sector and consultancy. She has a PhD in Theoretical Physics and an MSc in Mathematical Economics, and has published two books and several peer-reviewed papers.

David Skrbina is a Lecturer in Philosophy at the University of Michigan at Dearborn. His book, *Panpsychism in the West*, was published by MIT Press in 2005. He has recently edited a collection of essays, *Mind That Abides: Panpsychism in the New Millennium* (Benjamins, 2009).

Anders Søgaard is Assistant Professor in IT and Cognition at the University of Copenhagen. His research interests include computational linguistics, applied logic and the philosophy of science. His previous work has been published in acclaimed journals such as *Journal of Logic, Language and Information* and *Semiotica*.

Stine Østerskov Søgaard is a graduate student at the Dept. of Psychology at the University of Copenhagen. She has a strong interest in cognitive psychology and philosophy of mind.

Steve Torrance is Professor Emeritus at Middlesex University, London. He is visiting Senior Research Fellow in the Department of Informatics, University of Sussex, and visiting Lecturer at Goldsmiths College, University of London. He works on the relation between ethics and consciousness, and on the impact of research in AI and artificial agency to both fields of study.

Max Velmans is currently Emeritus Professor of Psychology at Goldsmiths, University of London, and Visiting Professor of Consciousness Studies at the University of Plymouth. He has around 100 publications on consciousness, his most recent book being *Understanding Consciousness, 2nd Edition* (Routledge, 2009). He co-founded, and from 2003 to 2006 chaired, the Consciousness and Experiential Psychology Section of the British Psychological Society'.

Ram L.P. Vimal is Professor (Research) and founder of the Vision Research Institute (USA) and Dristi Anusandhana Sansthana (India). He did BE (Elect. Engineering, India), MS (Computer Science and Physics, USA), PhD (Physics/Biophysics, University of Illinois, USA), and Postdoctoral Fellowship (Colour Vision Psychophysics, University of Chicago, USA). He performed further research in Visual Psychophysics at York University (Canada) and New England College of Optometry (Boston), and neuroscience and fMRI at Harvard Medical Schools (Schepens Eye Research Institute and McLean Hospital). His has keen interest in neuroscience, mind–brain problem, and colour vision.

Ram Lakhan Pandey Vimal

Meanings Attributed to the Term 'Consciousness'

An Overview

Keywords: Classification, consciousness, definitions, meanings, structure, function, experience, materialism, physicalism, dualism, dual-aspect, neural-Darwinism, *yogins*, pure awareness, *samadhi*.

Abstract: *I here describe meanings (or aspects) attributed to the term consciousness, extracted from the literature and from recent online discussions. Forty such meanings were identified and categorized according to whether they were principally about function or about experience; some overlapped but others were apparently mutually exclusive — and this list is by no means exhaustive. Most can be regarded as expressions of authors' views about the basis of consciousness, or opinions about the significance of aspects of its contents. The prospects for reaching any single, agreed, theory independent definition of consciousness thus appear remote. However, much confusion could be avoided if authors were always to specify which aspects of consciousness they refer to when using the term. An example is outlined of how this can be done (using a 'PE–SE' framework).*

1. Introduction

The term consciousness 'means different things to different people' (Rao, 1998). Here, I shall offer outline descriptions and tabulations of

Correspondence:
Email: rlpvimal@yahoo.co.in; http://www.geocities.com/rlpvimal/

Journal of Consciousness Studies, **16**, No. 5, 2009, pp. 9–27

various meanings and/or definitions, derived from published works and also from recent online discussions. The latter can perhaps be regarded as providing a useful indication of usages current among 'people out there' in the consciousness community.

Although the meanings (or aspects) identified differ, many appear to share common characteristics and can be grouped according to two criteria, namely, *function* and *experience*. In general, materialists [Types A–C: (Chalmers, 2003) — see later discussion] attribute various *functions* ('easy problems', such as detection, discrimination, recognition, cognition, etc.) to consciousness, whereas others (e.g. Chalmers' Types E–F) attribute to it *experiences* (i.e. aspects of the 'hard problem').

Thus, from a reductive/materialistic perspective, consciousness has been defined as (a) a multidimensional physical/neurobiological process that 'emerges from interactions of the brain, the body, and the environment', and (b) 'the result of dynamic interactions among widely distributed groups of neurons' (Edelman, 2003). According to non-reductive views (such as substance dualism, property dualism, panpsychism, and pan-informationism), on the other hand, consciousness is an irreducible fundamental mental entity, even when regarded as being an aspect of, or closely associated with, matter or material processes.

From a dual-aspect perspective, one can envisage a variety of possible relationships between objective aspects of matter, proto-experience (PE) and subjective experience (SE) — see (Vimal, 2008b) and also (Vimal, 2008a; 2009). There are three hypotheses: Matter may be the *carrier* of both PEs and SEs (Vimal, 2008b); or it may carry PEs only, with *emergence* of SEs in the course of neural evolution (Vimal, 200x-a; 200x-b; 200x-d; 200x-e); or the three may be ontologically inseparable (Vimal, 200x-d) though possessing different epistemic aspects. A SE is an *expressed* first person experience that occurs/arises/emerges during interaction between feed-forward signals and feedback signals in a neural-net, which satisfies the *necessary* ingredients of consciousness (Vimal, 200x-e) such as wakefulness, re-entry, attention, working memory, stimulus at above threshold, and neural-net proto-experiences (PEs). In general, PEs are precursors of SEs. In the first hypothesis, PEs are precursors of SEs in the sense that PEs are superposed SEs in unexpressed form in the mental aspect of every entity, from which a specific SE is selected via matching and selection process. In the second and third hypotheses, PEs are precursors of SEs in the sense that SEs *somehow* arise/emerge from PEs, as elaborated in (Vimal, 200x-a, 200x-b, 200x-c, 200x-d). This framework is a *non-reductive physicalism*, (where *physicalism* = materialism + *experience*) (Vimal, 200x-c).

It thus suggests one way of envisaging overlap between *function* and *experience*. Hence, I am not suggesting that the two categories must be mutually exclusive, but they are nevertheless useful guides. Armed with them, we can set out to explore the jungle of meanings, starting with a description of David Chalmers' views on the topic.

2. Selected meanings

1. David Chalmers' Categorization

According to (Chalmers, 2003), 'On my view, the most important views on the metaphysics of consciousness can be divided almost exhaustively into six classes, which I will label "type A" through "type F". Three of these (A through C) involve broadly reductive views, seeing consciousness as a physical process that involves no expansion of a physical ontology. The other three (D through F) involve broadly non-reductive views, on which consciousness involves something irreducible in nature, and requires expansion or reconception of a physical ontology. ... The word "consciousness" is used in many different ways. It is sometimes used for the ability to discriminate stimuli, or to report information, or to monitor internal states, or to control behavior. We can think of these phenomena as posing the "easy problems" of consciousness. ... The hard problem of consciousness is the problem of experience. Human beings have subjective experience: there is something it is like to be them. We can say that a being is conscious in this sense — or is phenomenally conscious, as it is sometimes put — when there is something it is like to be that being. A mental state is conscious when there is something it is like to be in that state. Conscious states include states of perceptual experience, bodily sensation, mental imagery, emotional experience, occurrent thought, and more. ...

Type-A materialism (Dennett, 1991; Dretske, 1995; Harman, 1990) sometimes takes the form of eliminativism, holding that consciousness does not exist, and that there are no phenomenal truths. It sometimes takes the form of analytic functionalism or logical behaviorism, holding that consciousness exists, where the concept of "consciousness" is defined in wholly functional or behavioral terms (e.g., where to be conscious might be to have certain sorts of access to information, and/or certain sorts of dispositions to make verbal reports). For our purposes, the difference between these two views can be seen as terminological. Both agree that we are conscious in the sense of having

the functional capacities of access, report, control, and the like; and they agree that we are not conscious in any further (non-functionally defined) sense. ... the concept of consciousness [in Type-B materialism (Block & Stalnaker, 1999; Hill, 1997; Levine, 1983; Loar, 1997; Perry, 2001; Tye, 1995)] is distinct from any physical or functional concepts, but we may discover empirically that these refer to the same thing in nature. [According to (Levin, 2008), "Type-B materialism is the thesis that though phenomenal states are necessarily identical with physical states, phenomenal concepts have no *a priori* connections to physical or functional concepts"]. ... According to type-C materialism (Churchland, 2003; Crick & Koch, 2003; Edelman, 1993; 2003; Hamker, 2004; Koch, 2004; Nagel, 1974; Tononi, 2004; Van Gulick, 2001), there is a deep epistemic gap between the physical and phenomenal domains, but it is closable in principle. ... [According to (Quine, 1951)] explaining the functions explain everything (Dennett may be an example). ... [If materialism is false], it could be that consciousness is itself a fundamental feature of the world, like spacetime and mass. ...

[In] Type-D dualism (Beck & Eccles, 1992; Foster, 1991; Hodgson, 2005; Popper & Eccles, 1977), ... usually known as interactionism, physical states will cause phenomenal states, and phenomenal states cause physical states. ... Type-E dualism holds that phenomenal properties are ontologically distinct from physical properties, and that the phenomenal has no effect on the physical. [Type-E dualists include (Campbell, 1970; Huxley, 1874; Jackson, 1982; Robinson, 1988)]. This is the view usually known as *epiphenomenalism* (hence type-E): physical states cause phenomenal states, but not vice versa [and consciousness is irreducible]. ... Type-F monism [or panprotopsychism (Chalmers, 1996; Griffin, 1998; Lockwood, 1989; Russell, 1927; Stoljar, 2001; Strawson, 2000; Whitehead, 1978)] is the view that consciousness is constituted by the intrinsic properties of fundamental physical entities. ... On this view, phenomenal or protophenomenal properties are located at the fundamental level of physical reality, and in a certain sense, underlie physical reality itself'.

To summarize the above, consciousness is (i) a physical process for materialists (reductive or emergence views: Types A–C) or (ii) an irreducible fundamental mental (non-material) entity (Types D–F views including dualisms, panpsychism, etc.). However, on the basis of the PE–SE framework (Vimal, 2008b) mentioned earlier, for example, it can be argued that some, though probably not all, meanings of (i) and (ii) overlap.

2. Examples of Materialistic Definitions (James, Edelman, Baars, Block and Searle)

According to Edelman (2003), 'Consciousness is not a thing but rather, as William James pointed out (James, 1977), a process that emerges from interactions of the brain, the body, and the environment. ... it is a multidimensional process with a rich variety of properties. ... [C]onsciousness is not a property of a single brain location or neuronal type, but rather is the result of dynamic interactions among widely distributed groups of neurons'. Edelman (2003) also suggests, in his Table 1, that conscious states have *general features* '1. Conscious states are unitary, integrated, and constructed by the brain. 2. They can be enormously diverse and differentiated. 3. They are temporally ordered, serial, and changeable. 4. They reflect binding of diverse modalities. 5. They have constructive properties including gestalt, closure, and phenomena of filling in', *informational features* '1. They show intentionality with wide-ranging contents. 2. They have widespread access and associativity. 3. They have center periphery, surround, and fringe aspects. 4. They are subject to attentional modulation, from focal to diffuse', and *subjective features* '1. They reflect subjective feelings, qualia, phenomenality, mood, pleasure, and unpleasure. 2. They are concerned with situatedness and placement in the world. 3. They give rise to feelings of familiarity or its lack'.

For Baars (Baars, 1988), on the other hand, consciousness is accomplished by a 'distributed society of specialists that is equipped with a working memory, called a global workspace, whose contents can be broadcast to the system as a whole'. In a subsequent comment on Ned Block's proposals, Baars remarked (Baars & Laureys, 2005), 'Block (2005) has long argued that there are two kinds of consciousness: "phenomenological consciousness" (what we experience) and "access consciousness" (roughly, the information we can access via conscious experiences). ... There is no need for "access consciousness". All we need is consciously-mediated access to brain capacities, most of which are simply not conscious'.

Searle (2000) opined, 'Consciousness is entirely caused by neurobiological processes and is realized in brain structures. The essential trait of consciousness that we need to explain is unified qualitative subjectivity. Consciousness thus differs from other biological phenomena in that it has a subjective or first-person ontology, ... Two common approaches to consciousness are those that adopt the building block model, according to which any conscious field is made of its

various parts, and the unified field model, according to which we should try to explain the unified character of subjective states of consciousness'.

All these authors, while emphasizing different details, thus appear to regard consciousness as an outcome of complex neuro-biological processes.

3. *Gordon Globus' View*

Globus (1998) stated, 'the vague term "consciousness" is partially unpacked into "self", "cognition", "qualia" and "thrownness-in-the-world" [...] problem. I shall partially do so here, confining my investigation to (1) the self or subject, denoted by "I", (2) cognition, (3) thrownness in the world, and (4) "qualia"'.

However, the term 'qualia' may have different meaning to different people. Therefore, its meaning should be clarified; for example, SEs or 'first person experiences' is one of the meanings attributed to the term 'qualia'. In general, qualia are properties of conscious experiences, properties/qualities of objects, or both (Vimal, 200x-c). Therefore, I have used the term 'qualia; subjective experiences (SEs) of objects' in Table 2 (meaning #3).

4. *Non-Representational Theories: Dynamic System Theory, Externalism and Fractal Catalytic Theory*

According to (Freeman, 1999), 'The emergent pattern is not a representation of a stimulus. ... It is a phase transition that is induced by a stimulus, followed by a construction of a pattern that is shaped by the synaptic modulation among cortical neurons from prior learning. ... It is a dynamic action pattern that creates and carries the meaning of the stimulus for the subject'.

O'Reagan and Noe (2001) aver, 'seeing is a way of acting. It is a particular way of exploring the environment. Activity in internal representations does not generate the experience of seeing. The outside world serves as its own, external, representation. The experience of seeing occurs when the organism masters what we call the governing laws of sensorimotor contingency. ... [E]xperience does not involve having an internal representation, but instead involves making use of certain capacities to interact with the environment'.

In Radical Externalism or Consciousness as Existence, consciousness is perceptual (say seeing this page), reflective (say, thinking of home) or affective (say wanting to be there or intending to get there); perceptual consciousness is outside the head, whereas reflective and affective consciousness may be inside the cranium (Honderich, 2006). Furthermore, 'with respect to consciousness, *there is no difference between appearance and reality*. With consciousness, what there seems to be is what there is. What there seems to be is all there is'(Honderich, 2006).

According to Velmans (2007), 'Dualists believe that experiences have neither location nor extension, while reductive and "non-reductive" physicalists (biological naturalists) believe that experiences are really in the brain, producing an apparent impasse in current theories of mind. Enactive and reflexive models of perception try to resolve this impasse with a form of 'externalism' that challenges the assumption that experiences must either be nowhere or in the brain. However, they are externalist in very different ways. Insofar as they locate experiences anywhere, enactive models locate conscious phenomenology in the dynamic interaction of organisms with the external world, and in some versions, they reduce conscious phenomenology to such interactions, in the hope that this will resolve the hard problem of consciousness. The reflexive model accepts that experiences of the world result from dynamic organism-environment interactions, but argues that such interactions are preconscious. While the resulting phenomenal world is a consequence of such interactions, it cannot be reduced to them. The reflexive model is externalist in its claim that this external phenomenal world, which we normally think of as the "physical world", is literally outside the brain. Furthermore, there are no added conscious experiences of the external world inside the brain. ... [I]n closing the gap between the phenomenal world and what we normally think of as the physical world, the reflexive model resolves one facet of the hard problem of consciousness. Conversely, while enactive models have useful things to say about percept formation and representation, they fail to address the hard problem of consciousness'.

In a paper by Carpenter, *et al.* (2009), they '... [provide] support for a non-representational theory of perception called the Fractal Catalytic theory, which proposes that perception is a catalytic type of process. ... [E]xperience arises as an organism mediates (catalyzes) the transitions in its surround ... consciousness may be fundamental'.

Non-representational theories therefore suggest that consciousness is mostly *function* because (i) emergent pattern is viewed as a stimulus-induced phase transition (Freeman, 1999), (ii) experience is a way of acting that involves sensorimotor interaction (O'Regan & Noë, 2001), (iii) perceptual consciousness is outside the head (Honderich, 2006), or (iv) experiences of the world result from

dynamic organism-environment interactions (Velmans, 2007).[1] Alternatively, consciousness may be fundamental and 'experience arises as an organism mediates (catalyses) the transitions in its surround' (Carpenter *et al.*, 2009).

5. Meanings Attributed in JCS, MindBrain, and Nature Network Online Discussion Groups.

In 2008–2009, JCS-online and MindBrain-online discussion groups, and the *Nature Network forum 'Brain Physiology, Cognition and Consciousness'* held interesting discussions on the definition of consciousness[2] (see meanings listed in the tables below that have no year attributed to them).

6. Idealism and Modern Constructivism

In idealism, matter emerges from consciousness; for example, cosmic consciousness is the primary from which matter emerges (De & Pal, 2005; Hegel, 1971; Pal & De, 2004; Schäfer, 1997; 2006). For constructivists, according to (Müller, 2008), 'Matter is a structure that crystallizes within mind'.

[1] Velmans commented that the discussion (iv) of representational theories versus non-representational implies 'that I argue for a non-representational view of consciousness. But in my own work I find it important to distinguish the conditions that support the arising of a given conscious experience from the conscious experience itself. Dynamic organism-environment interactions are clearly involved in the formation of percepts of the external world, however the latter may represent events in the world once they arise — see, for example, (Velmans, 1990) which also elaborates on the closure of the psychological with the physical (and which predates Honderich, 2006, by 16 years' (personal communication November, 2008).

[2] See http://tech.groups.yahoo.com/group/jcs-online/messages/nnnn : where nnnn is (i) 6240 and 6269 for Allsop, (ii) 6231, 6246 and 6247 for Deiss, (iii) 6221, 6230, and 6236 for Edwards, (iv) 6332 for Faichney, (v) 6228, 6243, and 6244 for McCard, (vi) 6246, 6267, 6645, and 6683 for Patlavskiy, 5957 and 6523 for his formulation of the hard problem, (vii) 6305 for Alfredo Pereira Jr., and (viii) 6244, 6249, and 6283 for Ricke. See http://groups.yahoo.com/group/MindBrain/nnnn, where nnnn is (i) 12877 for Patlavskiy's formulation of the Law of the Conservation of Consciousness, (ii) 14552 for Kelvin McQueen, (iii) 14553 for Robert Karl Stonjek, (iii) 14562 and 16505 for Serge Patlavskiy, and (iv) 14560 for Alfredo Pereira Jr.. See http://en.wikipedia.org/wiki/Consciousness for wikipedia. See also http://network.nature.com/groups/bpcc/forum/topics/t?page=p#, where t: 1585 with p: 71, 81, 84, 85, 93, 97, 99 and 101; t: 3943 with p: 1; these are not discussed because of the lack of space.

Table 1
Meanings attributed to the term *Consciousness* by various authors based on the criterion *function*. References without year are from online discussion groups as per footnote 2.

#	Meanings Attributed to the Term 'Consciousness'	References
	Materialistic Meanings (Types A–C)	
1	The ability to discriminate stimuli, to report information, to monitor internal states or to control behaviour: related to 'easy problems'	Chalmers, 2003
2	Consciousness as (multidimensional) physical/neurobiological processes	Baars, 1988; Edelman, 2003; James, 1977; Searle, 2000; Vimal, 2008; 200x-c; Pereira Jr.
3	Consciousness is accomplished by a 'distributed society of specialists that is equipped with a working memory, called a global workspace, whose contents can be broadcast to the system as a whole'	Baars, 1988
4	Cognition including memory, attention, abstraction, inner speech, imagination, behaviour, intentionality, and language	Globus, 1998; Vimal, 2008a; 2009
5	Processing of SE	Bruzzo & Vimal, 2007; Vimal, 2008a; 2008b
6	Thought processing, initiation of activities and/or other cognitive processing	Bruzzo & Vimal, 2007; Vimal, 2008a; 2009
7	Consciousness is 'that which can be reported verbally (in humans) and that which is experienced subjectively'; however, consciousness is not necessarily dependent on the language constraint	Stonjek; Pereira Jr.
8	Thrownness in the world	Globus, 1998; Vimal, 2009
9	Act of processing and conceptualization of information and the construction of the intellectual products in a form of inner speech and imagination, behaviour (including adaptive activity), language, etc.; consciousness as an ability of the complex system to reduce its entropy by transforming physical sensory signals into information	Patlavskiy; Patlavskiy, 1999

10	Self-organization	Vimal, 2008a; 2009
11	Responsive to the environment: Humphrey's (2000) primitive, single-celled creature (floating in the ancient sea) detects red light and makes a characteristic *wriggle* of activity. The detection is its *function* because the animal is responsive to the environment (Vimal, 200x–b)	Humphrey, 2000; Vimal, 200x–b
12	'The awareness of a dynamic physical entity is its being informed by influences from other dynamic entities, including, perhaps, indirect influences from its own prior state. Phenomenal experience is what it is like to be thus informed'. Interpreter of sensory signals: 'interpretation and experiential sensing may be the same thing', panexperientialism	Edwards
13	Stream of intentional information	Faichney
14	Non-representational theories: Consciousness is mostly *function* such as emergent pattern is a stimulus-induced phase transition (Freeman, 1999), experience is a way of acting that involves sensorimotor interaction (O'Regan & Noë, 2001), perceptual consciousness is outside the head (radical externalism) (Honderich, 2006), or experiences of the world result from dynamic organism-environment interactions (Velmans, 2007)	Freeman, 1999; Honderich, 2006; O'Regan & Noë, 2001; Velmans, 2007
15	Reflective awareness, such as perception, thought, and volition; intentional entity in western perspective	Rao, 1998
16	Paradoxical awareness or awareness without being aware, such as subliminal perception, implicit memory, blindsight and hypnotic analgesia[3]	Rao, 1998

[3] Rao remarked, '... western paradigm ... equates consciousness with subjective awareness, and does not apparently leave room for consciousness as something entirely different from and independent of the mind, a notion central to Indian tradition. I have no problem with considering blindsight as some sort of subconscious phenomena. ... In the Indian tradition I have attempted to espouse, consciousness is the underlying principle of all awareness, including implicit awareness. It is not the same as subjective awareness, which is a category of awareness. It is a manifestation of consciousness but mediated and modulated by cortical processes. Function, structure, experience, etc. are inappropriate categories to understand consciousness-as-such even though they may prove helpful in understanding the manifestations of consciousness as in implicit memory or subliminal perception. I have no problem with your classification, even though I may have some reservations about the analysis of consciousness in terms of function and experience. I enjoyed reading your paper'. (Personal communication in September and October 2008).

17	Consciousness is a way of being and of perceiving the various dimensions of reality; consciousness is a tool we use, not who we are; self-consciousness.	McCard
18	Consciousness is a process of interpreting sensed qualitative contrasts for their meaning as expectations we derive from them and storing those expectations in memory for future use.	Deiss
19	Memory and abstraction.	Ricke
20	Consciousness denotes being awake and *responsive to the environment*, in contrast to being asleep or in a coma.	Wikipedia

7. *Eastern Perspectives*

According to (Rao, 1998), 'In the western scholarly tradition, (a) consciousness is generally equated with the mind; (b) intentionality is regarded as its defining characteristic; and (c) the goal is one of seeking rational understanding of what consciousness/mind is. In the eastern tradition, as represented by the Indian approach to the study of consciousness, (a) consciousness and mind are considered to be different; (b) consciousness as such is believed to be nonintentional while the mind is regarded as intentional; and (c) the goal is one of developing practical methods for transformation of the human condition via realization of consciousness as such.

It is suggested that consciousness encompasses two different domains, the transcendental and the phenomenal, and that humans enjoy dual citizenship in them. ... Consciousness in the sense of being aware refers to at least seven different things. First is reflective awareness, such as we find in the acts of perception, thought, and volition. Second is paradoxical awareness or awareness without being aware, which includes among other things subliminal perception, implicit memory, blindsight and hypnotic analgesia. Third is awareness of awareness, the awareness of being aware. Fourth is self-awareness,

the awareness of personal identity, one's being distinct from the rest. Fifth is the awareness of unity and continuity in one's awareness, the so-called stream of awareness. Sixth is intuitive awareness, awareness that is apparently independent of and sensorially disconnected from the object of awareness such as intuitions, veridical hunches and extrasensory perception (Rao & Palmer, 1987). Finally, awareness as such or pure awareness which is not predicated of any object or process, a state often reported in mystical experiences and by yogins.

The above seven meanings of consciousness fall into two categories. The first category is what may be called 'object awareness', where awareness is always predicated of an object. The object may be physical or mental, real or imaginary. The second category is 'subject awareness' where awareness is awareness of itself or one of its aspects. It also includes the possibility of experiencing or realizing awareness as such, an awareness state with no object, whether of the awareness process or of the world of objects and thoughts'. Again according to Rao (2005), 'Perception is sensory awareness. Cognition is reflective awareness. Consciousness is awareness-as-such. In Indian psychology, as represented by *Samkhya-Yoga* and *Advaita Vedanta* systems, consciousness and mind are fundamentally different. Reality is the composite of being (*sat*), knowing (*cit*) and feeling (*ananda*). Consciousness is the knowledge side of the universe. It is the ground condition of all awareness. ... In the western tradition the dominant perspective is one of rational understanding of what consciousness is. In the eastern tradition the approach is one of developing practical methods for transforming consciousness in specific ways for specific purposes. These differing approaches led to radically different emphases as to what is essential in discussing consciousness. A recognition of this fact is not only likely to help us appreciate the context and significance of each other's perspectives, but may also enable us to see the respects in which they are genuinely complementary'.

Meanings of consciousness extracted from the above relating to *function* are listed in Table 1 and those related to *experience* in Table 2, including awareness-as-such or pure awareness occurring in *samadhi* states, which has been replicated by many yogis since the RigVedic period 6000 years ago (Vimal & Pandey-Vimal, 2007).

Table 2
Meanings attributed to the term *Consciousness* by various authors based on the criterion *experience*. References without year are from online discussion groups as per footnote 2.

#	**Meanings Attributed to the Term 'Consciousness'**	**References**
	Non-materialistic but physicalist (= materialistic + experiential) meanings includes western/eastern perspectives: (Types D–F), idealism, and modern constructivism	
1	The problem of experience: '*hard problem*': Conscious states include states of perceptual experience, bodily sensation, mental imagery, emotional experience, occurrent thought and more (Chalmers, 2003)	Chalmers, 2003
2	Self (subjective or first person experience of subject) or self-awareness denoted by 'I'; the subject of cognitive activity	Bruzzo & Vimal, 2007; Globus, 1998; MacGregor & Vimal, 2008; Rao, 1998; Vimal, 2008a; 2008b; Wikipedia; Patlavskiy
3	Qualia; subjective experiences (SEs) of objects	Edelman, 2003; Globus, 1998; Searle, 2000; Vimal, 2008a; 2008b; Edwards (qualia)
4	Proto-experiences (PEs)	Vimal, 200x–b; 2008a; 2008b
5	*Something that it is like* to be something (Nagel, 1974). It can be re-phrased as 'A state is a phenomenally conscious state, if and only if there is something it is like to have (or be in) that state. Moreover, an organism is phenomenally conscious, if and only if there is something it is like to be that organism' (McQueen)	Nagel, 1974; McQueen
6	SEs related to sensations, perceptions, moods, emotions, dreams and so on	Wikipedia; Bruzzo & Vimal, 2007; MacGregor & Vimal, 2008; Vimal, 2008a; 2008b
7	Access and phenomenal awareness; phenomenal experience	Block, 2005; Lamme, 2003; 2004; Vimal, 2008a
8	Thought	Wikipedia; Bruzzo & Vimal, 2007; Vimal, 2008a
9	Awareness of awareness	Rao, 1998

10	Intuitive awareness	Rao, 1998; Rao & Palmer, 1987
11	Free will	Bruzzo & Vimal, 2007; Vimal, 2008a
12	Phenomenal time and phenomenal space	Vimal, 2007; Vimal & Davia, 2008
13	Unified world of knowledge or awareness composed of phenomenal properties maintained by our brains; ineffable phenomenal qualities	Allsop
14	Whitehead's Actual Occasions	Whitehead, 1978; McCard
15	Non-representational theory: Consciousness may be fundamental and 'experience arises as an organism mediates (catalyzes) the transitions in its surround'	Carpenter *et al.*, 2009
16	Idealism: matter emerges from consciousness	De & Pal, 2005; Hegel, 1971; Pal & De, 2004; Rao, 1998; Schäfer, 1997; 2006
17	Modern constructivism: matter is a structure that crystallizes within mind	Müller, 2008
	Experiential meanings: Eastern perspective	
18	Non-intentional entity in eastern perspective	Rao, 1998
19	Awareness of unity and continuity in one's awareness or stream of awareness	Rao, 1998
20	Awareness-as-such or pure awareness of *yogins*, such as during the unification of SE of observer, SE of observed objects, and the processing of SEs at *samadhi* state	Rao, 1998; 2005

3. Conclusions

Given such a multiplicity of meanings, even within some particular paradigm such as materialism, it is hard to arrive at any single, widely acceptable, definition of consciousness (Vimal, 200x–c); attempts to do so often lead to confusion and circular discussion. And of course the lists offered here are by no means exhaustive — they simply represent meanings to be found in some of the most popular current literature and everyday usage.

According to (Crick & Koch, 1998), 'Everyone has a rough idea of what is meant by being conscious. For now, it is better to avoid a

precise definition of consciousness because of the dangers of premature definition. Until the problem is understood much better, any attempt at a formal definition is likely to be either misleading or overly restrictive, or both'. But confusion also often arises from misunderstandings of what people mean when using the term. Therefore, the best option may be to identify its various aspects and then define each aspect.

An example of how this can be done is provided by discussion of the dual-aspect PE–SE framework (Bruzzo & Vimal, 2007; MacGregor & Vimal, 2008; Vimal, 200x–a; 200x–b; 2008a; 2008b; 2009; 200x-d; 200x-e; Vimal & Davia, 2008). The subjective experience (SE) and proto-experience (PE) aspects of consciousness were differentiated, described, and separately addressed. In the PE–SE framework, an entity has two aspects: material and experiential. The material aspect is composed of structures and *functions*, whereas the experiential aspect is composed of *experiences*. As shown in Tables 1 and 2, the *functions* and *experiences* together constitute the meanings attributed to the term *consciousness*. This approach arguably allowed relatively precise and understandable treatments of 'consciousness' in these papers; the method can, I suggest, be recommended to all.

Acknowledgments

The work was partly supported by VP-Research Foundation Trust and Vision Research Institute research Fund. I would like to thank (1) Anonymous reviewers, Chris Nunn, Michael J.S. Beaton, Max Velmans, K. Ramakrishna Rao, Anthony Freeman, Manju-Uma C. Pandey-Vimal, Vivekanand Pandey Vimal, Shalini Pandey Vimal and Love (Shyam) Pandey Vimal for their critical comments, suggestions, and grammatical corrections, and (2) Alfredo Pereira Junior and Serge Patlavskiy for providing more information related to their online discussion. The most recent and longer version of this article is available at http://www.geocities.com/rlpvimal/meanings-Vimal.pdf. The author is affiliated with Vision Research Institute, 428 Great Road, Suite 11, Acton, MA 01720 USA; Dristi Anusandhana Sansthana, A-60 Umed Park, Sola Road, Ahmedabad-61, Gujrat, India; Dristi Anusandhana Sansthana, c/o NiceTech Computer Education Institute, Pendra, Bilaspur, C.G. 495119, India; and Dristi Anusandhana Sansthana, Sai Niwas, East of Hanuman Mandir, Betiahata, Gorakhpur, U.P. 273001, India.

References

Baars, B.J. (1988), *A cognitive theory of consciousness* (New York: Cambridge University Press).

Baars, B.J. & Laureys, S. (2005), 'One, not two, neural correlates of consciousness', *Trends in Cognitive Sciences*, **9** (6), p. 269; author reply p. 270.

Beck, F. & Eccles, J. (1992), 'Quantum aspects of brain activity and the role of consciousness', *Proceedings of the National Academy of Sciences of the USA*, **89**, pp. 11357–61.

Block, N. (2005), 'Two neural correlates of consciousness', *Trends in Cognitive Sciences*, **9** (2), pp. 47–52.

Block, N. & Stalnaker, R. (1999), 'Conceptual analysis, dualism, and the explanatory gap', *Philosophical Review*, **108**, pp. 1–46.

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), pp. 541–66.

Campbell, K.K. (1970), *Body and Mind* (Doubleday).

Carpenter, P.A., Davia, C.J. & Vimal, R.L.P. (2009), 'Catalysis, Perception and Consciousness', *New Mathematics and Natural Computation (NMNC) (World Scientific)*, **5** (1), pp. 1–20.

Chalmers, D. (1996), *The Conscious Mind* (Oxford: Oxford University Press). See also http://www.ditext.com/chalmers/chalm.html.

Chalmers, D.J. (2003), 'Consciousness and its Place in Nature', In S. Stich & F. Warfield (Ed.), *Blackwell Guide to Philosophy of Mind* (Blackwell). Also in Chalmers, D. (Ed, 2002), *Consciousness and its Place in Nature* (Oxford University Press), http://consc.net/papers/nature.html; also email correspondence on 11 November 2005.

Churchland, P.S. (2003), 'Self-representation in nervous systems', *Annals of the New York Academy of Science*, **1001**, pp. 31–8.

Crick, F. & Koch, C. (1998), 'Consciousness and neuroscience', *Cerebral Cortex*, **8** (2), pp. 97–107.

Crick, F. & Koch, C. (2003), 'A framework for consciousness', *Nature Neuroscience*, **6** (2), pp. 119–26.

De, A.U. & Pal, D. (2005), 'Consciousness Model: Significance of thought-carrying particles and thought-retaining particles in quantum measurement as well as cognitive problem', *NeuroQuantology*, **2**, pp. 111–8.

Dennett, D.C. (1991), *Consciousness Explained* (Boston: Little, Brown and Company).

Dretske, F. (1995), *Naturalizing the Mind* (MIT Press).

Edelman, G.M. (1993) 'Neural Darwinism: selection and reentrant signaling in higher brain function', *Neuron*, **10** (2), pp. 115–25.

Edelman, G.M. (2003), 'Naturalizing consciousness: a theoretical framework', *The Proceedings of the National Academy of Sciences USA*, **100** (9), pp. 5520–4.

Foster, J. (1991), *The Immaterial Self: A Defence of the Cartesian Dualist Conception of the Mind* (Oxford University Press).

Freeman, W.J. (1999), 'Consciousness, intentionality and causality', *Journal of Consciousness Studies*, **6**, pp. 143–72.

Globus, G.G. (1998), 'Self, Cognition, Qualia and World in Quantum Brain Dynamics', *Journal of Consciousness Studies*, **5** (1), pp. 34–52.

Griffin, D.R. (1998), *Unsnarling the World-Knot: Consciousness, Freedom, and the Mind-Body Problem* (University of California Press).

Hamker, F.H. (2004), 'The Reentry Hypothesis: The Putative Interaction of the Frontal Eye Field, Ventrolateral Prefrontal Cortex, and Areas V4, IT for Attention and Eye Movement', *Cerebral Cortex*, **15** (4), pp. 431–47.

Harman, G. (1990), 'The intrinsic quality of experience', *Philosophical Perspectives*, **4**, pp. 31–52.

Hegel, G.W.F. (1971), *Hegel's Philosophy of Mind: Being Part Three of the Encyclopaedia of Philosophical Sciences* (Oxford: Clarendon Press), Translated by W. Wallace.

Hill, C.S. (1997), 'Imaginability, conceivability, possibility, and the mind-body problem', *Philosophical Studies*, **87**, pp. 61–85.

Hodgson, D. (2005), 'Plain Person's Free Will', *Journal of Consciousness Studies*, **12** (1), pp. 3–19; discussion pp. 20–75; response pp. 76–95.

Honderich, T. (2006), 'Radical Externalism', In A. Freeman (Ed.), *Radical Externalism: Honderich's theory of consciousness discussed* (Exeter, UK and Charlottesville, VA, USA: Imprint Academic), pp. 3–13.

Humphrey, N. (2000), 'The Privatization of Sensation', In L. Huber & C. Heyes (Ed.), *The Evolution of Cognition* (Cambridge, MA, USA: MIT Press), pp. 241–52.

Huxley, T. (1874), 'On the Hypothesis that Animals are Automata, and its History', *Fortnightly Review*, **95**, pp. 555–80. Reprinted in *Collected Essays* (London), 1893.

Jackson, F. (1982), 'Epiphenomenal qualia', *Philosophical Quarterly*, **32**, pp. 127–36.

James, W. (1977), In J.J. McDermott (Ed.), *Writings of William James* (Chicago: University of Chicago Press), pp. 169–83.

Koch, C. (2004), 'Qualia', *Current Biology*, **14** (13), p. R496.

Lamme, V.A. (2003), 'Why Visual Attention and Awareness are Different', *Trends in Cognitive Sciences*, **7** (1), pp. 12–7.

Lamme, V.A. (2004), 'Separate Neural Definitions of Visual Consciousness and Visual Attention; a case for phenomenal awareness', *Neural Network*, **17** (5–6), pp. 861–72.

Levin, J. (2008), 'Taking Type-B Materialism Seriously', *Mind & Language*, **23** (4), pp. 402–25.

Levine, J. (1983), 'Materialism and Qualia: The explanatory gap', *Pacific Philosophical Quarterly*, **64**, pp. 354–61.

Loar, B. (1997), 'Phenomenal States', revised edition, in N. Block, O. Flanagan & G. Güzeldere (Ed.), *The Nature of Consciousness* (MIT Press).

Lockwood, M. (1989), *Mind, Brain, and the Quantum* (Oxford University Press).

MacGregor, R.J. & Vimal, R.L.P. (2008), 'Consciousness and the Structure of Matter', *Journal of Integrative Neuroscience*, **7** (1), pp. 75–116.

Nagel, T. (1974), 'What is it Like to be a Bat?', *Philosophical Review*, **83**, pp. 435–50.

O'Regan, J.K. & Noë, A. (2001), 'A Sensorimotor Account of Vision and Visual Consciousness', *Behavioral and Brain Sciences*, **24** (5), pp. 939–73; discussion pp. 973–1031.

Pal, D. & De, A.U. (2004), 'Physics of Consciousness and its Model May Provide Guidelines to Solve Many Scientific Problems', *NeuroQuantology*, **1**, pp. 17–28.

Patlavskiy, S.F. (1999), 'Elaboration of the New Paradigm of Interdisciplinary Investigations', *Journal of Conscientiology*, **1** (4), pp. 305–36, (IIPC Ed., Miami, FL) a version with color figures is available at http://cogprints.org/4633/ and http://www.geocities.com/spatlavskiy/ElaborNewParadigm.pdf.

Perry, J. (2001), *Knowledge, Possibility, and Consciousness* (MIT Press).

Popper, K. & Eccles, J. (1977), *The Self and Its Brain: An Argument for Interactionism* (Springer).
Quine, W.V. (1951), 'Two Dogmas of Empiricism', *Philosophical Review*, **60**, pp. 20–43.
Rao, K.R. (1998), 'Two Faces of Consciousness: A Look at Eastern and Western Perspectives', *Journal of Consciousness Studies*, **5** (3), pp. 309–27.
Rao, K.R. (2005), 'Perception, Cognition and Consciousness in Classical Hindu Psychology', *Journal of Consciousness Studies*, **12** (3), pp. 3–30.
Rao, K.R. & Palmer, J. (1987), 'The Anomaly Called psi: Recent research and criticism', *Behavorial and Brain Sciences*, **10**, pp. 539–643.
Robinson, W.S. (1988), *Brains and People: An Essay on Mentality and its Causal Conditions* (Temple University Press).
Russell, B. (1927), *The Analysis of Matter* (London: Kegan Paul).
Schäfer, L. (1997), *In Search of Divine Reality* (Fayetteville: Univ. of Arkansas Press).
Schäfer, L. (2006), 'Quantum Reality and the Consciousness of the Universe: Quantum reality, the emergence of complex order from virtual states, and the importance of consciousness in the universe', *Zygon*, **41** (3), pp. 505–32.
Searle, J.R. (2000), 'Consciousness', *Annual Review of Neuroscience*, **23**, pp. 557–78.
Stoljar, D. (2001), 'Two Conceptions of the Physical', *Philosophy and Phenomenological Research*, **62**, pp. 253–81.
Strawson, G. (2000), 'Realistic Materialist Monism', in S. Hameroff, A. Kaszniak & D. Chalmers (Ed.), *Toward a Science of Consciousness III* (MIT Press).
Tononi, G. (2004), 'An Information Integration Theory of Consciousness', *BMC Neuroscience*, **5** (1), p. 42.
Tye, M. (Ed, 1995), *Ten Problems of Consciousness: A Representational Theory of the Phenomenal Mind* (MIT Press).
Van Gulick, R. (2001), 'Reduction, Emergence and Other Recent Options on the Mind/Body Problem: A Philosophic Overview', *Journal of Consciousness Studies*, **8** (9–10), pp. 1–34.
Velmans, M. (1990), 'Consciousness, Brain and the Physical World', *Philosophical Psychology*, **3** (1), pp. 77–99, http://cogprints.org/238/230/199801005.html
Velmans, M. (2007), 'Where Experiences Are: Dualist, reductionist, enactive and reflexive accounts of phenomenal consciousness', *Phenomenology and the Cognitive Sciences* (in press); http://cogprints.org/4891/2/Enactive_vs_Reflexive_with_accepted_corrections.pdf.
Vimal, R.L.P. (200x-a), 'Proto-Experiences and Subjective Experiences I: Integration of Classical, Quantum, and Subquantum Concepts', *In review*, available at http://www.geocities. com/rlpvimal/PE-SE-SQ-Vimal.pdf.
Vimal, R.L.P. (200x-b), 'Proto-Experiences and Subjective Experiences II: Integration of Classical and Quantum Concepts for Emergence Hypothesis', *In review*, available at http://www.geocities.com/rlpvimal/PE-SE-Emergence-Vimal.pdf.
Vimal, R.L.P. (200x-c), 'Quest for the Definition of Consciousness, Qualia, Mind, and Awareness', *In preparation*, available at http://www.geocities.com/rlpvimal/DefineC-Vimal.pdf
Vimal, R.L.P. (2007), 'Subjective Experiences of Space and Time: Self, Sensation, and Phenomenal time', Nature Precedings: http://precedings.nature.com/, Mind and Brain Yahoo-group: http://tech.groups.yahoo.com/group/ MindBrain/, and Karl Jaspers Forum: http://www.kjf.ca/. Available: http://precedings.nature.com/documents/2272/version/1, http://tech.groups.yahoo.com/group/MindBrain/message/11199 and http://www.kjf.ca/102-TAVIM.htm.

Vimal, R.L.P. & Pandey-Vimal, M.-U.C. (2007), 'Ancient Historical Scripture and Color Vision', *Color Research and Application*, **32** (4), pp. 332–3.
Vimal, R.L.P. (2008a), 'Attention and Emotion', *The Annual Review of Biomedical Sciences (ARBS)*, **10**, pp. 84–104. Available: http://arbs.biblioteca.unesp.br/viewissue.php.
Vimal, R.L.P. (2008b), 'Proto-experiences and Subjective Experiences: Classical and Quantum Concepts', *Journal of Integrative Neuroscience*, **7** (1), pp. 49–73.
Vimal, R.L.P. (2009), 'Selection of a specific subjective experience: conjugate matching and subjective experience', *Journal of Integrative Neuroscience*, submitted on 24 July 2008, available at http://www.geocities.com/rlpvimal/selection-matching- Vimal.pdf.
Vimal, R.L.P. (200x-d), 'Towards a Theory of Everything: Unification of Consciousness with Fundamental Forces in String Theory', *In review*, available at http://www.geocities.com/ rlpvimal/TOE-Vimal.pdf.
Vimal, R.L.P. (200x-e), 'Necessary Ingredients of Awareness: Integration of Psychophysical, Neurophysiological, and Consciousness Research for the Red-Green Channel', *In review*, available at http://www.geocities.com/rlpvimal/Visual-Awareness-Vimal.pdf.
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*, **2**, pp. 102–51, available at http://www.quantumbionet.org/admin/files/QBS2%20102-20151.pdf.
Whitehead, A.N. (1978), *Process and Reality. An Essay in Cosmology [1929] Corrected edition* (New York-London: The Free Press, a division of Macmillan Publishing Co., Inc.-Collier Macmillan Publishers).