other things that are inherently existent. Nor is one asserting that they are *merely* dependent on some more fundamental independent thing. ... Rather as far as one analyzes, one finds only dependence, relativity, and emptiness, and their dependence, relativity, and emptiness.’ (Nāgārjuna & Garfield, 1995) (p. 177).

In physics, we assume that MIR is MDR when observations are successfully replicated at any laboratory and at any time, and they are not significantly different from each other, i.e., when the observations are independent of space and time. However, it is still MDR, not MIR. MDR is consistent with dependent co-origination from the Nāgārjuna’s four conditions (efficient, percept-object, immediate, and dominant conditions), which entails emptiness (lack of essence) of causation. MDR is an illusion (*māyā* = that which is not);  $MDR \sim MIR + (\text{mind, subjectivity, or SEs})$  [plus NCC and other factors, see Eq. (1)];  $MIR \sim MDR - \text{Mind}$ .<sup>32</sup> The selection of a specific SE in the dual-aspect-dual-mode PE-SE framework (Vimal, 2008a, 2008b, 2009c, 2009d) and enlightenment are also inherently non-existent and co-arise dependently. If dependent co-origination is denied, action and resultant change would be pointless, life would not have real meaning, and MDR would not exist.

MIR is very hard to know because any process of knowing always involves mind. However, some insight into MIR and ultimate reality can be gained through MDR’s reasoning, language, deep thinking process, meditation, and so on. To gain some insight into ultimate reality, Nāgārjuna suggests that one should acquire the state of *Nirvāṇa* (via meditation).<sup>X</sup> Moreover, ‘if *Nirvāṇa* is liberation from cyclic existence<sup>33</sup> and hence from arising and ceasing, it follows that, from the ultimate standpoint, all things in *samsāra* [MDR] are actually just as they are in *Nirvāṇa* ... everything is both conventionally real and ultimately unreal. [p.250] [...] That is, independent of conceptual imputation there are no objects, no identities, and so, no distinctions [i.e., the ultimate nature of things is inexpressible, inconceivable, and uncharacterizable, but one might directly perceive it in *Nirvāṇa* state of mind] [p.251]’ (Nāgārjuna & Garfield, 1995). *Nirvāṇa* is a complete cessation of *samsāra*; *samsāra* includes grasping (including *Nirvāṇa* itself), delusion, attachment, craving, suffering, and the cyclic existence. Both *Nirvāṇa* and *samsāra* are not inherently existent. It appears that the ultimate reality is experienced at the state of *Nirvāṇa*. [...] Furthermore, MIR seems to be MDR without subjectivity (SEs). There is no

<sup>32</sup> Here,  $MIR \sim MDR - \text{mind}$ , where by ‘mind’ is SEs; in general mind includes functions (such as detection, discrimination, cognition, intentionality, thinking process, reasoning, language, and so on) and SEs.

<sup>33</sup> The term ‘cyclic existence’ refers to the cycle of arising (birth), abiding (life), and ceasing (death) of an entity, a process, or relation for conventional truth (MDR). For example, (i) the cycle of suffering and happiness, (ii) the cycle of our birth, life, and death, (iii) the cycle of birth of universe at Big Bang, its life over billions of years, and its death during Big Freeze/Big Crunch, and so on. For ultimate truth, there is no cyclic existence. Thus, cyclic existence is not inherently existent in time and space for MDR.

difference in entity between MDR and MIR. The physics and its laws presumably more or less remain the same in MDR and MIR. An alternative method for getting insight into MIR needs further research; for example, just imagine you are in the sea of EMR [electromagnetic radiation] but all your sensory systems are shut down.”

Monteiro’s hypothesis related to MDR and MIR is as follows (personal communication in May 2010): “I claim for the existence of MIR as well as MDR to be complementary. I shortly make the statement, that both are right if the theory (model) is set up formally consistent and the experiment is brought under specified condition. What is ‘right’ or ‘wrong’ depends on the ‘perspective’, which one holds. The mind can be MDR as well as MIR under specified ‘conditions’. Perception is MDR, but the other side of the picture is cognition (‘I’) as an autonomous process as MIR. An example of MIR is ‘creativity’. It is relevant to define the ‘individual’ ‘I’ formally and unambiguously in the context of MIR abolishing the metaphorical personalized construct of ‘homunculus’.”

To sum up, the SEs aspect of consciousness constructs the MDR; mind-independent reality (MIR) is unknowable although mystics/yogis claim direct perception that is close to MIR. Furthermore, Monteiro’s hypothesis is interesting because the cognition (‘I’) or the ‘individual’ ‘I’ (if it is an autonomous process) and/or creativity might be MIR.

## 8. Hard problems

(Nixon, 2010c) elaborates the hard problem of experiences as follows: “I do not feel that it is the conscious quality of experience which is the Hard Problem, the unexplained mystery; it is the fact of experience itself which resists being plumbed. ... Consciousness, I have suggested, is the name we give to the reflection of experience back upon itself through symbolic interaction and intersubjectivity. But it is not experience in itself. [...] The Hard Problem of experience may be the only one that *needs*, if not an explanation, a response. ... the Hard Problem is [1] ‘Did experience simply evolve from non-experiencing organic interactions?’ or [2] ‘Did experience ‘dirempt’ or ‘focus’ from some sort of nonspecific, preorganic, experiential potentiality that was part of a universe of all possibilities?’ On the personal level, the Hard Problem might be phrased as [3] ‘Was I in some way conscious before my memory of consciousness begins?’ or [4] ‘Was the experiential groundwork for my individual consciousness already present before ‘I began?’ [...] [substance dualists propose that] the basic form of self-aware consciousness we experience on a daily basis existed as a soul before this life and will exist after it ... Consciousness, here [in evolutionary emergentism], is clearly an evolved *product* of various forces in an otherwise non-conscious, non-living universe. [...] the material or spatial world itself is a product of perceptual construction that was preceded by non-perceptual experience within the vicissitudes of temporal duration: Experience of time precedes perception of space (or material). [...] Hard Problem: [5] Did consciousness evolve through natural, materialistic processes in an otherwise non-conscious, non-experiencing universe? To answer ‘yes’ is simply to take a stand with unprovable assumptions.”

In PE-SE framework, hard problems are Types 1-3 explanatory gaps (Vimal, 2009h, 2009i): **(i)** Type-1 explanatory gap is how can SEs emerge/evolve from non-experiential matter? For example, how can SEs *emerge from* brain or *identical with* brain-states? **(ii)** Type-2 explanatory gap is how can SEs pre-exist, i.e., how is it possible that our SEs (such as happiness, sadness, painfulness, and similar SEs) were already present in primal entities, whereas there is no shred of evidence that such SEs were conceived at the onset of universe? **(iii)** Type-3 explanatory gap is how can we say physics reveals mind-independent reality (MIR) when mind (subjective experience) is always used in setting up theories and observation? or “How Do We Know What We Believe We Know?” (Glaserfeld, 1985). For conscious SEs, necessary ingredients must be satisfied (Vimal, 2009f), such as the formation of neural-network, wakefulness, re-entry (Edelman, 1993), attention, working memory, stimulus above threshold level, and neural-net PEs.

Perhaps, Nixon’s hard problem of experience is related to Type-1 and Type-2 explanatory gaps. In my view, perhaps, the answers of the Nixon’s questions [1]-[3] and [5] are ‘no’ in dual-aspect view as in panexperientialism. According to hypothesis H<sub>1</sub>, organism-environment interactions are necessary. In addition, co-evolution, co-development, matching and selection mechanisms are needed to select a specific SE via matching process. Details are given in (Vimal, 2010d). The answer of the Nixon’s question [4], to some extent, is ‘yes’ because either SEs pre-exist (or can be derived from the interaction of a PE and 3 *gunas*) and *potential* SEs are superposed in the mental aspect of each entity in the dual-aspect view with hypothesis H<sub>1</sub>, which hypothesizes that rudimentary individual consciousness is relational and is the result of organism-environment interaction. Intersubjectivity sharpens individual consciousness to its final form.

Furthermore, there is another explanatory gap and hard problem of panexperientialism: It is not still clear how matter (in mind independent reality: MIR) can arise from experiences related to panexperientialism, perhaps, because we do not have relevant evidence and MIR is mysteriously unknown. For this, we need to have experimental data to test a relevant hypothesis. In mind dependent reality (MDR), experiences/mind can *construct* the *appearance* of matter, but that matter must pre-exist otherwise how can experiences *construct* the appearance of the matter, where the term ‘matter’ is related to MIR? For example, how can experiences create the material aspect (NOT the *appearance*) of Taj Mahal, Empire State Building, or World Trade Center from Ground Zero? This is not clear to me. So far, this seems impossible to me!

(Nixon, 2010a) addressed this explanatory gap as follows: “These constructions you mention are the very epitome of experience made manifest. Nature could not manage this on her own. Somebody had an image, invisible in this world of matter-energy, and that image, that dream, became the ultimate source of these buildings — which consciously directed experience then constructed in this very world of matter-energy. In the quantum, isn’t it thought that most energy fields are in the form of waves (‘state vectors’) that, when observed (when conscious expectation is placed upon them), ‘collapse’ into the bound form of photons or subatomic particles? The wave is a not in any particular state of ‘matter’ (it is a vector of possibilities). Upon measurement or observation, a particular form is taken. Does this not indicate that experience gives matter-energy its particular form & structure? Note that this experience may not be conscious of itself, so (as Whitehead indicated) the forms or entities that matter-energy has already taken will

influence the form taken as the wave of potential (or state vector) collapses. Included amongst the forms of entities in the objective world, after all, are all sorts of experiencers, and their expectations of a continuing world affect the continuing (creative) collapse into more forms or entities. Behind it all is ongoing experience itself; thus, the world is a manifestation of ongoing experience, mostly being ‘in-formed’ by the forms of former creative collapses. Put another way, the world process is itself experience happening, becoming manifest only temporarily.”

It is an excellent explanation for the *appearance* of artifacts built by humans in mind dependent reality (MDR). However, energy, wave, particle are material entities; they are not experiential entities as per physics. We can, however, assume that each of them has a mental aspect that has experiences in dual-aspect view, but physical aspect cannot be excluded. One could argue that the gap still remains in mind-independent reality (MIR, thing-in-itself), and for natural material entities such as, rocks, mountains, rivers, trees, and so on. These material entities must pre-exist in MIR. Then only, mind can construct their *appearances*. In other words, matter must pre-exist before its mental construction for its *appearance*. Question is: where these material entities come from? How matter can arise from conscious or non-conscious experiences in MIR? It should be noted that there is a NO mind/consciousness/experience in MIR (by definition) and collapse needs mind/observer. Material universe must have existed billions of years without human mind/observer.<sup>XI</sup> If one assume that experiences existed before living entities appear, then this definition of experience is too broad or non-specific because one has to assume that any type of interaction is related to an experience. Thus, the closing of the gap is still unclear to me in the panexperientialism framework.

## **9. Existential crisis, selective process, predictive behavior, and chaotic process for the emergence of consciousness**

According to (Nixon, 2010d), “I conclude that prehumans underwent an existential crisis that could be resolved only by the discovery-creation of the larger realm of symbolic consciousness we call the sacred. [...] The self is founded with death at its core.”

However, one could ask: from where symbolic consciousness and related SEs arise, which can resolve the *existential crisis*? One of answers may be: they must pre-exist to pick them out *demonstratively* (Vimal, 2009g). This is the conclusion of my discussion with Type-B materialist Levin. She used the most advanced theory of phenomenal concept strategy to defend Type-B materialism (Levin, 2006). The pre-existence of SEs is consistent with our frameworks.

The *existential crisis* phenomenon is non-causal and non-seminal event, rather it is an epiphenomenon as per (Hersch, 2010): “There can be no doubt the individual self-awareness of mortality is one of the great and terrible contradictions of conscious experience, but I contend that the crisis created by this knowledge is not causal, nor is it a formative event in the

emergence of consciousness. To the contrary, I contend that the psychological impact of mortal knowledge is an epiphenomenon that had a late onset in the course of human experience.”<sup>34</sup>

(Hersch, 2010) proposes a framework of evolution, selection, adaptation, predictive behavior, the internalization of organism-environment interactions, and the language for the emergence of intersubjectivity and then individual consciousness: “All organisms engage in predictive behavior, but in the absence of consciousness, that behavior is genetically engrained rather than intentional. [...] Again, in the case of non-conscious behavior, every organism must of necessity, have built into its genetically determined behavioral repertoire, predictions that have been selected for on the basis of patterned events [equivalent to Nixon’s cosmic cycles] that actually take place repeatedly in its environment, and this behavioral repertoire will be passed on to subsequent generations. [...] We have a tendency to view the process of evolution in morphological terms rather than behavioral terms, yet morphology can be aptly viewed as nothing more than an instrument of behavior that, at its most fundamental level, involves survival and reproduction, and it is from the standpoint of the predictive nature of all living behavior, that we must address the emergence of consciousness. [...] The change begins when the predictive behaviors that reflect the interactions between the creature and its environment become turned inward amongst the group itself. [...] It is the call and the response, in which the response in turn, becomes a call itself, that marks the emergence of the intersubjective conscious creature. Awakening to consciousness entails a leap to meaningful language, and language behavior involves, at its root, patterned, predictive, mutuality.”

(Hersch, 2010) elaborates further the selective process for the emergence of consciousness: “In the final analysis, it needs to be remembered that the interactions among and between various species have been determined by a selective process based on the random variation that takes place in the context of the entire constellation of physiological-behavioral differences that emerge among living organisms. There are no rules that determine what works at any given time, in any given place, and in any given ecological context. Among individuals and groups, competitive and cooperative behaviors, dominance and submission, are equally subject to selection pressures. Selection is the ultimate equal opportunity employer. Failure to understand this is the fallacy inherent in Social Darwinism.”

The above hypothesis is somewhat consistent with the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d) in a complementary manner. However, again, SEs must pre-exist to pick them out *demonstratively* (Vimal, 2009g). This seems somewhat consistent with the hypothesis of pre-existence of the continuum of experiences (Nixon, 2010b).

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<sup>34</sup> (Nixon, 2010a) commented that (Hersch, 2010) ignores a great deal of psychological evidence for death denial (Becker, 1973) at the mind’s core.

Becker’s *The Denial of Death* (Becker, 1973) is interesting. In some sense, we all are involved in Becker’s *immortality project* (or *causa sui*), in which we create, publish, and/or become part of something which we feel will last forever; something that will never die, compared to our physical body that will die one day. This gives us the feeling that our lives have meaning, a purpose, and significance in the grand scheme of things. However, this comes later after our basic needs are satisfied.

The developmental *neural Darwinism* in the PE-SE framework (Vimal, 2008b, 2010d) is consistent with (Hersch, 2010)'s embryologic development: "It is difficult to imagine the exact context in which the transformation occurred among our ancestors, but we can see the process at work in child development. We are all familiar with the idea that in embryologic development, we see much of evolutionary development mirrored in the development of the embryo --- gills and the like. In this same fashion, we can see in the development of the child, the various stages by which consciousness emerges in microcosm. The newborn infant is not conscious, though from a genetic standpoint, it is both equipped and predisposed to acquire consciousness. At first the infant is entirely focused and reactively dependent on its mother. The mother, who is both programmed and conscious, calls forth the consciousness of the infant, and pop-psychology notwithstanding, is genetically compelled to perform the behaviors necessary accomplish this calling-forth. [...] As the infant matures, the mother engages in rhythmic vocalizations that are the immediate precursors to language. These include cooing, repetitious phrases, and singing.<sup>35</sup> [...] And so the child is awakened to a symbolic world of theory in which the meaning of things is engendered in cause and effect relationships --- reliably and predictably."

(Hersch, 2010) compares his *embryologic development* framework with Nixon's *existential crisis* framework as follows: "To place this picture of the process of emergence of consciousness in microcosm in the context of Nixon's crisis of mortal knowledge, we might ask ourselves how the very same crisis awareness emerges in human development. Since I have not come across any academic literature that correlates anticipatory death terror with developmental age, I can only speculate. It seems to me that the terror engendered by the anticipation of one's eventual death develops quite slowly over the course of a lifetime."

(Nixon, 2010c) makes the case for rather *sudden* appearance of self-referential language; only a crisis can account for this sudden (over a few generations) transformation as per (Nixon, 2010a). In my view, if the *existential crisis* is the only factor that can account for this *sudden* transformation related to the appearance of self-referential language, then the related neural-network must be formed over a few generations. Furthermore, the *embryologic* developmental aspect of language seems to imply that the *existential crisis* factor participates later in life's timeline.

(Hersch, 2010) then examines the predictive behavior with respect to the embryologic development: "Common sense tells us that the child acquires the name for things, categorizes them and thereafter, organizes them into predictive theoretical relationships. As difficult as it may be to grasp this idea, the situation is actually the opposite. The child experiences everything in relation --- in predictive interaction with the world --- and names things in order to clothe relation with symbolic objects (objectification). In this process, the child undergoes a transformation from a behaving creature that reacts to the world to a predictive intentional actor who acts upon the world. We see that theory (as prediction) precedes data."

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<sup>35</sup> (Nixon, 2010a) commented that since humans are the only ones who do this with their young — speak to them as though they were already conscious — it begs the question of the origins of same in our species.

I agree and it seems to entail that consciousness with its two aspects (function and experience) in rudimentary form pre-exists for intersubjective interaction.

One could argue that the 3-5 years embryonic development of consciousness in infants appear equivalent to the emergence of consciousness over many generations in ancestral troop of wandering hominids (human-like apes).<sup>36</sup> However, in all cases, SEs must pre-exist to pick them out *demonstratively* (Vimal, 2009g).

The emergence of individual consciousness from social/tribal consciousness from the developmental rhythmic call and response behavior is argued by (Hersch, 2010) as: “The individual [in ancestral troop/tribe of wandering hominids] may have been self-aware, but in a dimmer sense than we rugged individualists experience today. [...] This does not mean that individuals did not come into conflict with one another. [...] In contrast to Nixon’s mortal knowledge thesis, I have asserted that conscious emerges from rhythmic call and response behavior spawned from complex sign behavior, and that call and response is perpetuated and elaborated in language behavior in ongoing intersubjective inter—ACTION. The faculty of symbolic interaction (language behavior) enables the construction of a shared predictive/theoretical narrative --- a socially constructed reality --- that functions to produce coordinated, collaborative, intentional (meaningful), and innovative, action among members of the fundamentally the eusocial human species. [...] As I have explained, the emergence of tribal-centric consciousness in which the individual self is fully realized is not only consistent with a definition of consciousness, but it is the essence of consciousness that, Nixon and I agree, emerges in symbolic interaction among eusocial creatures. The immersion of the self in relation to a larger causal narrative that embodies tribal identity, takes precedence and this remains true today in the emergence of consciousness that can be observed in child development. [...] we can place the emergence of the symbolic, language-using, *Homo sapiens* at around 150,000 years ago. [...] The 140,000-year experiment with tribal-centric consciousness produced a stunningly rapid expansion of range for *Homo sapiens*. The most recent 10,000 year experiment in which object-centric consciousness, a cultural product realized in intersubjective relation, produces increasing economic efficiencies at an exponentially increasing rate, has resulted in a stunningly rapid expansion of population.”

(Nixon, 2010h) replied to (Hersch, 2010): “My thesis is that with the life threatening crisis of mortal knowledge the human awoke to his own existence and the mind itself now found a place between the environmental stimulus and the instinctual response system. [...] in my statement of the genetic imperative to survive and reproduce, I ignore cooperative communities, which are central evolutionary features, as well. [...] new categories of thought involved the prediction of future events. That is even clear from the archeological record. I’m not sure where he thinks I deny this. I base thought on emotions because I asked myself, *why were predictions made? To what end was foreknowledge needed?* And the answer was always to fulfill needs that emotions indicated needed to be fulfilled. We certainly did use our new conceptual categories to predict and to build a new cultural world, but we did so for two reasons: We were biologically and psychologically compelled to do so. The former involves the natural emotions (or, as Hersch would have it, *feelings*) that arise from our embodiment and the latter involves the emotions that

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<sup>36</sup> (Nixon, 2010a) commented that many generations is not evolutionarily slow, and the definite evidence of symbolic behavior has only been found in *H. sapiens*.

This is true, but one could argue the emergence of consciousness over many generations might be considered *equivalent* to 3-5 years embryonic development in infant.

arose in response to the existential crisis of mortal knowledge. [...] I can't agree that (symbolic) culture is a 'product' of conscious action [i.e., the cause of symbolic culture is conscious action]; it is, instead, a simultaneous appearance. We cannot become conscious of our selves without intersubjectivity, and intersubjectivity is a cultural phenomenon. [...] I too tend to favour the old idea that the development of the individual from the womb onwards loosely tends to recapitulate evolution – including in this case the cultural evolution of the self.”

(Nixon, 2010c) proposes an alternative chaotic process for the emergence of consciousness: “Another position derived from a combination of quantum physics and far from equilibrium thermodynamics sees experience of any sort creating experienced worlds from the chaos or semi-chaos of the unknown and non-experienced — the Kantian ‘things in themselves’.”

However, according to (Monteiro, 2010), “the autonomous non-experiencing thing or chaotic unrelated process and experiencing is the borderline between meaningless and meaningful to be incorporated in a philosophy or theory. The meaningless autonomy of a process (Ding-an-sich) must be the axiomatic starting point. The question is how to build the bridge between meaningless and meaningful experiencing: 1) one has to postulate accidental random material object interaction to generate or activate the mind (matter→mind); and 2) accidental random subject mental interaction to activate matter (mind→matter). Through interpersonal feedback, meaningful experiencing (perception) comes into being. The question is what happens in the non-causal gaps of matter→mind and mind→matter” [p. 374].

In the dual-aspect PE-SE framework, self (Bruzzo & Vimal, 2007) is SE of subject and is related to an adaptive pressure arising from self-organization, chaotic dynamics, and *neural Darwinism* (Edelman, 1993).

Furthermore, (Nixon, 2010d) emphasizes the role of evolution, existential crisis, and chaotic processes for the emergence of consciousness: “the evolution of language [...] The existential crisis (the crisis of motivation brought on by the peripheral observation of inevitable mortality) didn't create syntax on the spur of the moment *ex nihilo*. It is a tenet of systems and ‘chaos’ theory that when any system enters a crisis state, its organization will begin to degenerate or it will transform into a new system through ‘emergent evolution’ (*cf.* (Pattee, 1995)). [...] (Gallagher, 2001) is correct in positing a primary intersubjectivity from which individual subjectivity emerges. [...] speech, though asserted by individuals, was experienced as a communal phenomenon”.

In my view, the existential crisis and chaotic emergent evolution may have helped the evolution of languages, but the individual self (SE of subject) (Bruzzo & Vimal, 2007) might already have occurred in brain when self-related neural-networks evolved.<sup>37</sup>

<sup>37</sup> (Nixon, 2010a) questioned: Do you imagine such a thing just spontaneously evolved? As noted, language & brain co-evolved (see (Deacon, 1997)), so one might say mind & brain co-evolved. What happened to human experience that led to the natural selection self-related neural-networks?

I agree that since language & brain co-evolved (Deacon, 1997), so one might say mind & brain co-evolved. I guess, Nixon's rationale is that co-evolution involves real hard existential crisis and chaos, whereas soft easy going developmental rhythmic call and response behavior (*predictive behavior*) and/or spontaneous co-evolution is not

To sum up, in my view, (Nixon, 2010d; Nixon, 2010h) and (Hersch, 2010) are complementary to each other in some sense. Therefore, one can try bridging their two hypotheses by arguing that the developmental rhythmic call and response behavior (*predictive behavior*) of (Hersch, 2010) occurs first and then Nixon's *existential crisis*<sup>38</sup> (Nixon, 2010d) occur later and both contribute towards the emergence/occurrence of consciousness along with: (i) the *emotionally-based* knowledge, (ii) genetic imperative to survive and reproduce, (iii) contributions from cooperative communities, (iv) social Darwinism, (v) predictive behavior to fulfill biologically and psychologically compelled emotion related needs, and (vi) the pre-existence of SEs. In PE-SE framework, the individual consciousness is modulated (not *emerged*) by the *symbolic interaction among eusocial creatures*. In other words, social consciousness emerges from the interactions among individual consciousnesses (or interaction between brains)<sup>xii</sup>. This is because an individual must pick out *demonstratively* a specific SE even in materialism so it must pre-exist say in a *virtual reservoir*: a specific SE is selected from the *virtual reservoir* containing all kinds of *potential* SEs in superposed form as in hypothesis H<sub>1</sub> (Vimal, 2008b, 2010d) or SEs emerge from the interaction of a PE and relevant three-*gunas* as in hypothesis H<sub>2</sub> (Vimal, 2009g).<sup>39</sup> On the basis of evolution, (i) individual consciousness in *rudimentary form* might have occurred about 540 millions years ago (mya) during Cambrian explosion (Hameroff, 1998); (ii) symbolic, language-using, Homo sapiens (tribal-centric consciousness) emerged at around 150,000 years ago (kya) (Hersch, 2010), and (iii) self-centric or object-centric consciousness might have emerged at around 10 kya (Hersch, 2010). In summary, one can argue that *predictive behavior*, *existential crisis*, *chaotic emergent evolution*, and so on may all have their appropriate percent contribution in the evolution of individual consciousness and intersubjectivity; further research is needed to address the issue of their precise timeline and percent contribution.

## 10. Interaction between brains, inter-subjectivity, and social consciousness, and origin of individual consciousness

(Nixon, 2010c) proposes that the origin of individual consciousness is inter-subjectivity (second person perspective): "For the subjectivist, conscious origins tend to take off for more ethereal regions, above into the Great Beyond of transcendent spirituality. This is not the way we come to consciousness nor the way we experience it drawn through time. Percy, for example, sees

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going to cause co-evolution because it is within the normal range. However, in the life's timeline (of say 100 years), the sequence of developmental rhythmic call and response behavior occurs first because of newborn's development then the existential crisis such as death occurs at the end.

<sup>38</sup> (Nixon, 2010a) commented that call & response may have led to protolanguage (cf. (Bickerton, 2000)). One could argue that since call and response behavior may have led to protolanguage (Bickerton, 2000) that leads to language, developmental rhythmic call and response behavior contribute first then the existential crisis in our life time line.

<sup>39</sup> From my discussion with type-B materialists Levin and Papineau in (Vimal, 2009g), my view is that SEs must pre-exist to pick it out *demonstratively* and therefore materialism fails even after the most advance argument of PCS (phenomenal concept strategy) theory for type-B materialism. This failure supports our hypotheses H<sub>1</sub> (Vimal, 2010d) and H<sub>2</sub> (Vimal, 2009b).

conscious experience as evolving neither from third person materialism nor pre-existing in first person spirituality. He writes that ‘there has come into existence a relation which transcends the physico-causal relations obtaining among data. This relation is intersubjectivity. It is a reality which can no longer be understood in the instrumental terms of biological adaptation’ (1975, pp. 271-2). One might call intersubjectivity the second person perspective.”

According to (Adams, 2010b), “Nixon [(Nixon, 2010c)] tends to the view that subjectivity is self-knowing, or proto-knowing. While he supports the notion that the ‘self’ is merely a narrative structure, somewhat arbitrarily built and maintained by conversations in society, he seems to at the same time believe that ‘The recognition of the self is, in a sense, the objectification of the subject by the subject...’ The relationship between subjectivity and the self is never made explicit. The narrative self is the total set of stories we tell ourselves about who we are, but at the same time, ‘Subjectivity, then, is the experience of being the implied subject of discourse.’ Nixon suggests (but does not state) that subjectivity is a prerequisite for development of a narrative self, for subjectivity is necessary to define intersubjectivity, the awareness we have of each other’s minds.”

In dual-aspect-dual-mode PE-SE framework, self is SE of subject (Bruzzo & Vimal, 2007) seems somewhat consistent with Nixon’s self and subjectivity.<sup>XIII</sup> However, the origin of individual consciousness is the *virtual reservoir* (equivalent to the Nixon’s universal background of awareness) via relational organism-environment interaction, and this individual consciousness is later modulated by inter-subjectivity.<sup>40</sup>

(Nixon, 2010c) emphasizes language as a key factor for inter-subjectivity and conscious experiences: “Language acquisition is the final threshold, which requires the *assertion* of experience in speech and a consequent sense of subjectivity, *narrational practice* and its pronouns that make reference to such subjectivity, and the *intersubjective dynamic* by which we recognize and help create subjects in other persons (and who reflexively affect our own subjectivity) [p. 257]. [...] Being in itself or experience as such out of which our conscious experience arose is perhaps possible to identify with some attributes of the cultural construct we know as ‘nature’. [...] The view of primordial self-existence derives no doubt from the *reification* of the sense of self, the assumption that the self exists before language and communicates through language as another cultural tool. [...] (Lacan, 1977) makes it clear that, for whatever reason, it is an error of immense proportion to simply assume that there is a world of experience ‘out there’ or ‘in here’ previous to or beneath or beyond language to which we have access. [...] as Kerby indicated, this self has had its linguistic creation prepared for it before

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<sup>40</sup> (Nixon, 2010a) commented that it is unclear how this (individual consciousness is later modulated by inter-subjectivity) could be unless you are referring to something mystical like the *Atman* or soul.

I am not referring to *Atman* or soul as in Vedic system or religion, which is close to substance-dualism-and-property-dualism; rather my framework is a dual-aspect view that has substance-**monism**-and-property-dualism. The problem seems that our definitions are different: Nixon’s definitions are panexperientialism-based and mine are dual-aspect based. I do not see that Nixon is contradicting my view seriously on mental aspect (Vimal, 2010d). We both accept that individual consciousness is relational; in my dual-aspect framework, ‘relation’ involves organism-environment interaction, where environment may include all non-living and living entities (including other human individuals).

its biological birth and it will leave linguistic echoes after its biological demise. [...] all that is outside of language is non-conscious experience in a *reality* that is largely a construction of our biological human sensory and memory systems relating to the things in themselves. [...] Thought is built within language and language is the activity of a people.”

(Nixon, 2010c) discusses the decision making at preconscious level, the language hypothesis for conscious experiences, and the origin of conscious experience from nonconscious experience further as: “Libet (e.g., (Libet, 1992)), though questioned by some, have persuasively revealed that most conscious decision making takes place an entire half-second after brain activation readings show that subconscious neural processing has begun, indicating the actual decision takes place preconsciously. [...] Consciousness shades into the unconscious, into nonconscious experience, with vistas of information arriving both preconsciously and departing postconsciously. (Dennett, 1991) has famously insisted that consciousness does not even do that, that it is not even real but a mere side effect of language, the intentional fallacy. It seems clear, however, that even side effects have some reality. For (Velmans, 2009), consciousness has the vital role of making existence, things in themselves, real for us [p. 261]”.

If language is mandatory for conscious experiences, then how do we explain the conscious experiences of mute people who cannot speak, a subject who is isolated (such as in a prison cell) or animals that cannot speak? One could, however, argue for mental language for these cases.<sup>41</sup>

To address inter-subjectivity, we need to explain the second person perspective: “The term ‘second person’ is a grammatical term which describes the person whom the doer or the first person talks to. When you add the word perspective with the word it describes that something is being watched from the perspective of the second person.”<sup>42</sup>

In the dual-aspect dual-mode PE-SE framework,<sup>43</sup> *intersubjective dynamics* (second person perspective) is a part of developmental *neural Darwinism* where mind and brain (including self)

<sup>41</sup> (Nixon, 2010a) commented that if deaf-mutes never even learn to *comprehend* symbolic interaction, they have no means to become conscious of themselves. It is possible to enter the world of the symbolic (in which one finds oneself immersed) without being to speak or even understand particular words. Feral or brutally isolated children, I would argue, are not conscious (as in self-conscious) but they are experiencing. I have made the case that nonhuman animals experience emotions but are not conscious of that experience (not self-conscious).

Nixon’s definition of conscious experience is restricted to self-consciousness (and/or Block’s *access* or reportable consciousness), whereas my definition of SEs includes Nixon’s and also Block’s *phenomenal* (non-reportable) consciousness. Nixon would categorize the latter under non-conscious experiences. If this is correct, Nixon’s conscious experience should be qualified with ‘*access* or reportable’ to avoid confusion. It should be noted that pan-experientialism has explanatory gap problems; the dual-aspect framework does not have such problem. The latter framework is *optimal* (that has least number of problems) and is complementary to Type-B materialism in a sense that the dual-aspect view argues for mental aspect in addition to Type-B materialism’s physical aspect.

<sup>42</sup> Adapted from <http://www.blurtit.com/q163012.html>.

<sup>43</sup> Since every entity has mental and physical aspects in the dual-aspect dual-mode PE-SE framework, conscious robots are possible as discussed in (Vimal, 2010d). Our definition of *mind = experiences and/or functions* in (Vimal, 2010e) encompasses panpsychism.

co-develop including sensorimotor tuning between ‘I’ (first person perspective), ‘You’ (second person perspective), and ‘s/he, it’ (third person perspective). In other words, the *intersubjective dynamics of second person* perspective helps in co-tuning and co-developing the SEs of *first person* (‘I’) subjective perspective with related neural-correlates of *third person* (‘s/he, it’) objective perspective and *second person* (‘You’) intersubjective perspective.

This appears consistent with (Nixon, 2010f): “I do not classify my approach within the philosophical dichotomy of realism vs. idealism. Instead, I embrace Terrence Deacon’s co-evolution of language and the brain, each affecting change in the other, which is to say conscious experience [of objects including other interacting human beings] may depend on the brain [and] the brain is in turn changed by conscious experience (since for me language and symbol provided the context for human (self) consciousness). However this begs the question of experience in itself, since most of our experiencing, I believe, is unconscious.”

(de Quincey, 2010) compares the three (first, second and third person) perspectives: “on the one hand, investigations of third-person, objective, correlates (e.g. neuroscience and cognitive science) and investigations of first-person, subjective, experience and phenomena (e.g. introspection and meditation), on the other. These two perspectives set the terms of debate in contemporary consciousness research: Is consciousness first-person subjective or third-person objective? How can we bridge the ‘explanatory gap’ between objective brains and subjective minds? [...] Although the second-person perspective has been almost entirely overlooked in Western philosophy of mind, the notion of intersubjectivity actually has had significant proponents in other disciplines-such as linguistics, social psychology, psychotherapy, and anthropology.”

In addition, (de Quincey, 2010) proposes: (i) “that intersubjectivity is foundational to both a philosophical understanding of, and an experiential engagement with transpersonal phenomena” and (ii) “an evolutionary model of consciousness based on a distinction between intersubjective and interpersonal consciousness - a model that provides a philosophical foundation for the core insights of transpersonal psychology.” He argues that “in addition to methodologies of first-person subjectivity (exploring consciousness from ‘within’ through meditation and introspection), and third person objectivity (studying external correlates of consciousness, such as brains and neurons), a holistic science of consciousness would also expand to include second-person intersubjective methodology and epistemology<sup>44</sup> - to account for the inter-reflexivity of consciousness (subjectivity-reflected-in-subjectivity) in ‘I thou’ relationships. Whereas first-person methodologies, such as meditative practices, lead to ‘monologic’ consciousness (Whorf, 1956), second-person methodologies, such as Bohmian dialogue,<sup>45</sup> lead to ‘dialogic’

<sup>44</sup> See <http://en.wikipedia.org/wiki/Epistemology>

<sup>45</sup> “Bohm Dialogue (also known as Bohmian Dialogue) is a freely-flowing group conversation that makes an attempt, utilizing a theoretical understanding of the way thoughts relate to universal reality, to more effectively investigate the crises that face society, and indeed the whole of human nature and consciousness. [...] ‘when the 2nd person replies, the 1st person sees a *Difference* between what he meant to say and what the other person understood. On considering this difference, he may then be able to see something new, which is relevant both to his own views and to those of the other person. And so it can go back and forth, with the continual emergence of a new content that is common to both participants. Thus, in a dialogue, each person does not attempt to *make common* certain

consciousness (Bohm, 1985).” (de Quincey, 2010) further argues that ‘consciousness’ (awareness) can be either “contrasted with being unconscious (psychological meaning)”, or “contrasted with the complete absence of any mental activity whatsoever (philosophical meaning)”.

(de Quincey, 2010) argues for two kinds of subjectivity: In **Subjectivity-1**, “subjectivity means, essentially, a capacity for feeling that is intrinsic, or interior, to the entity under consideration--a what-it-feels-like-from within. The key notion here is ‘experienced interiority’ as distinct from vacuous (i.e. without experience) external relations. ... experience doesn't ‘happen to’ a subject, it is constitutive of the subject.” In **Subjectivity-2**, “subjectivity means an isolated, independent, self-sufficient locus of experience. Classically, this is the Cartesian ego, wholly private, and independent of all reality external to it. In the first case, subjectivity-1, experienced interiority is not automatically self-contained within its own private domain-- it is interior, but not necessarily independent or isolated. The question of whether it is self-contained or interdependent is left open: It is possible for subjectivity-1 to be either interior and shared, or interior and private. In this second, Cartesian, case, the subject is not only interior, it is self-contained and private. Such independent egos, or subjects--Leibniz called them ‘monads’--can communicate only via mediating signals, whereas subjectivity-1 can communicate by participating in shared presence. With subjectivity-1, interiority or feeling can be ‘intersubjective’ and precede individual subjects; in subjectivity-2, interiority is always private, and intersubjectivity, if it occurs, is always secondary.”

According to (de Quincey, 2010), (Kant, 1961) implies that as “an object, the ‘I’ becomes ‘me,’ and the spontaneity of the ‘I’ is obliterated. In short the subject can never become an object to itself. At best, the first-person ‘I’ recedes, and in its place an objectified third person ‘me’ appears. But this ‘me’-as-object lacks the very autonomy and spontaneity that is the characteristic essence of the ‘I’-as-subject. The ‘I’ is autonomous, creative and now; the ‘me’ is reflected, and therefore past (a habitual construct in memory, built up throughout a lifetime).”

This can be interpreted in terms of our dual-aspect dual-mode PE-SE framework (Vimal, 2010d) where the two modes are: (1) the non-tilde mode representing ‘I’ (in self-related feedback signals from cortical midline structures) and ‘me’ (in terms of past in a habitual construct built up throughout a lifetime in memory) as the cognitive nearest *past* approaching towards present and (2) tilde mode representing the feed forward stimulus related signals which pertains to the nearest future approaching towards present. “When the conjugate match is made between the two modes, the *world-presence (Now)* is disclosed” (Vimal, 2010d).<sup>46</sup>

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ideas or items of information that are already known to him. Rather, it may be said that two people are making something in *common*, i.e., creating something new together.’ (from [Bohm’s] *on dialogue*)” ([http://en.wikipedia.org/wiki/Bohm\\_Dialogue](http://en.wikipedia.org/wiki/Bohm_Dialogue)).

<sup>46</sup> According to (Vimal, 2010d), “We incorporate the dual-mode concept in our dual-aspect PE-SE (proto-experiences-subjective experience) framework. The two modes are: (1) the non-tilde mode that is the material and mental aspect of cognition (memory and attention) related feedback signals in a neural-network, which refers to the cognitive nearest past approaching towards present; and (2) the tilde mode that is the material and mental aspect of the feed forward signals due to external environmental input and internal endogenous input, which pertains to the nearest future approaching towards present and is a entropy-reversed representation of non-tilde mode. [...] We

By proposing ego/alter-ego framework, (de Quincey, 2010) addresses the critical question on individual-subjectivity vs. intersubjectivity raised by many investigators: “How can there be a circle of intersubjectivity unless there are subjects already present to start with?”<sup>47</sup> Mead recognized this problem and proposed as a solution that in the same moment the self encounters an alter ego—the moment ‘I’ encounter ‘you’—the concrete organism establishes a relationship to itself. ‘The self, as that which can be an object to itself, is essentially a social structure, and it arises in social experience’ ((Mead, 1962/1967), p.140). The self is thus ‘first encountered as a subject in the moment when communicative relations are established between organisms.’ ((Hohengarten, 1992), p. xvi). The self, thus, has two components: the theoretical ‘me,’ my consciousness of myself, and the practical ‘me,’ the agency through which I monitor my behavior (such as speaking)<sup>48</sup>. ‘The ‘I’ is the response of the organism to the attitudes of the others; the ‘me’ is the organized set of attitudes of others which one himself assumes’ ((Mead, 1962/1967), p.175). Hohengarten explains: This practical ‘me’ comes into existence when the subject establishes a practical relation to herself by adopting the normative attitude of an alter ego toward her own behavior. [...] such a conventionally constituted self is nonetheless a precondition for the emergence of a nonconventional aspect of the practical self: the practical ‘I,’ which opposes the ‘me’ with both presocial drives and innovative fantasy. [...] Yet the self is intersubjectively constituted through and through; the relationship to a community is what makes the practical relation-to-self possible ((Hohengarten, 1992), pp.xvi-xvii. ...). Mead’s emphasis on the intersubjective constitution of the self, of the subject’s sense of continuity and identity, accounts for self as an ‘individualized context’ for the contents of experience. But it still does not account for the ‘metacontext’--the non-individualized ontological context that underlies all contents of consciousness. [...] the essence of human being was relationship, and Buber gave

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propose that: (i) the *quantum conjugate matching* between *experiences* in the mental aspect of the tilde mode and that of the non-tilde mode is related more to the mental aspect of the quantum microtubule-dendritic-web and less to that of the non-quantum sub-pathways. And (ii) the classical *matching* between *experiences* in the mental aspect of the tilde mode and that of the non-tilde mode is related to the mental aspect of the non-quantum sub-pathways (such as classical axonal-dendritic neural sub-pathway). In both cases, a specific SE is *selected* when the tilde mode interacts with the non-tilde mode to *match* for a specific SE, and when the *necessary* ingredients of SEs (such as the formation of neural-networks, wakefulness, re-entry, attention, working memory, and so on) are satisfied. When the conjugate match is made between the two modes, the *world-presence (Now)* is disclosed.”

<sup>47</sup> (Nixon, 2010a) commented that individual subjects emerge in the process of learning to communicate symbolically. Language is haltingly co-invented by groups of speakers each of whom often finish what another has begun (as inspiration strikes). In this case, rudimentary language (felt to come from elsewhere, like the gods) precedes the internalization of language into thought and thus individual subjectivity. So, yes, 2nd person origin: Nixon likes it.

In my view, this seems to imply that rudimentary individual consciousness (that is relational and occurs during organism-environment (‘it’, ‘s/he’, and/or ‘you’) interactions) precedes intersubjectivity, which in turn sharpens the individual consciousness.

<sup>48</sup> (Nixon, 2010a) commented that the monitoring of emotional experience & its direction is a key component of conscious experience. I love the way de Quincey brings in Mead (though not so much Hohengarten).

Experimental data is necessary to test both hypotheses: individual consciousness is the result of intersubjectivity *versus* full blown individual consciousness is the result of (i) first organism-environment interaction for rudimentary individual consciousness, and (ii) then sharpening of rudimentary individual consciousness via intersubjectivity.

ontological status to the ‘between’—a mysterious force, ‘presence,’ or creative milieu, in which the experience of being a self arises. Relations, then, not the relata, were primordial, if not actually primary. ‘Spirit is not in the I but between I and You’ ((Buber, 1970), p.89). [...] Buber’s vision-replacing the notion of substance with dynamic relations.”

To sum up, the above inter-subjective hypothesis implies that *self* emerges during interaction between the subject (ego) and objects (alter ego and/or other persons) with contents of individual experience in the subject. However, this implication is controversial because (1) self as SE of subject without second person (You) is possible, especially during eye-closed meditation, but this happens after the sense of self is learned via language acquisition as per (Nixon, 2010a), and (2) ‘what is before interaction’ is unclear (perhaps it is individual consciousness or self!)<sup>XIV</sup>.

(de Quincey, 2010) critiques Buber: “Buber is not always consistent about whether the relationship, the ‘betweenness,’ is fundamental, or whether, as logic seems to require, any relationship must always be between some pre-existing entities.” Wheelwright summarizes Buber’s position in *Between Man and Man* as: “By nature each person is a single being, finding himself in company with other single beings; to be single is not to be isolated, however, and by vocation each one is to find and realize his proper focus by entering into relationship with others” ((Wheelwright, 1967), p.75).

The *betweenness* can be interpreted in terms of the dual-aspect-dual-mode PE-SE framework as follows: “In the *holoworld* framework (Globus, 2004; Globus, 2006; Globus, 1987; Globus, 1995; Globus, 1998, 2002; Globus, 2005; Globus, 2007) when the interaction occurs between (i) the non-tilde future (*an ‘alter time-reversed’ quantum mode*) approaching towards present and (ii) the tilde cognitive past (*‘our’ mode*) approaching towards present and the conjugate match is made, the ‘world-presence’ (‘Now’/‘present’) is disclosed in the match for the ‘belonging-together’ (Heidegger’s (Heidegger, 1927/1962) *zusammen-gehören* of *die Ursprung=belong together of the origin*) of a specific between-two. [...] In Vitiello’s framework (Vitiello, 1995; Vitiello, 2004), consciousness is generated *between-two* during the interaction of the brain system and its world environment, which are the two quantum modes. [...] Thus, the selected specific SE during conjugate matching between [two modes] (i) and (ii) is the real explicate state of the between-two in which the dual complex-valued modes belong-together at the juncture of the interaction of feed forward and feedback signals, for example, at V4/V8/VO neurons for color. [...] The between-two is explicate, world-thrown. [...] In quantum-thermofield framework (*restricted panpsychism* or panpsychism above coherence length) (Globus, 2009), subjectivity (intentionality) tunes the belonging-together of the *between-two*. [...] The dual-aspect-dual-mode PE-SE framework has the dual-aspect everywhere in each mode and also in the between-two: coming from the past (cognitive feedback signals, non-tilde mode), coming from future (stimulus dependent feed forward signals, tilde mode)<sup>49</sup> and the Now (between-two modes). For example, the mental aspect of a *between-two* is SE *redness* and the material-aspect of the *between-two* is the related V4/V8/VO neural-network and its activity when a trichromat views a red-ball. [...] the ‘experience’ is *denoted* by the *between-two*: ‘our thrownness in a world of qualities’ [...]

<sup>49</sup> The terms ‘tilde’ and ‘non-tilde’ used for in Globus’ *holoworld* framework and the dual-aspect-dual-mode PE-SE framework are just opposite.

Situatedness is not between-two but is one of the two. [...] The subjectivity (intentionality) tunes the belonging-together of the *between-two* modes (tilde and nontilde modes). What belongs-together is sensory input and *situatedness*, and this match explicates world-thrownness. [...] One could argue that the *between-two* is fully phenomenal -- world-like -- in the belonging-together of sensory input, intentional input (subjectivity) and re-traces. However, the 'world-like', the *phenomenal* or *access awareness* (Block, 2005) of world is mind-dependent reality. Thus, one could argue that the *between-two* (that denotes 'experience' and, in my view, equivalent to SE in the PE-SE framework for bridging purpose) also depends on the subjects. That is why, one could argue that the *between-two* for achromats is black-white world and that for the trichromats is color-world. [...] the 'subjective *between-two*' in the *holoworld* framework can be considered equivalent to 'subjective *experience*' in the PE-SE framework for bridging purpose. The *between-two* appears *subjective* because, for example, the *between-two* is the dark-gray ball for an achromat and the red ball for a trichromat for looking at the same long wavelength reflecting ball."

(de Quincey, 2010) elaborates (Jacques, 1991) position on the relationship between I, you, and he/she: "Jacques has developed a theory of 'being-as-speaking' and of the 'being-who-speaks.' He parts company with most other intersubjectivists, by presenting a tripartite schema of the subject--not just 'I' and 'thou,' but one that includes also 'he/she.' Self-identity, he says, results from integration of the three poles of any communication: 'by speaking to other and saying I, by being spoken to by others as you, or by being spoken of by others as a he/she that the subject would accept as appropriate' ((Jacques, 1991), p. xv). He takes issue with Buber who claimed that human beings become I and derive their interiority only when they encounter a you. Jacques argues that a human being becomes a personal self only when, in addition to I-thou, the 'otherness' of an absent third-party, he/she, is acknowledged." These positions potentiate the hypothesis that first, second, and third person all interact for the emergence of *full-blown* personal self.

The above inter-subjective hypothesis of (Jacques, 1991) implies that personal *self* emerges during interaction between all three perspectives: (i) first person ('I'), the subject (ego), (ii) second person (*thou*, objects: alter ego and/or other persons), and (iii) third person (s/he). However, one needs to explain the self during non-reportable *phenomenal* SE aspect of consciousness where attention is not necessary, i.e., (ii) and (iii) are missing.

(Habermas, 1992) proposes that ego (self) is intersubjective process mediated via language: "The ego, which seems to me to be given in my self-consciousness as what is purely my own, cannot be maintained by me solely through my own power, as it were for me alone--it does not 'belong' to me. Rather, this ego always retains an intersubjective core because the process of individuation from which it emerges runs through the network of linguistically mediated interactions<sup>50</sup> [p. 170] [...] The idealizing supposition of a universalistic form of life, in which everyone can take up the perspective of everyone else and can count on reciprocal recognition by everybody, makes it possible for individuated beings to exist within a community--individualism as the flip-side of universalism [p. 186]."

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<sup>50</sup> (Nixon, 2010a) still thinks that this *intersubjective core* is fear, specifically mortal fear.

This seems to address ‘what is before interaction’ to some extent: the ‘self before interaction’ is modified after intersubjective interaction via the process of individuation. This is consistent with the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d).

(de Quincey, 2010) proposes further that language is the key entity in the inter-subjective interaction (between first and second person) and in the emergence of social (inter-subjective) and individual consciousness while pointing out the problems of first and third person approaches: “Language engages speakers and hearers in such a way that both participate and risk themselves in communication. In the process, consciousness intersubjectively creates and reveals itself. We can identify three central elements of Habermas' work-- the three ‘Ps’: (1) emphasis on practice away from theory; (2) the public or intersubjective origin and role of language and meaning; and (3) the performative function of language [communicative action]. [...] Language and meaning unfold from the ‘dialogical’ reciprocity of ‘I-speakers’ and ‘you-listeners.’ [...] It is here, in Habermas, where ‘intersubjective agreement’ (through linguistic tokens) and ‘intersubjective co-creativity’ (through shared experience) come together. The first is a foundation for consensual scientific knowledge established between communicating individual subjects (Velmans, 1992). The second is true intersubjective mutual beholding--where the experience of self, of consciousness, arises as a felt experience from the encounter. [...] The standard approaches to the study of consciousness have bifurcated along apparently irreconcilable methodologies derived, respectively, from Cartesian-inspired philosophy of the subject (first-person epistemology) and from Hobbesian inspired philosophy of matter (third-person objects). In the first case, knowledge of the objective world remains problematic; in the second, knowledge of the knowing subject (of consciousness)--and therefore of all knowledge--is inexplicable and radically problematic. [...] We all use all three ways of knowing--objectivity, subjectivity, and intersubjectivity--in one form or another most of the time. We all deal with external material objects, we all feel what it is like to be a being from within, and we all participate and communicate with other human beings.”

In the dual-aspect dual-mode PE-SE framework, the self (SE of subject) could be modified by the interaction between first (‘I’), third (s/he, me), and second person (‘you’) entities.

The first-, second-, and third-person perspectives are elaborated further by (de Quincey, 2010) as: “We tend not to notice the second-person perspective because it is right in front of our noses everyday. It’s the medium in which we most naturally live. Whereas for third-person perspective we need to set up controlled (and artificial) laboratory experiments to induce (at least the illusion of) a separation between observer and observed, and thus step back, or step out of the stream of natural living and human interaction. This stepping-back allows us to notice the third-person perspective in action--because it's not ‘normal.’ Similarly, for first-person perspective: in meditation (or other contemplative or introspective) disciplines we ‘withdraw’ from the ‘normal’ world, and the subjective perspective shows up in contrast. [...] [In second person perspective, something] different happens in consciousness when we engage like this. Physicist David Bohm recognized this potential for consciousness exploration in his approach to ‘dialogue’ (Bohm, 1985; Bohm, 1996). [...] The ‘I’ that encounters you (as the locus of another ‘I’) is different from the ‘I’ that encounters the world as a conglomeration of ‘its.’ Who I am can be revealed (at

least partially) through my encounter with you, whereas I-as-‘I’ remain entirely unattainable if I encounter the world as merely a collection of ‘its.’ [...] There is something about the nature of consciousness, it seems, that requires the presence of the ‘other’ as another subject that can acknowledge my being. (When I experience myself being experienced by you, my experience of myself-- and of you--is profoundly enriched, and, in some encounters, even ‘transformed.’) [...] a second-person perspective to complement third- and first-person perspectives.”

In dual-aspect dual-mode PE-SE framework, the self (SE of subject) that is modulated by second-person interaction is indeed different from the self that is modified by inert objects (third person interaction),<sup>51</sup> which is different from the self-before-interaction (first person self),<sup>52</sup> but in a complementary manner and seems to be consistent with above to some extent.

(de Quincey, 2010) elaborates further various inter-subjective communal consciousnesses such as social consciousness as: “Consciousness, in other words, was originally communal, a property of the group. This sense remains today in forms of consciousness referred to, for example, as ‘social consciousness,’ ‘political consciousness,’ ‘feminist consciousness,’ ‘racial consciousness,’ and is manifested in such diverse groups as church congregations, religious movements, political parties, sports teams and fans, and religious and political cults. [...] ‘consciousness’ implied a dialogic process--an interaction or communication between two or more knowing beings. [...] Elements or facets of this emerging worldview would include, for example, the discovery of nonlocality in quantum physics (Albert, 1992); accumulating documentation of evidence for nonlocal psi phenomena (Schlitz & Braud, 1997); increased globalization of economies (Korten, 1995); awareness of ecological interdependence (Roszak, 1992); and, perhaps, even the globalization and interconnectedness of communications technologies such as satellite TV, telephones, and the Internet (Elgin, 1993; Russell, 1995). It is becoming less and less easy to deny our deep interconnectedness. We might also include in this list a growing awareness of the central [Nāgārjuna’s] doctrine of co-dependent arising in Buddhism [(Nāgārjuna & Garfield, 1995)], as it continues to spread into modernist, Western societies and worldviews (Macy, 1991). [...] We could say that standard third-person inquiry leads to a science of external bodies, first-person inquiry to an interior science of the mind, while second person engagement leads to a communal science of the heart. Whereas the ultimate ideal of objective knowledge is control, and the ultimate ideal of subjective knowledge is peace, the ultimate ideal of intersubjective knowledge is relationship--and, dare I say it, love” (de Quincey, 2010).

<sup>51</sup> In other words, here it seems to be the self that arises during organism-environment interaction, when the environment is composed of inert objects (third person interaction)

<sup>52</sup> According to (Nixon, 2010a), he and many of these sources do not think that ‘self-before-interaction’ exists.

According to pan-experientialism (that has problems) self-before-interaction is a non-conscious experience that arises from the universal background of experiences. According to dual-aspect dual-mode PE-SE framework (that has only one justifiable brute fact problem of dual-aspect assumption), self-before-interaction is the ‘SE of subject’, which is potentially superposed with other potential SEs in *virtual reservoir* (as per hypothesis H<sub>1</sub>) or is the result of the interaction between a PE and 3 relevant *gunas* (as per hypothesis H<sub>2</sub>) in the mental aspect of each entity (fermions, bosons, space-time, strings, loops etc).

One could argue second person perspective or inter-subjectivity is one of the necessary ingredients of *social consciousness*<sup>53</sup> as it is the result of interaction between brains, minds, and their environments, which is consistent with the Nagarjuna's dependent co-origination (which involves organism-environment interaction) (Vimal, 2009a).

(Nixon, 2010d) emphasizes that communion or inter-subjective consciousness precedes individual consciousness and is its source: "Communion of this depth is not seen elsewhere in nature, to our knowledge. It apparently was something new on Earth, preceding self-consciousness and personal identity. The foregoing demonstrates how primary intersubjectivity (see, e.g., (Gallagher, 2001)) is the garden from within which individual subjectivity later sprouts." On the hand, "'Theory of Mind' or 'mindreading' propositions (e.g., (Povinelli, 1999; Premack, 2004)) assume the primacy of a private subjectivity which must at a very young age somehow reason its way to comprehending other minds because others behave 'like me'. Primary intersubjectivity makes such ideas unnecessary" (Nixon, 2010d).

The controversy of inter-subjectivity vs. individualism can be addressed hypothesizing that both are the aspects of consciousness complementary to each other: inter-subjectivity is more related to the interaction between minds/brains,<sup>54</sup> which results the related social consciousness; and individualism is the property of single mind/brain interacting with its environment,<sup>55</sup> which is related to the SE aspect of consciousness. One could argue that the SEs aspect of consciousness can occur in a single brain via matching and selection mechanisms in the dual-aspect dual-mode PE-SE framework. When many brains interact with each other and with the their environment then *social consciousness* emerges via *social interaction mechanism(s)* that needs further research.

According to (Nixon, 2010d), evolution might have played important role in the emergence of inter-subjectivity and individual subjectivity: "Without archeological markers that indicate such activity or at least a species-wide fossil record of rounded skull bases that indicate the fallen larynx necessary for complex speech, there is no reason to guess that the leap into reflective

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<sup>53</sup> Here, the term 'social consciousness' also includes 'political consciousness,' 'feminist consciousness,' 'racial consciousness,' consciousness manifested in such diverse groups as church congregations, religious movements, political parties, sports teams and fans, religious and political cults, and so on. Other the necessary ingredients of consciousness are the formation of neural network, wakefulness, memory, re-entry (Edelman, 1993), attention, stimulus-above-threshold, neural-net PEs (Vimal, 2009f).

<sup>54</sup> According to (Nixon, 2010a), "intersubjectivity is more a social or cultural phenomenon than a physical one. Brains respond to our socially constructed modes of relationship. I agree with Bill Adams here."

The use of the term 'minds/brains' in place of 'brains' should address this problem because mind and brain are the two aspects of the same entity in our dual-aspect dual-mode PE-SE framework.

<sup>55</sup> (Nixon, 2010a) commented that the use of the term individualism may not be correct to apply it to a member of species acting according to species instincts.

In my view, we differ because Nixon's framework is panexperientialism and mine is dual-aspect view, where individualism is the property of single mind/brain interacting with its environment (consistent with Nagarjuna's dependent co-origination); environment when includes human subjects (you, s/he) leads to full blown individual consciousness.

conscious experience has been made. [...] In his [Giegerich's] article 'Killings' (Giegerich, 1993), he asserts that 'humanization came about precisely through man's killing activities. The birth of the Gods, piety, soul and consciousness, culture itself did not merely arise from the spirit of killing but from actual killings' (p. 8). [...] the reality of the *mythosphere* (Teilhard de Chardin, 1959), of the tribal and totemistic mind, also reveals the primacy of intersubjectivity. Intersubjectivity is a term open to many meanings but the way it is intended here is to imply something more than mere communication from isolated mental monad to isolated mental monad. [...] I agree with (Lacan, 1977) and later phenomenologists like (Merleau-Ponty, 1973) in taking the step of assuming the initial *identification* with others, usually the primary caregiver(s), — obvious in the case of the fetus in the mother but continuing for the infant. [...] (Gallagher, 2001) is correct in positing a primary intersubjectivity from which individual subjectivity emerges."

However one could still argue for first the emergence of *individual consciousness* from the organism-environment interaction, and then the interaction between brains and their minds leads to *inter-subjectivity* or *social consciousness*, rather than first the emergence of *social consciousness* or *inter-subjectivity* which then leads to *individual consciousness*. It is logical that inter-subjectivity in turn can alter/influence individual consciousness.<sup>56</sup>

Furthermore, according to (Nixon, 2010d), the origin of human self-consciousness is in the discovery of the *sacred* (symbolic consciousness): "prehumans underwent an existential crisis that could be resolved only by the discovery creation of the larger realm of symbolic consciousness we call *the sacred*. Thus, although we, the human species, are but one species among innumerable others, we differ in kind, not degree. This quality is our symbolically enabled self-consciousness, the *fortress* of cultural identity that empowers but also imprisons awareness."

To sum up, in our dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d), (i) the *existential crisis* and/or *biological crisis* can be interpreted as the motivation/cause of the formation of appropriate neural-networks (this is correct because experience alters the brain mapping as per (Nixon, 2010a)) including language related (Broca's areas, which include the ventral premotor cortex (PMv), Brodmann area 44 and 45) neural-network, and (ii) self (SE of subject) (Bruzzo & Vimal, 2007) occurred in brain when self-related neural-network were formed and necessary ingredients of consciousness (such as the formation of neural-networks, wakefulness, attention, re-entry (Edelman, 1993), memory, and so on) were satisfied (Vimal, 2009f). In other words, the materialistic (or physicalistic)<sup>57</sup> evolution, in Nixon's constructionist

<sup>56</sup> (Nixon, 2010a) commented that he does not see this because the use terms like "individual" are used very loosely. In my view, this is because Nixon's framework is panexperientialism and mine is dual-aspect view.

<sup>57</sup> For the materialistic evolution two examples are: (1) (Cassirer, 1946a; Cassirer, 1946b) emphasized that "the creativity found in the symbolic forms, but these are not Platonic forms dwelling eternally beyond Nature" (Nixon, 2010d). (2) Another example is: "Neuroscientist Antonio Damasio (Damasio, 2003) agrees that human consciousness emerged as a necessary response to a biological crisis: 'Confronting death and suffering can forcefully disrupt the homeostatic state. ... The yearning for homeostatic correctives would have begun as a response to anguish' (p. 271). He seems to agree that 'social emotions and feelings of empathy' that 'already were budding in nonhuman species' would be enough to bring on this life-threatening anguish, and that memory-extended

framework (Nixon, 2010b, 2010c) (perception of matter or SEs of subject (self) and objects are constructed by mind in MDR), certainly played useful role in which *symbolic consciousness* (the *sacred*) may have contributed to *self-consciousness* to some extent. However, the co-evolution and co-development (*neural Darwinism*) of mind and brain and the dual-aspect-dual-mode PE-SE framework are necessary in a complementary manner. Furthermore, the emphasis on *inter-subjectivity* (*second person* perspective) by (Nixon, 2010d) and (de Quincey, 2010) that individual self emerges from the interactions between ‘I’ and ‘You’ (two or more conscious brains) and their respective environment (dialogue philosophy) needs unpacking in terms of the dual-aspect-dual-mode PE-SE framework.<sup>58</sup> In other words, inter-subjectivity may modulate the attributes of already created/occurred individual-self in self-related neural-network (Northoff & Bermpohl, 2004; Northoff et al., 2006).

## 11. Summary and Conclusion

We summarize the our analysis in terms of dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d) as follows:

(I) Consciousness has two aspects: experience and function. These two aspects can exist together or separate depending on certain conditions: experience, function, or both function & experience. In other words, conscious experience, non-conscious experience, and non-experiential (or functional) consciousness are possible when we consider the general definition of consciousness that accommodates most metaphysical views: “*consciousness is a mental aspect of a system or a process, which is a conscious experience, a conscious function, or both depending on the context and particular bias (e.g. metaphysical assumptions)*”, where *experiences* can be conscious experiences and/or non-conscious experiences and *functions* can be conscious functions and/or non-conscious functions that include qualities of objects. These are *a posteriori* definitions because they are based on observations and the categorization” (Vimal, 2010e).

(II) One could argue for the continuum of consciousness, experience, and function because experience and function are the two aspects of consciousness<sup>59</sup> (Vimal, 2009e, 2010e).

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consciousness and imagination, unique to humans, compensated with hope and reverence. He even supplies an evolutionary rationale for the spread of such abstract thinking: ‘Those individuals whose brains were capable of imagining such correctives and effectively restoring homeostatic balance would have been rewarded by longer life and larger progeny’ (pp. 271-2)” (Nixon, 2010d).

<sup>58</sup> (Nixon, 2010a) does not see why, when neural changes can result from experience or behavioral changes.

This is because pan-experientialism has many problems and dual-aspect has only one justifiable problem of brute fact of dual-aspect. A specific SE is selected via matching process when stimulus dependent feed forward neural signals interact with cognitive feedback neural signals. Since structure, function, and experience are linked, if one changes it should affect other.

<sup>59</sup> (Nixon, 2010a) does not agree because consciousness is the quality of experience reflected back upon itself, not the other way round.

We differ because we have different frameworks. Nixon’s definition of conscious experience is limited to self-consciousness (experience reflected back upon itself, i.e., reportable *access* consciousness). Nixon does not include

(III) The origin of individual consciousness could be ‘a universal background of awareness’ (Nixon, 2010c), which is like a plenum or *virtual reservoir* (such as elementary particles). Our SEs of subject (self) and objects are: (a) stored *potentially* in superposed form and a specific SE is selected as needed via matching process<sup>60</sup> as in hypothesis H<sub>1</sub> or (b) derived from the interaction of a proto-experience (PE) with 3 *gunas* (qualities) as in hypothesis H<sub>2</sub> of the dual-aspect-dual-mode PE-SE framework (Vimal, 2008b, 2010d).

(IV) Physicalism (brain creates experience) versus constructivism (experience constructs the *appearance* of objects including brain) can be bridged via the dual-aspect-dual-mode PE-SE framework, where a specific SE is selected during matching process (Vimal, 2010d) and conscious experience constructs the perception/appearance/SE of external objects and to some extent can affect the processing of brain.

(V) Since mental and physical aspects are inseparable, the dual-aspect dual-mode PE-SE framework is consistent with classical double-aspectism. However, since the mental aspect is known via first person perspective and the physical aspect is known via third person perspective, it seems consistent with double-perspectivism in this sense.

(VI) The SEs aspect of consciousness constructs the mind-dependent reality (MDR); the mind-independent reality (MIR) is unknowable although mystics/yogis claim direct perception that is close to MIR.<sup>61</sup>

(VII) In the dual-aspect-dual-mode PE-SE framework, hard problems are Types 1-3 explanatory gaps (Vimal, 2009h, 2009i): Type-1 explanatory gap is how can SEs emerge from non-experiential matter? Type-2 is how can SEs pre-exist? Type-3 is how can we say MIR ~ MDR in physics? The hard problem of panexperientialism is how can experiences create matter in the mind independent reality? For example, how can experiences create World Trade Center from Ground Zero? Although it is understandable that experiences can construct the *appearance* of matter in mind dependent reality, but for this matter must pre-exist.

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non-reportable *phenomenal* consciousness in conscious experiences. In my framework, both *access* and *phenomenal* consciousnesses are included in first person SEs.

<sup>60</sup> (Nixon, 2010a) commented, “You’re not admitting it, but this does sound very much like G.O.D. & the creation of souls with individual destinies already decided. “Superposed form”? “selected” by whom or what?”

The concept of G.O.D. is close to substance-dualism-and-property-dualism. My framework is a dual-aspect view that has substance-**monism**-and-property-dualism. Dual-aspect’s God is discussed in (Vimal, 2009c): God might be a big bag of all interactive processes in terms of dual-aspect view; of course, processes related to creation, maintenance, and annihilation are included. The quantum superposition of *potential* SEs in the mental aspect of each entity, the selection of a specific SE via matching process, and neural Darwinism are detailed (Vimal, 2010b), which is very important to understand our dual aspect framework.

<sup>61</sup> (Nixon, 2010a) commented, “So they lose their minds?”

In my view, they (yogis) merge their minds with environment (any thing that surrounds a yogi including inert matter, force carriers, plant life, animals, human beings, and so on).

(VIII) The *predictive behavior* (developmental rhythmic call and response behavior: (Hersch, 2010)) occurs first and then *existential crisis* (Nixon, 2010d) occurs later<sup>62</sup>; and both contribute towards the emergence of consciousness. On the basis of evolution, (a) individual consciousness in *rudimentary form* might have occurred about 540 mya during Cambrian explosion<sup>63</sup> (Hameroff, 1998), (b) symbolic, language-using, Homo sapiens (tribal-centric consciousness) emerged at around 150 kya (Hersch, 2010),<sup>64</sup> and (iii) self-centric or object-centric consciousness might have emerged at around 10 kya (Hersch, 2010).

(IX) In our PE-SE framework (Vimal, 2008b, 2010d), (a) the *existential crisis*, *biological crisis*, and *predictive behavior* can be interpreted as the motivation/cause of the formation of appropriate neural-networks including the neural-network for languages, and (b) self (SE of subject) (Bruzzo & Vimal, 2007) occurred in brain when self-related neural-network were formed and necessary ingredients of consciousness were satisfied (Vimal, 2009f). (c) The co-evolution, co-development, and co-tuning via sensori-motor interaction (*neural Darwinism*) of mind and brain and the dual-aspect-dual-mode PE-SE framework are necessary in a complementary way to physicalism. Inter-subjectivity can modulate the attributes of already created/occurred individual-self in self-related neural-network (Northoff & Bermpohl, 2004; Northoff et al., 2006).

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<sup>62</sup> Since Nixon does agree, so it is debatable. My arguments is based on timeline in our life time of about 100 yrs as death occurs at the end of life, and developmental neural Darwinism occurs since baby is born and of course before death. Perhaps, Nixon's argument is based on co-evolution over millions of years, where I tend to agree with him and also (Hersch, 2010). Both *predictive behavior* and *existential crisis* may have percent contribution in the emergence of consciousness.

<sup>63</sup> (Nixon, 2010a) commented that by "individual", Hameroff presumably meant *separate bodies*.

My impression is that (Hameroff, 1998) is talking about the emergence of consciousness that may include interactions between *brains/bodies* and environment during Cambrian explosion. He some times follows neutral monism (mind and matter are aspects of third neutral entity) (Hameroff & Powell, 2009), which is close to dual-aspect view (in which there is no third entity).

<sup>64</sup> As per (Nixon, 2010a), protolanguage (Bickerton, 2000) was probably in use by *H. erectus*, much earlier and symbolic self-consciousness was ca. 60 kya.

## Competing interests statement

The author declares that he has no competing financial interests.

## References

- Acerbi, L. (2008). The Epiontic Principle, Time and the Laws of Physics. [http://www.fqxi.org/data/essay-contest-files/Acerbi\\_acerbiepionticprinci.pdf](http://www.fqxi.org/data/essay-contest-files/Acerbi_acerbiepionticprinci.pdf).
- Adams, W. A. (2010a). The Edges of Experience and Beyond: Review of "Interactions among Minds/Brains: Individual Consciousness and Inter-subjectivity in Dual-Aspect Framework" by Ram Lakhan Pandey Vimal. *Journal of Consciousness Exploration & Research*, Available: wiladams@brandman.edu; <http://sites.google.com/site/billadamsphd/>. Personal email communication in June 2010.
- Adams, W. A. (2010b). Playing With Your Food: Review of "Hollows of Experience" by Greg Nixon. *Journal of Consciousness Exploration & Research*, 1(3), 342-345.
- Albert, D. Z. (1992). *Quantum mechanics and experience*. Cambridge, MA: Harvard University Press.
- Baars, B. J. (1988). *A cognitive theory of consciousness*. New York: Cambridge University Press.
- Balint, R. (1909). Seelenlähmung des "Schauens", optische Ataxia, räumliche Störung der Aufmerksamkeit. *Monatsschrift für Psychiatrie und Neurologie*, 25, 51-81.
- Bartels, A., & Zeki, S. (2000). The architecture of the colour centre in the human visual brain: new results and a review. *Eur J Neurosci*, 12, 172-193.
- Becker, E. (1973). *The Denial of Death* (Vol.). New York: Simon & Schuster.
- Bell, J. (1990, August). Against measurement. *Physics World*, 33-40.
- Bickerton, D. (2000). How protolanguage became language. In C. Knight & J. R. Hurford & M. Studdert-Kennedy (Eds.), *The Evolutionary Emergence of Language: Social Function and the Origins of Linguistic Form*. Cambridge: Cambridge University Press.
- Block, N. (2005). Two neural correlates of consciousness. *TRENDS in Cognitive Sciences*, 9(2), 47-52.
- Bohm, D. (1985). *Unfolding meaning: A weekend of dialogue*. London, UK: Routledge.
- Bohm, D. (1996). On Dialogue. In L. Nichol (Ed.). London: Routledge.
- Bruzzo, A. A., & Vimal, R. L. P. (2007). Self: An adaptive pressure arising from self-organization, chaotic dynamics, and neural Darwinism. *Journal of Integrative Neuroscience*, 6(4), 541-566.
- Buber, M. (1970). *I and thou*. New York: Charles Scribners Sons.
- Caponigro, M., Prakash, R., & Vimal, R. L. P. (2010). Observing is always quantum: the Implicate Order. In *preparation*, Available: <http://sites.google.com/site/rlpvimal/Home/2010-Caponigro-Prakash-Vimal-OBO-LVCR-2013-2018.pdf>.
- Carruthers, P. (2007). Higher-Order Theories of Consciousness. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2009 Edition) (pp. Available: <<http://plato.stanford.edu/archives/spr2009/entries/consciousness-higher/>>).
- Cassirer, E. (1946a). *Language and Myth* (S. K. Langer, Trans.). New York: Dover.
- Cassirer, E. (1946b). *The Myth of the State*. New Haven & London: Yale UP.
- Chalmers, D. J. (1995). Facing up to the problem of consciousness. *Journal of Consciousness Studies*, 2, 200-219.
- Chalmers, D. J. (1996). *The Conscious Mind: in Search of a Fundamental Theory*. New York: Oxford Univ. Press.
- Chalmers, D. J. (2000). What is a neural correlate of consciousness? In T. Metzinger (Ed.), *Neural correlates of consciousness – empirical and conceptual questions* (pp. 17-40). Cambridge, MA: MIT Press.
- Chalmers, D. J. (2010). Strong and Weak Emergence. <http://consc.net/papers/emergence.pdf>.
- Damasio, A. (2003). *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain*. Orlando FL: Harcourt.
- de Quincey, C. (2010). *Intersubjectivity: Exploring Consciousness from the Second-Person Perspective*. Available: <http://www.deepspirit.com/sys-tmpl/intersubjectivity/>; <http://www.deepspirit.com/sys-tmpl/intersubjectivity2/>; <http://www.deepspirit.com/sys-tmpl/intersubjectivity3/>; <http://www.deepspirit.com/sys-tmpl/intersubjectivity4/> [2010, April 27].
- Deacon, T. W. (1997). *The Symbolic Species: The Co-Evolution of Language and the Brain*. New York: W. W. Norton & Company.
- Dennett, D. C. (1991). *Consciousness Explained*. Boston: Little, Brown and Company.
- Dirac, P. (1930). *The Principles of Quantum Mechanics*. Oxford: Clarendon.

- Donald, M. (1991). *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge, MA: Harvard University Press.
- Donald, M. (2001). *A Mind So Rare: The Evolution of Human Consciousness*. New York: W.W. Norton.
- Edelman, G. M. (1989). *Neural Darwinism: The Theory of Group Neuronal Selection*. Oxford: Oxford University Press.
- Edelman, G. M. (1993). Neural Darwinism: selection and reentrant signaling in higher brain function. *Neuron*, 10(2), 115-125.
- Eklavya. (2010). Brainwaves Frequencies and their characteristics, *Instant Meditation: The Concept (Introduction to Brainwaves & EEG)*: [http://www.meditationiseasy.com/instant\\_meditation/brain\\_waves\\_frequencies.php](http://www.meditationiseasy.com/instant_meditation/brain_waves_frequencies.php).
- Elgin, D. (1993). *The awakening earth: Exploring the evolution of human culture and consciousness*. New York: William Morrow.
- Everett, H. (1957). "Relative state" formulation of quantum mechanics. *Rev. Mod. Phys.*, 29, 454-462.
- Feigl, H. (1967). *The 'Mental' and the 'Physical', The Essay and a Postscript*. Minneapolis: University of Minnesota Press.  
See also, *The 'mental' and the 'physical'*. *Minnesota Studies in the Philosophy of Science*, 2, 370-497.
- Fock, V. (1971a). The principle of relativity with respect to observation in modern physics. *Vestnik AN SSSR*, 4, 8-12.
- Fock, V. (1971b). Quantum physics and philosophical problems. *Foundations of Physics*, 1.(4), 293-306.
- Gallagher, S. (2001). The practice of mind: Theory, simulation or primary interaction. *Journal of Consciousness Studies*, 8(5-7), 83-108.
- Giegerich, W. (1993). 'Killings'. *Spring 54: A Journal of Archetype and Culture: The Reality Issue (Putnam CT: Spring Journal)*, 5-18.
- Glaserfeld, E. v. (1985). Einführung in den radikalen Konstruktivismus. In P. Watzlawick (Ed.), *Die erfundene Wirklichkeit. Wie wissen wir, was wir zu wissen glauben? (English version 'Invented Reality: How Do We Know What We Believe We Know?')*. München, Zürich: Piper.
- Globus, G. (2004). Dual mode ontology and its application to the Riemann Hypothesis. In G. Globus & K. Pribram & G. Vitiello (Eds.), *Brain and Being: At the boundary between science, philosophy, language and arts*. Amsterdam: John Benjamins.
- Globus, G. (2006). The Saltatory Sheaf-Odyssey of a Monadologist. *NeuroQuantology*, 4(3), 210-221.
- Globus, G. (2009). Halting the descent into panpsychism: A quantum thermofield theoretical perspective (Chapter 3). In D. Skrbina (Ed.), *Mind that abides: Panpsychism in the new millennium* (pp. 67-82). Amsterdam: John Benjamins.
- Globus, G. G. (1987). *Dream Life, Wake Life: The Human Condition Through Dreams*. New York: SUNY Press.
- Globus, G. G. (1995). Quantum Consciousness is Cybernetic. *PSYCHE*, 2 (21).
- Globus, G. G. (1998). Self, Cognition, Qualia and World in Quantum Brain Dynamics. *Journal of Consciousness Studies*, 5(1), 34-52.
- Globus, G. G. (2002). Ontological implications of quantum dynamics. In K. Yasue & M. Jibu & T. Della Senta (Eds.), *No Matter Never Mind: Proceedings of Toward a Science of Consciousness: Fundamental Approaches (Tokyo '99)* (pp. 137-143). Amsterdam: John Benjamins Publishing Company.
- Globus, G. G. (2005). The being/brain problem. *NeuroQuantology*, 4, 256-263.
- Globus, G. G. (2007). Mind, Matter, and Monad. *Mind and Matter*, 5(2), 201-214.
- Grinbaum, A. (2007). Reconstruction of quantum theory. *British Journal for the Philosophy of Science*, 58, 387-408.
- Grinbaum, A. (2010). A Mathematical Criterion of "Element of Reality". <http://arxiv.org/abs/1007.2756v1>.
- Habermas, J. (1992). *Postmetaphysical thinking*. Cambridge, MA: MIT Press.
- Hadjikhani, N., Liu, A. K., Dale, A. M., Cavanagh, P., & Tootell, R. B. (1998). Retinotopy and color sensitivity in human visual cortical area V8. *Nat Neurosci*, 1(3), 235-224; Comment in: *Nat Neurosci* 1998 Jul;1991(1993):1171-1993. Comment in: *Nat Neurosci* 1998 Sep;1991(1995):1335-1996.
- Hameroff, S. (1998). Did Consciousness Cause the Cambrian Evolutionary Explosion? In S. R. Hameroff & A. W. Kaszniak & A. C. Scott (Eds.), *Toward a Science of Consciousness II: The Second Tucson Discussions and Debates* (pp. 421-437). Cambridge, MA: MIT Press. <http://www.quantumconsciousness.org/penrose-hameroff/cambrian.html>.
- Hameroff, S., & Powell, J. (2009). The Conscious Connection: A Psycho-physical Bridge between Brain and Panexperiential Quantum Geometry (Chapter 5). In D. Skrbina (Ed.), *Mind That Abides: Panpsychism in the New Millennium* (pp. 109- 127). Amsterdam: John Benjamins Publishing Company.
- Heidegger, M. (1927/1962). *Being and time* (J. Macquarrie & E. Robinson, Trans.). New York: Harper & Row.
- Hermann, G. (1935). Die naturphilosophischen Grundlagen der Quantenmechanik. *Abhandlungen der Fries'schen Schule*, 6, 75-152.
- Hersch, M. (2010). The Predictive Mind and Mortal Knowledge. *Journal of Consciousness Exploration & Research*, 1(3), 354-368.
- Hohengarten, M. (1992). *Postmetaphysical thinking*. In J. Habermas (Ed.). Cambridge, MA: MIT Press.

- Hunt, H. T. (1995). *On the nature of consciousness: Cognitive, phenomenological, and transpersonal perspectives*. New Haven, CT: Yale University Press.
- Jacques, F. (1991). *Difference and subjectivity: Dialogue and personal identity* (A. Rothwell, Trans.). New Haven: Yale University Press.
- Jammer, M. (1974). *The Philosophy of Quantum Mechanics*: John Wiley and Sons (pp. 207-211).
- Jarvilehto, T. (2010). Consciousness as Shared and Categorized Result of Experience. *Journal of Consciousness Exploration & Research*, 1(3), 369-371.
- Kant, I. (1787/1996). *Critique of Pure Reason* (Werner Pluhar, Trans. 2nd ed.). Indianapolis: Hackett (Original Kritik der reinen Verkunst. Königsberg, 1787).
- Kant, I. (1950). *The Critique of Pure Reason* (K. Smith, Trans.). transl. Kemp Smith, London.
- Kant, I. (1961). The critique of pure reason. In W. Kaufmann (Ed.), *Philosophic classics: Bacon to Kant*. New Jersey: Prentice-Hall (Original German work (A) published 1781). (Second edition (B), published 1787).
- Korten, D. (1995). *When corporations ruled the world*. San Francisco: Berrett-Koehler.
- Lacan, J. (1977). *Ecrits* (A. Sheridan, Trans.). New York: Norton.
- Levin, J. (2006). What is a Phenomenal Concept? In T. Alter & S. Walter (Eds.), *Phenomenal Concepts and Phenomenal Knowledge. New essays on Consciousness and Physicalism*. Oxford: Oxford University Press.
- Levine, J. (1983). Materialism and qualia: The explanatory gap. *Pacific Philosophical Quarterly*, 64, 354-361.
- Libet, B. (1992). Models of Conscious Time and the Experimental Evidence. *Behavioral and Brain Sciences*, 15(2), 213-275.
- Macy, J. (1991). *Mutual causality in Buddhism and general systems theory: The dharma of natural systems*. Albany, NY: SUNY.
- Mead, G. H. (1962/1967). *Mind, self, & society: From the standpoint of a social behaviorist*. Chicago: University of Chicago Press.
- Merleau-Ponty, M. (1973). *Consciousness and the Acquisition of Language* (H. J. Silverman, Trans.). Evanston, IL: Northwestern UP.
- Milner, D., & Goodale, M. (1995). *The Visual Brain in Action*. Oxford: Oxford University Press.
- Monteiro, M. (2009). *Model of man: mind & matter - mind & morality*. New York: AEG Publishing Group.
- Monteiro, M. (2010). Commentary on Nixon's Three Papers. *Journal of Consciousness Exploration & Research*, 1(3), 373-376.
- Müller, H. F. J. (2008). *Subjects and Brains*. Posted in the Karl Jaspers Forum <http://www.kjf.ca/102-104-C4MUL.htm> as Commentary 4 (to R4) on TAs 102-104 (Vimal), 2 February 2008; see Vimal's reply at <<http://www.kjf.ca/102-104-R5MUL.htm>>.
- Nāgārjuna, & Garfield, J. L. (1995). *The Fundamental Wisdom of the Middle Way: Nāgārjuna's Mūlamadhyamakakārikā* (J. L. Garfield, Trans.). New York, Oxford: Oxford University Press (Translation and commentary by J. L. Garfield).
- Nagel, T. (1974). What is it like to be a bat? *Philosophical Review*, 83, 435-450.
- Nietzsche, F. W. (1968). *The Will to Power* (W. Kaufmann & R. J. Hollingdale, Trans. (Notes written: 1883-1888), (First Edition: 1901) ed.). New York: Vintage Books.
- Nixon, G. (2010a). Personal communication via email in May-June.
- Nixon, G. M. (2010b). From Panexperientialism to Individual Self Consciousness: The Continuum of Experience. *Journal of Consciousness Exploration & Research* [Available: <http://www.jcer.com/index.php/jcj/article/view/21/19>], 1(3), 216-233.
- Nixon, G. M. (2010c). Hollows of Experience. *Journal of Consciousness Exploration & Research* [Available: <http://www.jcer.com/index.php/jcj/article/view/22/20>], 1(3), 234-288.
- Nixon, G. M. (2010d). Myth and Mind: The Origin of Human Consciousness in the Discovery of the Sacred. *Journal of Consciousness Exploration & Research* [Available: <http://www.jcer.com/index.php/jcj/article/view/23/21>], 1(3), 289-337.
- Nixon, G. M. (2010e). Process philosophy. *Journal of Consciousness Exploration & Research*, 1 (5), Forthcoming.
- Nixon, G. M. (2010f). Response to the Commentary of Alfredo Pereira, Jr. (The Sensible Hollowing Itself Out). *Journal of Consciousness Exploration & Research*.
- Nixon, G. M. (2010g). Response to the Commentary of Frederick D. Abraham. *Journal of Consciousness Exploration & Research*, 1(3), 390.
- Nixon, G. M. (2010h). Response to the Commentary of Marc Hersch. *Journal of Consciousness Exploration & Research*, 1(3), 395-398.
- Nixon, G. M. (2010i). Response to the Commentary of Ram Lakhan Pandey Vimal. *Journal of Consciousness Exploration & Research*.
- Nixon, G. M. (2010j). Response to the Commentary of Syamala Hari. *Journal of Consciousness Exploration & Research*, 1(3), 393-394.

- Northoff, G., & Bermpohl, F. (2004). Cortical midline structures and the self. *Trends Cogn Sci*, 8(3), 102-107.
- Northoff, G., Heinzel, A., de Greck, M., Bermpohl, F., Dobrowolny, H., & Panksepp, J. (2006). Self-referential processing in our brain--a meta-analysis of imaging studies on the self. *Neuroimage*, 31(1), 440-457.
- Pattee, H. H. (1995). Evolving self-reference: Matter, symbols, and semantic closure. *Communication and Cognition - Artificial Intelligence*, 12(1-2), 9-27. Special Issue: Self-Reference in Biological and Cognitive Systems, L. Rocha, ed.
- Pereira Jr., A. (2010). Hollows of a Science of Consciousness? *Journal of Consciousness Exploration & Research*, 1(3), 379-380.
- Pereira Jr., A., & Ricke, H. (2009). What is Consciousness? Towards a Preliminary Definition. *Journal of Consciousness Studies: Special Issue on Defining consciousness* (Ed. Chris Nunn), 16(5), 28-45.
- Perrett, R. W. (2003). Intentionality and Self-Awareness. *Ratio*, 16(3), 222-236.
- Povinelli, D. (1999, Dec 11). Chimps or chumps? *The Economist*, 81.
- Powell, L. J., Macrae, C. N., Cloutier, J., Metcalfe, J., & Mitchell, J. P. (2010). Dissociable neural substrates for agentic versus conceptual representations of self. *J Cogn Neurosci*, 22(10), 2186-2197.
- Premack, D. (2004). Psychology. Is language the key to human intelligence? *Science*, 303(5656), 318-320.
- Rosen, S. M. (2010). Comment on Gregory Nixon's "From Panexperientialism to Individual Self Consciousness". *Journal of Consciousness Exploration & Research*, 1(3), 381-382. See also Rosen's website: [www.embodyingcyberspace.com](http://www.embodyingcyberspace.com).
- Rosenthal, D. (2009). Concepts and definitions of consciousness. In P. W. Banks (Ed.), *Encyclopedia of Consciousness* (pp. Available at [davidrosenthal1.googlepages.com/elsevier.pdf](http://davidrosenthal1.googlepages.com/elsevier.pdf)). Amsterdam: Elsevier.
- Rozzak, T. (1992). *The voice of the earth*. New York: Simon & Schuster.
- Rovelli, C. (1996). Relational quantum mechanics. *Int. J. of Theor. Phys.*, 35, 1637.
- Rowlatt, P. (2009). Consciousness and Memory. *Journal of Consciousness Studies: Special Issue on Defining consciousness* (Ed. Chris Nunn), 16(5), 68-78.
- Russell, P. (1995). *The global brain awakens: Our next evolutionary leap*. Palo Alto, CA: Global Brain Inc.
- Scheff, T. J. (Ed.). (2006). *Goffman Unbound! A New Paradigm for Social Science (The Sociological Imagination)*. Boulder, London: Paradigm Publishers.
- Schlitz, M., & Braud, W. (1997). Distant intentionality and healing: assessing the evidence. *Altern Ther Health Med*, 3(6), 62-73.
- Sion, A. (2008). Chapter 1. Kant's transcendental reality, *A Short Critique of Kant's Unreason*: [Available: [http://www.thelogician.net/6\\_reflect/6\\_Book\\_2/6b\\_chapter\\_01.htm](http://www.thelogician.net/6_reflect/6_Book_2/6b_chapter_01.htm)].
- Smetham, G. (2010). Quantum Karma: Bohm's Implicate Order, Wheeler's Participatory Universe, Stapp's Mindful Universe, Zurek's Quantum Darwinism and the Buddhist Mind-Only Ground Consciousness (Alayavijnana). *Manuscript in prepration* (Available: [graham.smetham@googlemail.com](mailto:graham.smetham@googlemail.com)).
- Sperling, G. (1960). The information available in brief visual presentations. *Psychological Monographs*, 74(11), 1-29.
- Stapp, H. P. (1996). The hard problem: a quantum approach. *Journal of Consciousness Studies*, 3(3), 194-210.
- Stapp, H. P. (2006). Quantum Approaches to Consciousness. In M. Moskovitch & P. Zelazo (Eds.), *Cambridge Handbook of Consciousness*. Cambridge U. K.: Cambridge Univ. Press [<http://www-physics.lbl.gov/~stapp/stappfiles.html>].
- Teilhard de Chardin, P. (1959). *The Phenomenon of Man* (B. Wall, Trans.). London: William Collins Sons.
- Tootell, R. B. H., Tsao, D., & Vanduffel, W. (2003). Neuroimaging Weighs In: Humans Meet Macaques in "Primate" Visual Cortex. *The Journal of Neuroscience*, 23(10), 3981-3989.
- Torrance, S. (2009). Contesting the concept of consciousness. *Journal of Consciousness Studies: Special Issue on Defining consciousness* (Ed. Chris Nunn), 16(5), 111-126.
- Trehub, A. (2007). Space, self, and the theater of consciousness. *Conscious Cogn*, 16, 310-330.
- Velmans, M. (1992). Symposium: Consciousness and the physical world. *Philosophical Psychology*, 5(2), 155.
- Velmans, M. (2009). *Understanding Consciousness* (2nd ed.). London & Philadelphia: Routledge/Taylor & Francis Group.
- Vimal, R. L. P. (1997). Orientation tuning of the spatial-frequency-tuned mechanisms of the Red-Green channel. *Journal of the Optical Society of America A*, 14, 12622-12632; Errata, *J. Opt. Soc. Am. A* 12615, 12758.
- Vimal, R. L. P. (1998a). Color-luminance interaction: data produced by oblique cross masking. *J Opt Soc Am A Opt Image Sci Vis*, 15(7), 1756-1766; Errata, *J. Opt. Soc. Am. A* 1715, 2931.
- Vimal, R. L. P. (1998b). Spatial-frequency tuning of sustained nonoriented units of the Red-Green channel. *J Opt Soc Am A Opt Image Sci Vis*, 15(1), 1-15.
- Vimal, R. L. P. (2000). Spatial color contrast matching: broad-bandpass functions and the flattening effect. *Vision Research*, 40(23), 3231-3243.

- Vimal, R. L. P. (2002a). Spatial frequency discrimination: a comparison of achromatic and chromatic conditions. *Vision Research*, 42(5), 599-611.
- Vimal, R. L. P. (2002b). Spatial frequency tuned mechanisms of the Red-Green channel estimated by oblique masking. *J. Opt. Soc. Am. A Opt Image Sci Vis*, 19(2), 276-288.
- Vimal, R. L. P. (2008a). Attention and Emotion. *The Annual Review of Biomedical Sciences (ARBS)* [Available: <http://sites.google.com/site/rlpvimal/Home/2008-Vimal-Attention-and-Emotion-ARBS-139>; updated and extended version is available at <http://sites.google.com/site/rlpvimal/Home/2010-Vimal-Attention-and-Emotion-LVCR-3-8.pdf>], 10, 84-104.
- Vimal, R. L. P. (2008b). Proto-experiences and Subjective Experiences: Classical and Quantum Concepts. *Journal of Integrative Neuroscience*. [Available at <http://sites.google.com/site/rlpvimal/Home/2008-Vimal-PE-SE-classical-quantum-IIN-0701-P49.pdf>], 7(1), 49-73.
- Vimal, R. L. P. (2009a). Dependent Co-origination and Inherent Existence: Dual-Aspect Framework. *Vision Research Institute: Living Vision and Consciousness Research* [Available: <http://sites.google.com/site/rlpvimal/Home/2009-Vimal-Coorigination-LVCR-2-7.pdf>], 2(7), 1-50.
- Vimal, R. L. P. (2009b). Derivation of Subjective Experiences from a Proto-experience and three Gunas in the Dual-Aspect-Dual-Mode Framework. *Vision Research Institute: Living Vision and Consciousness Research* [Available: <http://sites.google.com/site/rlpvimal/Home/2009-Vimal-Guna-LVCR-2-5.pdf>], 2(5), 1-140.
- Vimal, R. L. P. (2009c). Dual Aspect Framework for Consciousness and Its Implications: West meets East for Sublimation Process. [Longer and corrected version is available: <http://sites.google.com/site/rlpvimal/Home/2009-Vimal-Consciousness-and-its-implications-recent-version-LVCR-2-11.pdf>]. In G. Derfer & Z. Wang & M. Weber (Eds.), *The Roar of Awakening. A Whiteheadian Dialogue Between Western Psychotherapies and Eastern Worldviews*. (Vol. 3 of Whitehead Psychology Nexus Studies, pp. 39-70). Frankfurt / Lancaster: Ontos Verlag.
- Vimal, R. L. P. (2009d). Matching and selection of a specific subjective experience: conjugate matching and subjective experience. *In press: Journal of Integrative Neuroscience*, 8(3), Longer version is available at <http://sites.google.com/site/rlpvimal/Home/Selection-matching-Vimal-LVCR-2009-XII.pdf>.
- Vimal, R. L. P. (2009e). Meanings attributed to the term 'consciousness': an overview. *Journal of Consciousness Studies: Special Issue on Defining consciousness* (Ed. Chris Nunn) [Available: <http://sites.google.com/site/rlpvimal/Home/2009-Vimal-Meanings-LVCR-2-10.pdf>], 16(5), 9-27.
- Vimal, R. L. P. (2009f). Necessary Ingredients of Consciousness: Integration of Psychophysical, Neurophysiological, and Consciousness Research for the Red-Green Channel. *Vision Research Institute: Living Vision and Consciousness Research* [Available at <http://sites.google.com/site/rlpvimal/Home/2009-Vimal-Necessary-Ingredients-Consciousness-LVCR-2-1.pdf>], 2(1), 1-40.
- Vimal, R. L. P. (2009g). Pre-existence of Subjective Experiences in Type-B Materialism: Bridging Materialism and Anti-materialism via Dual-Aspect Optimal Framework. *Vision Research Institute: Living Vision and Consciousness Research* [Available: <http://sites.google.com/site/rlpvimal/Home/2009-Vimal-Bridging-Materialism-and-antiMaterialism-LVCR-2-2.pdf>], 2(2), 1-85.
- Vimal, R. L. P. (2009h). Subjective Experience Aspect of Consciousness Part I - Integration of Classical, Quantum, and Subquantum Concepts. *NeuroQuantology* [Available: <http://sites.google.com/site/rlpvimal/Home/2009-Vimal-PE-SE-SQ-Part1-LVCR-2-8.pdf>], 7(3), 390-410.
- Vimal, R. L. P. (2009i). Subjective Experience Aspect of Consciousness Part II: Integration of Classical and Quantum Concepts for Emergence Hypothesis. *NeuroQuantology* [Available: <http://sites.google.com/site/rlpvimal/Home/2009-PE-SE-Emergence-Part2-LVCR-2-9.pdf>], 7(3), 411-434.
- Vimal, R. L. P. (2009j). Subjects and Brains. *Vision Research Institute: Living Vision and Consciousness Research* [Available: <http://sites.google.com/site/rlpvimal/Home/2009-Vimal-Subjects-and-Brains-LVCR-1-13.pdf>]. Posted in the Karl Jaspers Forum <<http://www.kjf.ca/102-104-R5MUL.htm>> as Response 5 (to C4, Müller) related to TAs 102-104 (Vimal), 9 February 2008; see Muller's comments at <http://www.kjf.ca/102-104-C4MUL.htm>, 1(12), 1-25.
- Vimal, R. L. P. (2010a). Consciousness, Non-conscious Experiences and Functions, Proto-experiences and Proto-functions, and Subjective Experiences. *Journal of Consciousness Exploration & Research* [Available: <http://sites.google.com/site/rlpvimal/Home/2010-Vimal-Consciousness-Experience-LVCR-3-6.pdf>; <http://jcer.com/index.php/jci/article/view/37/35>], 1(3), 383-389.
- Vimal, R. L. P. (2010b). Downward Causation for Subjective Experiences: Dual-aspect Dual-mode framework. *Vision Research Institute: Living Vision and Consciousness Research* [Available: <http://sites.google.com/site/rlpvimal/Home/2010-Vimal-Downward-Causation-LVCR-3-9.pdf>]. In preparation, 3(9).
- Vimal, R. L. P. (2010c). Interactions among Minds/Brains: Individual Consciousness and Inter-subjectivity in Dual-Aspect Framework. *Journal of Consciousness Exploration & Research* [Available: <http://sites.google.com/site/rlpvimal/Home/2010-Vimal-MDR-MIR-LVCR-3-7.pdf>] (Forthcoming in August issue).

- Vimal, R. L. P. (2010d). Matching and selection of a specific subjective experience: conjugate matching and subjective experience. *Journal of Integrative Neuroscience* [Longer version is available at <http://sites.google.com/site/rlpvimal/Home/2009-Vimal-Matching-Selection-LVCR-3-1.pdf>], 9(2), 193-251.
- Vimal, R. L. P. (2010e). On the Quest of Defining Consciousness. *Mind and Matter* [Available:<http://sites.google.com/site/rlpvimal/Home/2010-Vimal-DefineC-LVCR-3-2.pdf>], 8(1), 93-121.
- Vimal, R. L. P. (2010f). Towards a Theory of Everything Part I - Introduction of Consciousness in Electromagnetic Theory, Special and General Theory of Relativity. *NeuroQuantology* (accepted for publication) [Available: <http://sites.google.com/site/rlpvimal/Home/2010-NQ-Vimal-TOE-Part-I-LVCR-3-3.pdf>], 8(2), 206-230.
- Vimal, R. L. P. (2010g). Towards a Theory of Everything Part II - Introduction of Consciousness in Schrödinger equation and Standard Model using Quantum Physics. *NeuroQuantology* [Available: <http://sites.google.com/site/rlpvimal/Home/2010-NQ-Vimal-TOE-Part-II-LVCR-3-4.doc>], 8(2).
- Vimal, R. L. P. (2010h). Towards a Theory of Everything Part III - Introduction of Consciousness in Loop Quantum Gravity and String Theory and Unification of Experiences with Fundamental Forces. *NeuroQuantology* [Available: <http://sites.google.com/site/rlpvimal/Home/2010-NQ-Vimal-TOE-Part-III-LVCR-3-5.doc>], 8(2).
- Vimal, R. L. P., & Davia, C. J. (2008). How Long is a Piece of Time? - Phenomenal Time and Quantum Coherence - Toward a Solution. *Quantum Biosystems* (Available: <http://www.quantumbionet.org/admin/files/QBS2%20102-151.pdf>), 2, 102-151.
- Vitiello, G. (1995). Dissipation and memory capacity in the quantum brain model. *International Journal of Modern Physics*, B9, 973-989.
- Vitiello, G. (2004). The dissipative brain. In G. Globus & K. Pribram & G. Vitiello (Eds.), *Brain and Being: At the boundary between science, philosophy, language and arts* (pp. 315-334). Amsterdam and New York: John Benjamins.
- von Neumann, J. (1932). *Mathematische Grundlagen der Quantenmechanik*. Berlin: Springer.
- Wandell, B. A. (1999). Computational neuroimaging of human visual cortex. *Annu. Rev. Neurosci.*, 22, 145-173.
- Warren, J. (2007). *The Head Trip: Adventures on the Wheel of Consciousness*: Random House.
- Wheeler, J. A. (1983). Law without law. In J. A. Wheeler & W. H. Zurek (Eds.), *Quantum Theory and Measurement* (pp. 182-213). Princeton: University Press.
- Wheelwright, P. (1967). Buber's philosophical anthropology. In P. A. Schlipp & M. Friedman (Eds.), *The philosophy of Martin Buber*. La Salle, IL: Open Court.
- Whitehead, A. N. (1978). *Process and Reality. An Essay in Cosmology* (Corrected ed.). New York-London: The Free Press. A division of Macmillan Publishing Co., Inc.-Collier Macmillan Publishers. Originally published in 1929.
- Whorf, B. L. (1956). *Language, thought, and reality*. New York: John Wiley & Sons.
- Wurzman, R., & Giordano, J. (2009). Explanation, Explanandum, Causality and Complexity: A Consideration of Mind, Matter, Neuroscience, and Physics. *NeuroQuantology*, 7(3), 368-381.
- Zahavi, D. (2005). *Subjectivity and Selfhood*. Cambridge, London: The MIT Press.

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## Endnotes

<sup>1</sup> (Nixon, 2010a) commented that this (consciousness is more fundamental than experience: similar to Hans Ricke's view) is backward to his view (experience is more fundamental than consciousness).

My justification is that there are over 40 meanings attributed to term 'consciousness' by various authors in literature, which were categorized in two aspects: experiences (about 20 meanings) and functions (20 meanings mostly from materialism) (Vimal, 2009e, 2010e). Therefore, if we want to encompass most views then the term 'consciousness' seems more fundamental than the term 'experiences' because *experience* is just one of the two aspects of consciousness; other aspect is *function*. My hypothesis is: if multiple views/models explains the same data, then these models/views can be somehow bridged. When we look at just Nixon's point of view, i.e., 'panexperientialism' (*only experience permeates the universe*) and reject other views especially when we reject materialism then Nixon appears correct because function is NOT another aspect of consciousness. He seems to have a different meaning of the term 'function' than I have. My meaning of the term 'function' is derived mostly from materialism (Vimal, 2009e). I do not reject materialism in some sense; rather I view it as complementary to the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d). This is because matter is one of the two aspects; other aspect is mind (= experiences and/or functions). In panexperientialism, experiences *construct* matter's appearances (*constructivism*), i.e., the appearance of matter is NOT an aspect rather matter's appearance IS *constructed* from

experiences. I argue that mental aspect of dual-aspect view is close to pan-experimentalism and physical aspect is close to Type-B materialism to some extent. In dual-aspect view, a specific eigen-state of a neural-network and its activities has two aspects: mental aspect (such as redness: the subjective first person perspective) and physical aspect (such as redness-related V4/V8/VO-neural-network and its activities: the objective third person perspective such as anatomical and fMRI measurements). In other words, it is not the identity theory of Type-B materialism (single substance and single aspect). In identity theory, a specific SE is identical with its related eigen-state of neural-network, i.e., mental aspect = physical aspect = eigen-state.

<sup>ii</sup> Rosen commented (personal communication in May 2010) as follows: “Given the ambitious scope of your article, it strikes me as having something of the quality of a book outline. I can see your table of contents expanded in a book-length treatment wherein you’d have the latitude in each chapter to treat your various subjects in greater depth and integrate these subjects in your overall presentation. This would include sorting out thorny semantic issues by making careful distinctions. For example, you could explore the distinction between ‘conscious’ as an adjective (meaning ‘wakefulness’) and ‘consciousness,’ the noun. The potential semantic problem here is illustrated by the possibility of there being ‘non-conscious’ (non-waking) experience but said experience still being understood as involving a certain level of ‘consciousness.’ ”

I agree with Rosen that this article can be expanded in a book and the semantic issue is difficult and must be addressed carefully. In (Vimal, 2009e), I assembled over 40 meanings attributed to the term ‘consciousness’ by various authors. One of the meanings may be ‘wakeful’ for ‘conscious’ as an adjective and ‘wakefulness’ for ‘consciousness’ as a noun. Alternatively, wakefulness is one of the *necessary* ingredients of conscious (or subjective) experiences; others *necessary* ingredients are: the formation of neural-networks, re-entry, memory, attention, and so on as detailed in (Vimal, 2009f).

<sup>iii</sup> (Adams, 2010a) commented, “But can such a structure perform the cognitive functions of detection and discrimination? Whole persons with minds (and brains) have cognitive faculties. To attribute cognitive abilities to a certain neural structure is to attribute to it qualities of mind. There is no scientific evidence that any neural structure has any qualities of mind, for the simple reason that the mind, being nonphysical, is not susceptible to scientific observation.”

Adam raised an interesting question; however, this question is for materialism, which eventually leads to Levine’s explanatory gap in materialism (Chalmers, 1995; Levine, 1983). A whole person consists of body, brain, and mind. A brain is composed neural-networks along with other structures. Mind is an entity that has functions and/or experiences. Brain and mind are related to each other. Cognitive faculties involve neural-networks. Since a neural-network has a specific function and the formation of neural-network is one of the necessary ingredients of experience, it has a quality of mind. Furthermore, in our dual-aspect dual-mode PE-SE framework, every entity has two aspects: mental and physical. Therefore, a neural-network also has mental and physical aspects; its mental aspect is composed of relevant function and experience; and its physical aspect consists of material structure (such as gray and white matter, ionic and neural activities, neurotransmitters, and so on). Thus, such as dual-aspect entity can indeed have all the qualities of mind. A specific SE can be experienced by the neural-network as long as it satisfies the *necessary* ingredient of consciousness, such as the formation of neural-network, wakefulness, re-entry (Edelman, 1993), attention, working memory, stimulus above threshold level, and neural-net PEs (Vimal, 2009f).

(Adams, 2010a) further commented, “If one were to insist anyway that a certain neural structure did indeed have qualities of mind, well then, the game would be up. If the brain has its own mind, there is no reason to study cognitive neurophysiology at all, since it would offer no explanation beyond studying the cognitive functions themselves, using cognitive psychology, for example, or psychophysics, or introspection.”

This argument needs reconsideration because it misses an important component of mind and subjective experiences (SEs) and proto-experiences (PEs) aspect of consciousness: organism-environment interaction, namely, the interaction between cognitive feedback signals and environmental/stimulus dependent feed forward signals. The terms ‘mind’ and ‘consciousness’ are defined and elaborated in (Vimal, 2009e, 2010e). The dual-aspect framework is complementary to materialism; therefore cognitive neurophysiology, neuroscience, psychophysics, introspection and all other sciences are useful for materialism and dual-aspect frameworks. *Potential* SEs are in *superposed* latent form in every entity. A specific SE is selected after matching process, as detailed in (Vimal, 2010d).

(Adams, 2010a) critiques against the assumption ‘brain has/is a mind’: “The brain is fantastically complex, but it is just a machine, a biological machine made of protein, fat and water. We have never discovered anything about

a brain that would justify the assumption that it has, or is, a mind, just as we would not (or should not) claim that a thermostat literally has, or is, a mind. We know through first person introspection and through intersubjectivity (the mental capacity that allows us to appreciate the presence of each other's minds) that we have minds and to know something about what they are like. But we are not intersubjective with brains, or with thermostats, and have no proper reason to believe that they have minds of their own. [...] He is trying to impute mental qualities to that tissue, specifically the quality of being able to have mental experience in the self-aware way we do when we identify and discriminate colors. But that cannot be right, for no one has any idea what it could mean for a piece of biological tissue to 'have an experience' in the common sense meaning."

The term 'mind' in our dual-aspect dual-mode PE-SE framework is defined as 'functions and/or experiences' in (Vimal, 2010e). As detailed in (Vimal, 2009f), the necessary ingredients of *access* (reportable) consciousness (that has two aspects: function and experience) are the formation of neural-network, wakefulness, attention, re-entry, memory, and so on. Therefore, photoreceptor, thermostat, and so on (even retina) may not satisfy these necessary conditions of consciousness. However, these entities have respective function(s). Therefore, some, such as panpsychists, could argue that they have mind in a sense of function. The term 'neural-network' is defined as a network of all necessary areas of central nervous system (CNS) including self-related areas, areas for wakefulness (including ARAS: ascending reticular system), attention, re-entry, memory, and so on. The neural-networks and all entities have two aspects: mental and physical in our framework. Since structure, function, and experience are linked, a neural-network that satisfies necessary ingredients of consciousness, has mind/consciousness/SEs; and hence intersubjectivity is possible via interactions between dual-aspect neural-networks of multiple brains/minds in our dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d).

(Adams, 2010a) continues to critique, "If you make a list of the qualities of a brain, and another of the qualities of a mind, there is little, if any overlap of the two lists, either conceptually or linguistically. To claim that the brain is actually the mind then is equivalent to claiming that the left kneecap is equivalent to the mind, or that the moon is equivalent to the mind. The claimed equivalence is arbitrary, not based on reason or evidence. Even as mere wishful fantasy, it is an unintelligible proposition. Epiphenomenalism and double-aspectism, to the extent that they are derivatives of identity theory, are equally unintelligible."

This may be materialist's or panpsychist's claim depending on how they define the term 'mind'; for its definition, please see (Vimal, 2010e); my view is dual-aspect. My framework is not derived from identity theory; rather former is complementary to the latter. It should be noted that identity theory of Type-B materialism requires the pre-existence of SEs to pick them out *demonstratively* as discussed with materialists in (Vimal, 2009g). The dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d) is *optimal* (has the least number of problems compared to other views), rigorous, and precise as detailed in (Vimal, 2010d).

<sup>IV</sup> (Nixon, 2010a) commented, "of course, the infant experiences its own birth. There is no self to experience so the experience is non-conscious, but the living newborn body is certainly experiencing the changes it is going through."

It appears that Nixon combining functions aspect of consciousness, mind, and/or cognition with experiences and thus making experiences as fundamental, which is required in panexperientialism. This means, functions might be derived from experiences. In panexperientialism, if (i) conscious experiences are from first person perspective, (ii) functions are from third person perspective, (iii) the appearance of matter is constructed from experiences (constructivism), and (iv) experiences include functions, then functions might emerge (or might be derived) from experiences. If this is correct, then panexperientialists must explain precisely how this is possible and what relevant the mechanisms are: this can be called an explanatory gap in panexperientialism. On the hand, if we consider functions and experiences as aspects of consciousness and consciousness as fundamental, as in the dual-aspect dual-mode PE-SE framework, then this problem does not arise.

(Nixon, 2010a) replied, "I have said before, I simply can make no sense of this — probably because, in an experiencing world with variously experiencing creatures all caught up on the struggles (or experience!) of life, there is no difference between subjectivity and objectivity. The '3rd person perspective', presumably the objective perspective (made possible by the separation of the subject from the object), appears only after humans crossed the symbolic threshold into formal language structures. Furthermore, as Merlin Donald (Donald, 1991, 2001) has convincingly argued, the mythic mind continued to draw few boundaries between the imagined and the real even after the symbolic crossing, so modern analytical objective thinking did not really emerge until the preSocratic Greeks began to write (and it went through several major stages after that as writing was codified & translations begun, the printing press invented, and the electronic era begun)."

If the above is true, then evidence is needed for the lack of difference between subjectivity and objectivity before humans crossed the symbolic threshold into formal language structures. Moreover, the difference between subjectivity and objectivity is lost in modern yogis at *samadhi state*, which is obviously after the symbolic crossing.

<sup>V</sup> In the hypothesis H<sub>1</sub> of the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d), SEs are fundamental irreducible entities in conventional reality; *potential* SEs are superposed in latent unexpressed form in the mental aspect of each entity. A specific SE is selected via matching process. In hypothesis H<sub>2</sub>, SEs are derived from (i) the interaction of a PE and 3 *gunas* (qualities) (Vimal, 2009b) and/or (ii) downward causation (Vimal, 2010b).

“In western philosophy (mostly due to Aristotle: (384 – 322 BC), there are six types of causes [quotes and some of the texts are from <http://en.wikipedia.org/wiki/Causality>]: (i) In the part-whole causation (material cause), the parts forms the whole. (ii) In the whole-part causation (*formal* cause: what form does the mind take? (Wurzman & Giordano, 2009)), whole (macrostructure) is the cause for the production of its parts. (iii) In the efficient cause, agents cause effects. (iv) In the final cause, there is a purpose or end for the sake of which a thing exists or is done. It includes ‘modern ideas of mental causation involving such psychological causes as volition, need, motivation, or motives; rational, irrational, ethical - all that gives purpose to behavior.’ (v) In reciprocal or circular causation, entities can be causes of one another as a relation of mutual dependence. (vi) The doctrine of causal factor suggests that the same thing can cause contrary effects as atmospheric pressure can have opposite effect in various chemical or physical reactions” (Vimal, 2009a).

There are 4 types of conditions. It seems that Monteiro is confusing cause vs. condition as per Nāgārjuna’s causes vs. conditions: “Nāgārjuna argued that the *real causes* should have powers as their essential properties and should have inherent existence. The causes that do not have these attributes cannot be *real causes*. Therefore, he proposes four ‘conditions’ (efficient, percept-object, immediate, and dominant conditions) instead of such apparent causality to explain phenomena in conventional reality” (Vimal, 2009a). Perhaps Monteiro’s ‘cause’ is not *real cause* because it lacks inherent existence (as defined by Nāgārjuna). It may be simply efficient or immediate condition instead of cause. The dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d) is consistent with Nāgārjuna’s dependent co-origination (Nāgārjuna & Garfield, 1995; Vimal, 2009a). As discussed above, according to Nāgārjuna, so called ‘causes’ are not ‘real causes’ because these ‘causes’ do not inherently exist. Therefore, they are ‘conditions’. This means, matching and selection processes for a specific SE from *virtual reservoir* (such as mental aspect of elementary particles and other entities) depend on ‘conditions’ of matching between feed forward stimulus dependent signals and cognitive feedback signals. It is also possible that the SEs which appear irreducible in conventional reality (as in hypothesis H<sub>1</sub>) may not have inherent existence, i.e., SEs can be derived from or reduced to some entities that inherently exist (as in hypothesis H<sub>2</sub>).

<sup>VI</sup> (Adams, 2010a) commented, “Presumably, that category would encompass the thermostat, photocell, and mousetrap. Yet Vimal still insists that such machines, such as a color detection machine, “can detect and discriminate red from green” even though it cannot have redness and greenness experiences. That is a self-contradiction, it seems to me, unless he uses the term “discriminate” only metaphorically. No machine can discriminate red from green. Only a whole human (or other animal with supposedly similar cognitive capacities), can discriminate red from green. The human can observe a machine’s differential output and metaphorically call it a discrimination, adopting Dennett’s concept of the intentional stance, but that is an ersatz discrimination, not the real thing. Consequently, I agree that Vimal’s robot performs functions, but I cannot agree that it is capable of discrimination or of any other cognitive function. I simply do not agree that behavioral functionality, in itself, ever constitutes a cognitive function. I would have to be specifically convinced of that. Oddly enough, later in his essay, Vimal says essentially the same thing, that behavioral functionality is an insufficient explanatory basis for mentality. I was not able to reconcile that later statement with this, his opening assertion of functionalism. Maybe when he says ‘discriminate’ he only means ‘behaves differentially.’ So while I did stumble with the opening of this essay, I did not fall down. The rest of it made a lot more sense to me.”

There are over 40 different meanings/aspects attributed to term ‘consciousness’, which can be categorized in two aspects: function and experience as detailed in (Vimal, 2009e, 2010e). The term ‘discrimination’ is defined as “the process by which two stimuli differing in some aspect are responded to differently [...] the ability to perceive and respond to differences among stimuli”. The term ‘detection’ is a discrimination of a stimulus (such as long wavelength light that appears red) with respect to ‘background’ or ‘surround’ (such as uniform white or dark background field) rather than with respect to another stimulus (such as middle wavelength light that appears green)

as in discrimination. Discrimination is a function, which is a mental entity and is an functional aspect of consciousness; function can be conscious or non-conscious; cognitive function can be conscious or non-conscious also; consciousness has two aspects: conscious function and conscious experience; they are elaborated in (Vimal, 2009e, 2010e). As for machine, spectrometer can discriminate wavelengths, but wavelength is physics, it is not color; color is perception/SE. The terms ‘discrimination’ and ‘detection’ are a psychophysical terms (Vimal, 1997, 1998a, 1998b, 2000, 2002a, 2002b), but can be used for machine with appropriate context and qualification. Zombie, by definition, has only non-conscious functions. Robot is a dual-aspect entity as any other entity; and if necessary ingredients are programmed then we may have conscious robots in future (see last paragraph of section 3.13 of (Vimal, 2010d)).

<sup>vii</sup> (Adams, 2010a) commented, “Vimal’s account of experience-in-itself differs importantly from Nixon’s and Strawson’s purely naturalistic versions in that Vimal invokes an Eastern cosmology associated with the *Samkhya* philosophy of India and the *Bhagavad-Gita*. I say this because of his reference to ‘the three *gunas*’ that interact with ‘proto-experience’ to produce ‘subjective experience’ (‘PE interacts with 3 *gunas* to result SEs depending on the kinds of 3-*gunas*’). I am no expert on Hindu philosophy, but my understanding is that these ‘*gunas*’ are supposed to be the fundamental elements of nature, like earth, air, fire and water were for the ancient Greeks. The *gunas* are inherent to all beings (alive or inanimate), and determine, through their combinations and intensities, the nature of each being, including the nature of its experience. They can do that because they are not mere combinatorial units in the passive sense that we think of, for example, when we consider the elements of the periodic table, but they are the active, dynamic principles of existence: creation, preservation, and destruction, corresponding to the Hindu gods, Brahma, Vishnu, and Shiva, respectively. That is not unreasonable, because the truth is, when you get down to the axiomatic, irreducible principles of the mind, you simply must propose a first principle such as experience-in-itself or proto-self-awareness, that is outside the set that makes up the first principles of physics (gravity, energy, time, space, and so forth). It would be so much more convenient if the first principles of physics included something that could plausibly be applied to a fundamental analysis of the mind. Alas, that is not the case. But if you are forced outside of standard science for your basic explananda, then are there any constraints? Why not invoke spirits, ghosts, angels, devils, gods? You’re out in the weeds anyway, so anything goes, it would seem. To avoid that uncomfortable situation, I think it is better to look to basic psychological principles that, while non-scientific, are at least observable and confirmable by introspection. And should we ever develop a well-defined first-person methodology of inquiry, we would be able to arrive at a consensus about such non-scientific, but nevertheless empirical first principles of mind.”

My framework is the dual-aspect dual-mode PE-SE framework (Vimal, 2008b, 2010d), which is somewhat close to *Trika Kashmir Shaivism* (TKS), where *Shiva* and *Shakti* are two aspects of the same entity, i.e., dual-aspect view. I critique *Samkhya* philosophy because it is *Dvait-Advait* (dual-nondual) *Vedanta*, which is somewhat close to Stapp’s view (Stapp, 1996, 2006): at pragmatic/operational level it is dualistic, and at deep ontological level, it is non-dual or mentalistic monism. The *Gunas* (Vimal, 2009b) in my dual-aspect framework is somewhat different from the *gunas* used in dual-nondual *Dvait-Advait Vedanta*. I borrowed the idea of *gunas* from *Samkhya*’s *Dvait-Advait Vedanta*, but in my framework, the one *potential* PE and three *potential gunas* are in *superposed* latent form in the mental aspect of each entity as in hypothesis H<sub>2</sub> of my framework. However, in hypothesis H<sub>1</sub> of my framework, there is no *gunas* concept: all *potential* SEs are *superposed* in the mental aspect of each entity and my treatment is scientific and rigorous, as in (Vimal, 2008b, 2010d). Moreover, the idea of *superposition* differentiates my framework from TKS. SEs are not outside, rather they are one of the two aspects in my framework. In addition, I have introduced *potential* SEs in physics that remains invariant under PE-SE transformation; details are given in (Vimal, 2010f; Vimal, 2010g, 2010h).

<sup>viii</sup> Nāgārjuna discusses the two truths or realities, “[XXIV.] 8. The Buddha’s teaching of the Dharma Is based on two truths: A truth of worldly convention And an ultimate truth. [...] 9. Those who do not understand The distinction drawn between these two truths Do not understand The Buddha’s profound truth. [...] 10. Without a foundation in the conventional truth, The significance of the ultimate cannot be taught. Without understanding the significance of ultimate, Liberation is not achieved. [...] 11. Without a foundation in the conventional truth, The significance of the ultimate cannot be taught. Without understanding the significance of the ultimate, Liberation is not achieved.” (Nāgārjuna & Garfield, 1995).p.298-9.

<sup>IX</sup> Nāgārjuna argues: “All phenomena are arisen, but arise as empty, and as dependent. [p.169] [...] arising, abiding, and ceasing are not entities at all—they are mere relations [...] the self as pure subject does not exist—nor do perception or perceptual objects exist as entities—yet want to affirm the conventional reality of perception, perceivers, and perceiveds, in general, we want to deny the inherent existence of phenomena and affirm their conventional reality. . . [p.176]” (Nāgārjuna & Garfield, 1995).

<sup>X</sup> Nāgārjuna described Nirvāṇa: “[XXV.]3. Unrelinquished, unattained, Unannihilated, not permanent, Unarisen, unceased: This is how Nirvāṇa is described. [...] 9. That which comes and goes Is dependent and changing. That, when it is not dependent and changing, Is taught to be Nirvāṇa. [...] 17. Having passed into Nirvāṇa, the Victorious Conqueror Is neither said to be existent Nor said to nonexistent. Neither both or neither are said. [...] 20. Whatever is the limit of Nirvāṇa, That is the limit of cyclic existence. There is not the slightest difference Between them, Or even the subtlest thing.” (Nāgārjuna & Garfield, 1995)-p.323-331.

<sup>XI</sup> However, (Acerbi, 2008) implies that an observer is an entity that interacts with other entities: “Examples of observers could be a galaxy, a cat, a photographic plate, a chunk of wood. Each of these observers is able to memorize and process information, each one in different ways: a packet of photons coming from a dog is handled differently by a chunk of wood, a photographic plate and a cat.” As per (Acerbi, 2008), whole universe can be an observer. In addition, (Grinbaum, 2010) discusses observers defined/implied by various investigators and then defines an observer as a system identification algorithm phrased in information theoretic terms: “Quantum mechanical formalism has an orthodox interpretation that relies on the cut between the observer and the system observed (Dirac, 1930; von Neumann, 1932). This ‘shifty split’ (Bell, 1990) of the world into two parts cannot be removed: the formalism only applies if the observer and the system are demarcated as two separate entities. Standard quantum mechanics says nothing about the physical composition of the observer, who is an abstract notion having no physical description from within quantum theory. One cannot infer from the formalism if the observer is a human being, a machine, a stone, a Martian, or the whole Universe. As emphasized by Wheeler, this makes it extraordinarily difficult to state clearly where “the community of observer-participators” begins and where it ends (Wheeler, 1983). As a part of his relative-state interpretation, Everett argued that observers are physical systems with memory, i.e., ‘parts... whose states are in correspondence with past experience of the observers’ (Everett, 1957). This was further developed by Rovelli, who claimed that observers are ordinary physical systems such that some of their degrees of freedom are correlated with some property of the observed system (Rovelli, 1996). [...] a general definition of observer [is] phrased in information theoretic terms and [is] based on the intuition that the key component of observation is system identification. [...] What characterizes an observer is that it has information about some physical system. This information fully or partially describes the state of the system. The observer then measures the system, obtains further information and updates his description accordingly. Physical processes listed here: the measurement, updating of the information, ascribing a state, happen in many ways depending on the physical constituency of the observer. [...] Still one feature unites all observers: that whatever they do, they do it to a *system*. [...] What remains constant throughout measurement is the identification [in spite of a change in the state of this system], by the observer, of the quantum system. [...] An observer is a system identification algorithm (SIA). [...] Particular observers can be made of flesh or perhaps of silicon. ‘Hardware’ and ‘low-level programming’ are different for such observers, yet they all perform the task of system identification. This task can be defined as an algorithm on a universal computer, e.g., the Turing machine: take a band containing a list of all the degrees of freedom, send a Turing machine along this band and put a mark against those degrees of freedom that belong to the quantum system under consideration. Any concrete SIA may proceed in a very different manner, yet all can be modelled with the help of this construction. [...] The Copenhagen view of quantum mechanics traditionally described quantum systems and observers, epistemologically, as belonging to different categories. On the contrary, the view based on the relativity of observation, as proposed by Everett and later Rovelli, puts all systems on equal grounds and ascribes them only relative states. These two views are not as contradictory as they may seem. Relativity of observation has been understood by some proponents of the Copenhagen school (Fock, 1971a; Fock, 1971b; Hermann, 1935; Jammer, 1974). Information-theoretic treatment of the observer gives a chance to completely overcome the tension. On the one hand, the observer is a SIA [system identification algorithm] and is characterized by its Kolmogorov complexity [which is a measure of the computational resources needed to specify the object]. On the other hand, quantum mechanics can be reconstructed from information theoretic axioms and thus

seen as a theory of information (Grinbaum, 2007). This puts all systems on equal grounds, in the spirit of Rovelli, while emphasizing the idea of relativity of observation, in the spirit of Fock.”

If the above is correct, then before life began, observers were interacting entities and collapses might have been occurring for them and the dual-aspect entities might be co-evolving and eventually neural-networks were formed and subjective experience (SE) aspect of consciousness occurred in our brains. Furthermore, it is an interesting idea that source might be the ‘universal background of awareness’ (Nixon, 2010c) or eternal universal background of dual-aspect entities from where both aspects co-evolved via some still unclear mechanisms. This needs to be unpacked to address the Type-2 explanatory gap: *how can SEs pre-exist, i.e., how is it possible that our SEs (such as happiness, sadness, painfulness, and similar SEs) were already present in primal entities, whereas there is no shred of evidence that such SEs were conceived at the onset of universe?* [This footnote is the result of my personal discussion on (Smetham, 2010) and (Acerbi, 2008) in 7-July-2010-email to Graham Smetham and Michele Caponigro.] Furthermore, it is interesting to put observer and the system to be measured in the same category on equal grounds. In our dual-aspect dual-mode PE-SE framework, (a) information is a dual-aspect entity; (b) observer is related to brain’s cognitive feedback signals, (c) the system to be measured is represented by stimulus dependent feed forward signals, and (d) the interaction between observer and the system to be measured (implicate order) leads to the selection of a specific SE (explicate order) via matching process (Caponigro, Prakash, & Vimal, 2010), which may be interpreted in terms of dual-aspect information-theoretic treatment of the observer and the system to be measured. However, it is unclear that the observer is a system identification algorithm and is characterized by its Kolmogorov complexity (Grinbaum, 2010).

<sup>xii</sup> (Nixon, 2010a) “insists that experiencing (but frightened) proto-humans in groups produced language (in the form of myths) *together*. Group sharing, group awareness preceded the internalization of language as thought *and* as mind. Language = conscious experience. Therefore, intersubjectivity precedes subjectivity. How could you think individuals just became conscious, because of some brain mutation? Selfhood is *learned*.”

Perhaps, my definitions in dual-aspect framework differ from Nixon’s: In my framework, self is the SE of a subject; this conscious experience is selected via matching process (in analogy to SEs of objects) and embedded in self-related neural-network during co-development, sensorimotor interaction, and co-tuning during developmental neural Darwinism. “Subjectivity refers to a [first] person’s perspective or opinion, particular feelings, beliefs, and desires. In philosophy, the term can either be contrasted with or linked with objectivity [third person perspective].” “Intersubjectivity is a term used in philosophy and psychology to describe a condition somewhere between subjectivity and objectivity [i.e., second person perspective], one in which a phenomenon is personally experienced (subjectively) but by more than one subject. [...] Thomas Scheff defines intersubjectivity as ‘the sharing of subjective states by two or more individuals’ (Scheff, 2006)”. Thus, second person experiences (intersubjective SEs/consciousness or social consciousness) are because of the interaction between two or first person experiences, which implies that first person SEs (individual consciousness) must pre-exist. The first person SEs (individual consciousness) are the result of the interaction between (i) environmental stimulus dependent feed forward signals and (ii) organism (brain)’s cognition/attention dependent feedback signals, which means the organism, environment, and SEs must pre-exist. SEs includes SE of subject (self) and SEs of objects and stored in *virtual reservoir*. Perhaps, panexperientialism combines both aspects (mental and physical) in a complicated manner because matter, mind, functions, cognition are derived from experiences and there is just one aspect that is experiences (panexperientialism is mentalistic monism close to idealism). Nixon agrees that the precise mechanism is unclear for how hard problems of panexperientialism can be addressed. In the dual-aspect dual-mode PE-SE framework (Vimal, 2010d), it is rigorous, precise and crystal clear how a specific SE is selected via matching process.

<sup>xiii</sup> The following is adapted from the author’s post #21 in Consciousness Research Forum on self (<http://sites.google.com/site/rpvmal/Home/2010-Self-page3-posts-21-30-network.nature.pdf>): As per (Powell, Macrae, Cloutier, Metcalfe, & Mitchell, 2010), self is “a collection of distinct mental operations distributed throughout the brain, rather than a unitary cognitive system”, which needs further examination.

According to (Northoff & Bermpohl, 2004), “the processing of self-referential stimuli in cortical midline structures (CMS) is a fundamental component in generating a model of the self.” In a meta-analysis, (Northoff et al., 2006) suggest, “Since the CMS are densely and reciprocally connected to subcortical midline regions, we advocate an integrated cortical-subcortical midline system underlying human self. We conclude that self-referential

processing in CMS constitutes the core of our self and is critical for elaborating experiential feelings of self, uniting several distinct concepts evident in current neuroscience.”

In (Bruzzo & Vimal, 2007), we define self as the subjective experience (SE) of a subject, where the essential ingredients of SEs are the formation of neural-network, wakefulness, re-entry, attention, memory, neural-net proto-experiences (PEs), and so on. In addition, we propose that self “arises from chaotic dynamics, self-organization and selective mechanisms during ontogenesis, while emerging post-ontogenically as an adaptive pressure driven by both volume and synaptic-neural transmission and influencing the functional connectivity of neural nets (structure).”

Thus, one could argue that self could be unitary but it can involve multiple mental operations including ‘free Will’, ‘agentic role’, context, and/or as ‘the object of judgment/reflection’.

(Northoff et al., 2006) argue for 3 concepts of self: (1) proto/bodily self (involving sensory cortex and sensory processing), (2) core/mental/minimal self (involving medial cortex and self-referential processing), and (3) autobiographical, emotional, spatial and verbal, etc self (involving lateral cortex and higher order processing). (Trehub, 2007) ‘phenomenal self’ might be part of the 3<sup>rd</sup> concept because core self is its prerequisite.

Self in 1pp (first person perspective), 2pp, 3pp might have subjective, inter-subjective, and objective status. 1pp and 3pp being the mental (SE of subject) and physical (its neural-correlates) aspects of self seems consistent with dual-aspect view.

(Trehub, 2007)’s hypothesis is interesting that ‘core self’ (‘I’) is fixed and ‘phenomenal self’ changes. However, if the latter changeable (phenomenal) self characterizes the former (subjective core) self, then how could core self will remain fix is not clear to me.

<sup>xiv</sup> (Nixon, 2010a) commented, “after all this you still do not agree that it is non-conscious (as in pre-conscious) experience!”

Well, there is another explanatory gap of pan-experientialism: (i) where do non-conscious experiences come from? Nixon has assumed that they come from ‘universal background of awareness’. But there is no shred of any evidence that there are such entities at the start of universe (Big Bang). And (ii) how are conscious experiences precisely derived from non-conscious experiences? Physics supports only matter (fermions) and force carriers (bosons) and says nothing about experiences. It is very hard to maintain pan-experientialism because it has many problems.

(Nixon, 2010a) defended panexperientialism as follows: “I do think you are wrong about the limitations of panexperientialism since I did suggest that ‘experience’ must arise from a previously existing background of non-conscious and non-experiencing awareness-in-itself (like, say, the quantum flux or vacuum in an eternal present of potential existence). Plus the self most often means to me self-identity, or a being that is aware of itself as an existent (as opposed to a corporeal identity only). Similarly, subjectivity may be loosely associated with corporeal existence – knowing the boundaries & capabilities of the body that the creature is – but otherwise I would interpret the word to mean the sense of subjectivity, or, again, one’s existence as a self interacting with other selves. [...]”

The scientifically-based notion of the ‘quantum foam’ or ‘quantum vacuum’ is useful here. Non-conscious experiences are not ‘stored’ anywhere in it, but they may be emergent with the creation of time & space. The theory is that this quantum foam ‘field of nothingness’ in the absolute present that predates even the Big Bang (which is to say, ‘it’ was present if not exactly existent before time began) is actually a percolating sea of potential existence, with sub atomic particles or singularities constantly popping into existence then nearly instantaneously popping out again as the ‘particle’ (or singularity) meets its opposite-charged twin and they annihilate each other. Hawking has suggested that our universe began when one of the ‘particles’ disappeared (perhaps into a black hole) before it could annihilate itself & its opposite. The ‘particle’ that remained was all there was to existence so this singularity burst into time and change and the universe began. It is this ‘sea of nothingness’ (like the void awareness of various eastern religions, perhaps?) that, being timeless, may be chaotically yet quiescently aware without being aware OF anything (something only the most advanced-detached mystics might understand). It is thus unconscious and unintentional awareness — a dynamic sea of potential being, a chaos of creativity waiting to happen. Further details are in (Nixon, 2010c).

Addressing the question (how conscious experiences are precisely derived from non-conscious experiences) is the major topic of ‘Hollows of Experience’(Nixon, 2010c) in which I look closely at the features of human language and how it allowed us the ‘mental’ recursion to become reflectively conscious of our natural, somatic experiencing, or, to put it another way, to reflexively experience our own somatic experiencing. It’s also the major theme of ‘Myth and Mind’ (Nixon, 2010d) in which I look for the crossing of the symbolic threshold into language in prehistoric

times and speculate on what may have brought it about. I don't think the question could have been more thoroughly addressed (even if it turns out that I am mistaken).”

So far, Nixon's framework sounds fine to me qualitatively, except how physical aspect arises from experiences is still not clear to me. The *brute fact* (that is the way it is with no further explanation) of panexperientialism is: it is only the experiences that inherently exist in the universe and nothing else. So one needs to explain everything from this. One could ask: Why is then pan-experientialism still controversial? Why is Type-B materialism still dominant? To address these questions, we need to make our frameworks more precise quantitatively and test our hypotheses; if still not rejected then we might have some general consensus slowly.

(Nixon, 2010a) suggested to read *Process & Reality* (Nixon, 2010e; Whitehead, 1978) for how physical aspect arises from experiences. For the latter two questions, he replied, “Hidden truths are called ‘hidden’ for a reason. We seem to be material beings in a material world helplessly caught in the flow of time like leaves in a stream to the sea. But, as you must know, appearance is seldom the ‘real’ reality.”

The explanatory gap and hard problems of panexperientialism are discussed in Section 8 above.