Brain-Challenged Self and Self-Challenged Brain

The Central Impasse in Consciousness Studies

Sangeetha Menon

> In its widest sense a man's Self is the sum total of all that he CAN call his, not only his body and his psychic powers, but his clothes and his wife and children, his ancestors and friends, his reputation and works, his lands and horses, and yacht and bank-account. If they wax and prosper, he feels triumphant; if they dwindle and die away, he feels cast down, — not necessarily in the same degree for each thing, but in much the same way for all.
>
> William James (*Principles of Psychology,* 1890)

> That which is beyond caste and creed, family and lineage, devoid of name and form, merit and demerits, transcending space, time and sense objects, that brahman art thou, meditate on this in thy mind.
>
> Sankaracarya (AD 788–820)
> *Vivekacudamoni*: 164

> O son of Kunti! Sense-contacts with their objects cause cold and heat, pleasure and pain. These come and go—they are fleeting, O Bharata prince! Endure them.
>
> O hero! The one whom these do not agitate, who is the same in pain and pleasure, and who is wise, becomes fit indeed for immortality.
>
> These bodies that perish are said to pertain to the eternal Self that is embodied—the eternal Self, that is imperishable and indeterminable.
>
> *Bhagavad Gita*: 2: 14, 15, 18

The brain is arguably the most important part of the human body studied to understand the working of sensation, emotion, and consciousness. The single unit of information and experience that connects sensation, emotion, and consciousness is agreed to be the "self." There are two major streams of discussion on the self. Self is debated as a cognitive concept that helps tie the missing ends between the physical and psychological functions; and the self is argued to be the locus of conscious experience. However different the arguments for these two positions, it is agreed that human behaviours, attitudes, and emotions are intricately tied to the neural structures on one side, and the indivisible experiential self on the other. Brain and self are the common threads that are used by neuropsychiatry, neuropharmacology, and philosophy to get a hold on one of the most intractable problems of humankind, namely, "consciousness."

Is there a common issue in brain and self studies that appears over and again? Yes — it is the attempt to explain the unity, continuity, and adherence of our experience, whether it is sensory or mental. To address the unity, adherence, and continuity of experience is to address the place of the self in the brain. A major challenge to this effort is the fact that, though we tend to commonly address a static unit by calling it "self," the self is a constantly emerging phenomenon as a result of its interaction with nature outside (social and biological) and nurture inside (mind). In the process of its emergence, the boundaries of the self seem to change, creating havoc for some (in the case of psychiatric challenges) and peace to others (in the case of spiritual experiences).

Philosophically, we continue to ask about mind-body unity—how the mind and body, qualitatively different, can connect and give rise to meaning and quality to life. The binding problem and the Chalmersian hard problem showcase the age-old mind-body problem in the context of consciousness. Both demand mechanisms and reasons for mutual influence. The interconnections between brain and the self have been especially eschewed in the developments in understanding the brain and its functions.

The classical idea of the brain with designated cortical areas and assigned functions, though, is still not in vogue; the view that supersedes is that the brain is an organ with a high capacity to survive even with less cortical areas. There are medical cases where patients seem to live "almost normally" in spite of frontal lobotomy or cortical lesions due to psychiatric conditions (Feinberg 2001). It is suggested that perhaps the limbic system, the seat of emotion, is the most important part of the brain without which normal functioning is impossible (Damasio 1994). Another proposal is that all that constitutes the self can be reduced to the synaptic connections—the neural pathways. LeDoux (2002) writes:

> People don't come preassembled, but are glued together by life. And each time one of us is constructed, a different result occurs. One reason for this is that we all start out with different sets of genes; another is that we have different experiences. What's interesting about this formulation is not that nature and nurture both contribute to who we are, but that they actually speak the same language. They both ultimately achieve their mental and behavioural effects by shaping the synaptic organization of the brain. The particular patterns of synaptic connections in an individual's brain, and the information encoded by these connections, are the keys to who that person is.
>
> (LeDoux 2002, p. 3)

The brain also has the capacity to switch areas of neural function if the designated cortical area becomes impaired; this capacity is termed "neuroplasticity." The brain has an immense capacity for growth and renewal and is modifiable by experience. The synapses involved change because of new experiences.

The plasticity of the brain is accompanied by yet another enigma—

that the self is somehow able to make sense of the neural changes and create corresponding changes in sensations and personal identity. Self-effort, willpower, positive thinking, love, compassion, spiritual quietude and such qualities are found to enhance brain functioning in the case of patients who face mental and physical challenges. Just as there are neural correlates of consciousness, I wish to suggest that there are self-correlates of consciousness. The self-correlates seem to alter the functions of the neural correlates and neural pathways in curious ways.

This brings us to the million-dollar question: Where and how in the brain is the "self" housed? How does the self make adaptive changes in one's personality corresponding to changes in the brain? How does the self influence and alter neurochemical functions of the brain? Can the brain address its structural and functional challenges without recourse to the self? Can there be a self without the interface of the brain and the limbic system? Are the brain and self constantly challenging each other?

These and similar questions may not give immediate answers considering the complex ways in which both our brain and self are cross-wired. These questions are also difficult to answer because we are not comfortable in using concepts that do not have the backing of scientific, causal relations. We do not even agree upon different ways of understanding the subject and the object other than causal relations. But, several medical cases studied by neuropsychiatrists show that the way the patient behaves before and after a cure is not even amenable to arrive at straightforward causal relations between the brain and the self. The subject-object distinction itself is shadowed when the brain behaves in ways not true to its essential physical neural structure. Can the brain be called distinctly objective and physical when it defies the laws of medicine? How does the brain and self conceive their roleplay and create the conspiracy of experience where the physicality of the brain is lost in the subjectivity of the self?

In this essay—with examples from current research in brain studies, neuropsychology, and neuropsychiatry—I will try to show that the significant problem in consciousness studies is perhaps not the "hard problem," but how to trace the ways in which the brain challenges the self, and the self challenges the brain. It is important to continue the classic mind-body debates. But equally significant is to understand the emer-

gence and placement of self in the context of an evolving brain which has the capacity to be plastic. Greater insights into the nature of self—neural and ontological—will arrive if we focus our research on the challenges that the brain and the self give each other.

Discrete but Unconscious Perceptions

Of the many attempts to define the locus of consciousness in the brain, a successful one has been the attempt to trace the neural correlates of consciousness. The NCC approaches serve two functions: 1. to establish identity relations between the neural correlate and the conscious experience, and 2. to find the causal relations between the two. Interestingly the founders of NCC theory (Crick & Koch 1990) themselves were sceptical about the complete success of the attempt. They wrote:

> Everyone has a rough idea of what is meant by consciousness. We feel that it is better to avoid a precise definition of consciousness because of the dangers of premature definition. Until we understand the problem much better, any attempt at a formal definition is likely to be either misleading or overly restrictive, or both.
>
> (Crick & Koch 1990, 264)

A stronger position to NCC is the replacement of a causal relation between a neural correlate and the conscious experience by an identity relation—that there is nothing other than the neural process. The neural process *is* the conscious experience.

Such a position would ask: Do we need consciousness to see an object? Do we need the self to respond to what we perceive? One of the strong proponents of such questions is Nicholas Humphrey (2006). He believes that the self is not made entirely of conscious or explicit events. Many perceptual processes are implicit and we are not conscious of them. With his training in primatology, psychology, and cognitive science, Humphrey nonchalantly dismisses the subjective nature of consciousness and the ontological reality of self.

In his book *Seeing Red*, Humphrey investigates the traditional mind-body problem in the context of consciousness. How are conscious expe-

riences related to the physical brain? Adhering to an identity theory, Humphrey suggests that instead of finding a causal explanation for consciousness we need to find the neural correlate for each conscious mental experience. I will show that the NCC is identical with the content of the brain.

Consciousness is nothing other than sensations. We cannot talk about consciousness without sensations. He argues that all perceptions are unconscious and all sensations are actions. According to Humphrey, in the case of seeing a red object, there are two red things—the red object projected and the red sensation (visual experience). The perceiver sees the object, but he does not see the visual experience of the object. He consciously sees real things in the real world and not his experiences of those things. Perception of the red object and sensation of it are independent. We have the illusion that sensation and perception are linked because they occur at the same time. Sensation and perception, although they are triggered by the same event, are essentially independent, occurring not in series but in parallel, and only interacting, if they ever do, much further down the line (Humphrey 2006, 50). Visual experience is a form of action. For Humphrey, having a red sensation, waving your hand, and shouting at someone — all three are actions.

> Consciousness is made of a certain kind of physical activity inside the subject's head. And this activity, we can assume, has been designed by natural selection, using nothing other than the resources of a biologically evolved nervous system. (Humphrey 2006, 75)

Humphrey supports his claim that perceptions are unconscious, with several arguments. In the case of blindness some kind of visual perception takes place. But there is no conscious visual experience. Perception of the object exists without the "sensation" of seeing. Another example he mentions is that of subliminal perception whereby an advertiser gets a message across so rapidly that we are unconscious of seeing it on the television screen. Just as there can be perception without sensations, there can be changes in sensation without corresponding changes in perception. When a person is under the influence of LSD and other hallucinogens he may have the sensation that a chair has become gigantic while still perceiving the regular chair. The general argument that Humphrey

makes is that there are various instances in which the conscious visual experience and the unconscious perception come apart.

One of the best criticisms for Humphrey's position, and the maintenance of the qualitative nature of experience, is given by John SEARLE (2006). Searle considers mind and brain to belong to different dimensions. Humphrey's attempt is to put the conscious experience and the physical brain in the same dimension. The mind has qualitative subjectivity. The brain does not have it. The experience of seeing red has a qualitative subjectivity, but the neuron firings that produce this do not. Seeing red is a first-person phenomenon. Neuron firings are third-person objective phenomena which look theoretically similar. Seeing red is the action of "redding." This cannot be — actions like shouting or lifting my hand is up to me. But when I stare at a screen it is not up to me whether I see red.

Because some perceptions can take place without the subject's conscious awareness of them, we cannot conclude that perception is unconscious. Blindsight only suggests that there are several perceptual visual pathways in the brain, and not all of them are conscious. We cannot say that the only form of consciousness one can have is sensation. It is possible that we can have no sensations at all. Consciousness is not seeing alone or feeling sensations alone.

According to Vedanta, consciousness is self-luminous. It not only illuminates an object but is also self-luminous. Both sensation and introspection are available for conscious agents. Humphrey does not consider the self-luminous nature of consciousness, but only considers the cognitive function that leads to (visual) sensation.

Subject and object

The standard neuroscience position is that once neurobiologists identify the neural correlate of consciousness—the electrochemical events that occur in the brain when we have subjective experiences—then they can be tested to find if the correlation is causal. Perhaps the relation is not even causal but identical. There is no subjectivity bereft of a bodily feedback mechanism. Conscious sensations have evolved by monitoring our responses to input stimuli, and modifying the sensory pathways accord-

ingly. They function to give us a sense of "Self." Humphrey, Dennett (1997) and others who concur with this line of thinking are essentially interested in removing the primacy of self in conscious experience and thereby make consciousness similar to any other biological function. Whether causal or identity relations, the subject of consciousness is pervious to and exhausted by neurobiology, according to both Searle and Humphrey.

According to Searle (2006) "understanding consciousness is just a matter of neurobiological research," and finding the unified field (Searle 2005). However, there are many philosophical and conceptual difficulties along the way. Searle considers the "brain an extremely difficult *object* to study." Why does Searle consider the brain a difficult "object"? It is largely because there seems to be an impassable difficulty in understanding how the object gives rise to the subject. How does the functioning of the physical object, the brain, give rise to a personal subjective consciousness? How or why does the subject come from the object?

Is this question a foolproof one? Why do we assume that the subject comes from the object? Is it possible that the subject itself has fashioned the object to be what it is? If this question is relevant, then purpose, intention, and meaning of what we sensate become important. Perhaps there are no straight-jacketed causal and unidirectional connections between the subject and object. It is not just "seeing red" but seeing red in a context filled by memories, likes and dislikes, emotions, hopes, and feelings. The context gets significance over the otherwise boring singular sensation. When LeDoux (2002) asserts that all that is is a "synaptic self," he also concedes that it is an organic self that is biological, psychological, and cultural. What is not clear in LeDoux's take is the route from the "synaptic self" to the "organic self." Perhaps for LeDoux and other like-minded neurobiologists the route is not even important.

On a reductionist perspective about sensation we could say that the self is not just a static placeholder to affirm or dismiss the subjectivity of experience. Considering our lived experiences, self is a dynamic entity that can change, causes change on other selves, and is changed by other selves. Self does not appear to us as the sum of all sensations, because it is definitely something more, which is revealed only through the personality and attitudes of the person. And, that "something more" is what

makes all the difference to our personal lives and adds richness. Such a self is unavailable in the animal world and hence cannot be understood however many experiments are done with animals, as against LeDoux's claim. Self is not the collection of processes that lead to sensations. It is responsible for the mental content *around* and *in* those sensations. Content cannot be replaced by the process.

The "Feel" Factor and Its Representation

Unified feel

Most of human experiences come as a unified whole. There is a fundamental unity to all experiences. We can have not just one single unified sensory experience but multi-sensorial experiences. Each discrete sensory experience is presented to us as a unified whole. The multi-sensorial experience also is presented as a unified whole. Our experience presents all in one go. We can have five sensory experiences that are directed to one object or several objects at the same time. I could be eating an apple, watching the blue waves, feeling the wind on my skin, smelling the fresh air, hearing the distant call of the boatman—all these are experienced at the same time with a clear distinctive feel for each. At the same time I could be also revelling in what could be described as a nostalgic feeling about the rivers in Kerala. All these feelings are experienced in a discrete as well as a wholesome manner. They all are cohered in a unitary subject which is myself.

Chalmers (in Bayne and Chalmers 2003) says that at any given time, a subject has a multiplicity of experiences. These experiences are distinct from each other. But at the same time they are unified by being aspects of a single encompassing state of consciousness. This total state is not a conjunction of different conscious states. But it is another conscious state in its own right.

Representationalism

A strong supposition among the philosophers of mind is that all mental facts and states can be explained in terms of natural science—that

mind can be naturalized and explained reductively in terms of neural functions. Another contention that argues against this supposition is that the subjective nature of experience cannot be naturalised since the processes responsible are rooted in representational structures of mind. The notion of "mental representation" is a major contender, to understand qualia, amongst philosophers of mind in terms of cognition. Primarily, mental representation is a concept that has arisen from the theories of cognitive science.

Computational psychology and cognitive neuroscience postulate different structures and processes towards understanding representation. Often these structures are not parts of common experience, but are linguistic tools for representing the phenomenal, the feel factor. Computational theory of mind suggests that brain is like a computer and mental processes are computations. Metzinger (2003) cautions against such approaches:

> Because many such philosophers are superb at analyzing the deeper structure of language, they often fall into the trap of analyzing the conscious mind as if it were *itself* a linguistic entity, based not on dynamical self-organization in the human brain, but on a disembodied system of rule-based information processing. (Metzinger 2003, 4)

From ancient times the mind has been viewed as consisting of cognition, affect (emotion), and conation (motivation). A valid criticism against the approaches in cognitive science is that though the claim is that "mind" is studied, only one aspect of mind is projected to represent the whole of mind, namely cognition. Emotion and motivation are as important, or at times more important, than the cognitive rules we apply in life. Ledoux (2002) makes the following perceptive argument:

> The fact that emotion and motivation are not studied by cognitive science makes sense if cognitive science is regarded as a science of cognition, but is troubling if the field is supposed to be the science of mind. A mind without feelings and strivings (the kind of mind traditionally studied in cognitive science) might be able to solve certain problems given by a cognitive psychologist, but it doesn't stack up well as the mental foundation of a self. The kind of mind modeled by cognitive science can, for example, play chess very well, and can even be pro-

> grammed to cheat. But it is not plagued with guilt when it cheats, or distracted by love, anger, or fear. Neither is it self-motivated by a competitive streak, or by envy or compassion. If we are to understand how the mind, through the brain, makes us who we are, we need to consider the *whole* mind, not just the parts that subserve thinking.
>
> (LeDoux 2002, 14)

An offshoot of these attempts is to learn the behaviour of single neurons and identify them with exclusive cognitive functions. A report quoting the findings announced at the recent annual meeting of the *Society for Neuroscience* says that scientists who examine single neurons in the human brain have successfully identified individual brain cells responding to particular stimuli such as pictures of individual people and objects.[1] They have also found that people can control the firing of the single neurons. These research findings may help scientists understand the cognitive processes and how individual brain cells respond to particular stimuli. The hope from such studies is that the findings may find application in building machines that can be controlled by human thoughts. Such machines could help people who cannot move, like those suffering from quadriplegia.

But, is there a potential danger lingering in such exclusivist studies? The whole field throws open a highly controversial subject as far as human ethics is concerned. The possibility of knowing how a single neuron stores information also suggests ways for manipulating it for pedagogic and medical reasons. And this questions the role and place of human self, agency and freewill.

Bodily subjectivity and qualities

To review the place of the self in the dominant philosophical theories of brain-mind relations, it is important to understand how representationalism conceptualises subjectivity. Philosophers like Michael Tye (2003), who holds a strong representationalist view, defines the phenomenal (experiential) character of an experience as one and the same as

1. See PHYSORG.com; http://www.physorg.com/news175417796.html; accessed on 25 October 2009.

its poised, abstract, nonconceptual, intentional content (Tye 2003, 176). The phenomenal aspects of an experience is not present in the neural events or in a unified experience. They present themselves at the closure of the experience. Phenomenal unity comes along with the closure of experience under conjunction (Tye 2003, 84). Just as the meaning of a word is not a quality of the word, the phenomenal character of an experience is not a quality the experience possesses.[2]

According to Tye the content of qualia is nonconceptual and is not neurophysiological. We have different feelings for different shades of red. Even if we don't have different concepts for those shades of red, we are capable of many more feelings than concepts. Feelings lie in the interface of conceptual and nonconceptual domains. It is the output of the early, largely modular sensory processing and is the input to another system of higher-level cognitive processing. Differing from Fodor, Tye holds that a sentence would not be enough to represent a sensation, as a sensation includes some kind of "mapping" of the domain it refers to. For example, pain is about the body, and needs a way to represent the body parts that are affected by pain. Sentences lack this map-like representational power (Tye 1995). Tye proposes an 'encompassing experience' (he questions it and dismisses it subsequently since it leads to infinite regress) that includes all other experiences within itself. Experience is the bearer of the unified phenomenology (Tye 2003, 20).

The question of unity of experience is crucial in understanding the feel factor in an experience. Does each sensory experience come with a feel unique to it? Or is it that there is only a single experience with a rich feel? How is the distinct feel of discrete sensory experiences retained in a single unified experience?

Tye dismisses the very possibility of a metalevel of unification of sensory experiences. His key argument is that the unification happens at the end of the experience and is part of the process of representation.

> [T]o the question of what unifies different simultaneous bodily experiences is that it is a pseudoquestion, based on a mistaken assumption.

2. Tye, "Qualia," From *Stanford Encyclopedia of Philosophy*. (First published 20 August 1997; substantive revision 31 July 2007), http://plato.stanford.edu/entries/qualia/, accessed on 27 October 2009.

> There is only a single bodily experience at a time, an experience with a very rich and complex bodily phenomenal content. Qualities that are experienced in undergoing bodily experience—qualities that are *not* qualities of experiences but rather qualities of bodily disturbances, if they are qualities of anything—are experienced together at a time by entering into this *shared* content. In this way, the painfulness of a pain, the itchiness of an itch, the ticklishness of a tickle are phenomenologically unified. (Tye 2003, 66)

The Case for Non-Physical Feelings

Can I "feel" without a sensory experience? How do I understand the feelings that I have mentally that are not necessarily dependent on sensations? Much of the discussion on qualia is pre-dependent on the body and the examples are centered on bodily-subjectivity. But we know that we can "feel" without physical objects that are invoked by our thoughts, fears, elations, and such mental phenomena. During some occasions the "feel" extends from the mind to the spirit through the values that we cherish such as altruism and compassion.

Tye's view on qualia as a representation brings in the body as the center of subjectivity and thus discourages the scope for a nonphysical self. He argues that feelings are not properties of experience, and that bodily subjectivity plays the role of a continuing self.

Tye also seems to favour an intentional account of consciousness. But, in actual experience, we could argue that there is a greater role played by non-intentional consciousness, a consciousness that is not directed towards any object. The feel-experience that is directed from an object presupposes a non-intentional, pure, *I*-consciousness ("introspective consciousness," as termed by Tye) until that experience happens. Also, the *I*-consciousness stays in a different form in the background, so to say, as a reflective awareness (not the "responsive consciousness" suggested by Tye). It is the reflective awareness that enables the phenomenal character of the experience to be related to the subject. We are able to reflect upon the feel factor because of a non-intentional consciousness that presents itself continuously.

Every experience, along with the distinct sensory feel, comes with another awareness which is of a "belongingness" or "owning," as Kant says. But the ownership itself is an expression of the non-intentional consciousness. Vedanta describes this as one of the characteristics of the ontological self which serves as the adhering entity enabling us to aware the sensory experience(s). *Strong* representationalism defended by people such as Dretske, Tye, and Lycan holds that feeling is a representation of a certain kind which can be specified in functionalist or other physicalist terms. There is no need for recourse to properties of any ontologically "new" sort (Tye 1995). The mistake by Tye and others lies in confounding the phenomenal and ontological aspects of self and using them in an interchanged manner. For them, it is not a viable position to accept the ontological aspect of the self.

The other issue that has to be debated is the impersonal characteristic of qualia that is endorsed by the representationalists. Our sensations do not come to us in a blank receptor mode. The unique features of our personalities are the filters through which they arrive, change, and sustain. Hence the implications of the feel factor will be different for each person. The feel factor is not an isolated, clear, cognitive event. It is much more subjective in the sense it involves mood changes, invokes memories, and even brings in value. The phenomenal aspects of an experience can transform a person. Hence the result or extent of the feel can continue for many days, indefinitely, or stay only for the moment.

The mystery of "what it is like" is because we tend to address it in a cognitive context. With such an address its wholesome character is reduced or ignored. The query "what it is like to be someone" is, in its uniqueness, about subjectivity and being as a whole. This query is distinct from two other queries:

(a) What it is like to have raw green chilly?
(b) What it is like to have the flavor of raw green chilly enjoyed by X?

(a) is about the experience of a distinct sensation and (b) is about the distinct X-centric feelings that s/he enjoys from the flavour. (a) is object-centred. (b) is person centered. Is (a) equivalent to (b)?

Unless we make this distinction we will not even be able to approach the larger question of "what it is like to be oneself." Nagel remarks: "…

the analogical form of the English expression "what it is *like?*" is misleading. It does not mean "what (in our experience) it *resembles*," but rather "how it is for the subject himself?"[3]

Feelings challenge the brain

The discussion on qualia brings in the discussion on the relation between sensation and its designated feel. Each discrete sensation comes with its designated feel. The feel of touch is different from the feel of watching a sunset. The feel of anger is different from both these. This means that each sensation and mental state is discretely experienced. However, we cannot say that the feel is a property of the object of experience. We can only presume that the feel is a property of subjective experiences which is invoked by the object.

Yet another issue is about the universality of feeling. When we have a headache, or drink coffee, or watch the redness of an evening sky, they invoke a certain element of discomfort (in the case of a headache) or joy (in the case of watching a sunset) or another feel. This means that the feel factor is in a way dependent on the object and the personality of its beholder. The nature of the feeling invoked by the objects has universality such as ownership and an assuring sense of being related to the experienced world. But the consequences of feeling need not be the same for all. For instance, I may become irritated with my headache and have a bad mood the whole day. Or I may quietly put up with the discomfort without being overwhelmed by it. The feel factor is guided by the reflective consciousness the self possesses. In any case, what is arguably confirmed is that there is a subjective feeling to human experience, and this has unique as well as universal features. They influence the experience, those who experience, it, and the cohabitants.

What offers serious challenges to the unidirectional and closed theories about feeling and its relation to sensation is the question "can sensations be altered"? Can perceptions happen without a feeling? Is there a possibility for the brain to transfer and switch over sensory functions? Is

3. See Thomas NAGEL. "What Is It Like to Be a Bat?" *The Philosophical Review*, October 1974, reprinted in HOFSTADTER and DENNETT 1981, 395.

feeling a natural state or is it induced? What is the nature of the subjective self that gives a coherent feeling of sensations? If we establish the irreducible feel factor in experience then can we argue for an irreducible self? I discuss these questions with the help of the thought experiment of the autocerebroscope, synesthesia, and "soundscape" (auditory vision).

Arguments for the non-reducibility of feeling are often demonstrated with thought experiments. "Mary's knowledge" argument (Jackson 1977), and the "what it is like to be a bat" argument (Nagel 1974) make strong cases for the existence of qualia. Yet another thought experiment to favour the subjective irreducibility of qualia is the fictional instrument called the "autocerebroscope" suggested by Feigl (1967). It helps make a strong argument for the independent existence of feeling, though in a macabre manner. Autocerebroscope is a hypothetical brain scanner with which you can look into your brain and see the neural firings for your experiences. The experiment implies the limitations of causal relations in explaining the connections between neural processes and the actual experience. Feinberg explains the thought experiment:

> There is a viewer attached to the probe with a magnification device that allows you to observe the neurons of your own brain. Suppose one day, as you are merrily viewing your brain, you come upon your thalamus, the source of your feeling of pain. Suddenly you sneeze, and the scope's eyepiece pokes you in the eye! You now experience intense pain while you are looking through the scope at the very neurons in the thalamus that created that pain. Now you ask yourself: Did you see anything through your autocerebroscope that was equal to the pain that you experienced? Was there anything that you observed that explained your pain? You surely saw the neurons responsible for your pain, and you could analyze the brain chemistry of these neurons, but does this allow you to reduce your pain to those neurons? It was your neurons themselves, not your image of the neurons through the viewer, that hurts! It occurs to you that there appears to be a gap between the neurons as they are observed by you and the neurons themselves as they are experienced by you within your brain. And you cannot find the source of this difference no matter how long and hard you observe your brain and think about the thalamus. (Feinberg 2001)

The unbridgeable gap between observing a brain in a feeling state and

being a brain in the feeling state seems to only increase. How and why does brain activity generate feeling? It is not how the specific patterns of brain activity are generated. It is a question about how *feeling itself* is generated (HARNARD 2005). The feel factor is inevitable when the neural description of a particular feeling is incomplete without the actual experience. Further, it is not even possible to chart a clear pathway that begins with the physicality of neural structures and ends with the subjectivity of the experience. Perhaps that is the reason why Chalmers preferred to call it the "hard problem" of consciousness.

THE SELF'S INTEREST IS TO MAKE SENSE

Are the "how" and "when" (correlates) of feelings neurally determined? Is the brain hard wired for each sensation separately and without change? Does the brain always differentiate senses? Can there be cross-sensory experiences? Can the conscious agent intervene and adapt to such experiences? Does feeling always follow sensation and not vice versa? The case studies in synasthesia (RAMACHANDRAN 1998; CYTOWIC 2002) and experiments in auditory vision challenge our classic idea about sensation.

Synesthesia[4] involves a breakdown in communication between areas within the brain, leading to a release of limbic processes which are, in turn, experienced as synesthetic percepts (CYTOWIC 2002). It is a perceptual condition of mixed sensations. A stimulus in one sensory modality involuntarily elicits a sensation in a different sense or senses. An internal intentional object is constructed during perception (CYTOWIC 2002, 350) without a corresponding external object of reference. Synesthetes also experience mixed sensations with the same modality. For instance, perception of a form may induce a perception of colour.

The mixing up of sight with sound (chromosthesia) is by far the most frequent synesthetic experience. Color, movement, and geometric shape

4. The word **anesthesia** means "no sensation." ***Synesthesia*** means "joined sensation" (Greek, ***syn*** = together; ***aisthesis*** = perception). Synesthesia may also be induced by sensory deprivation, hallucinogens such as LSD and peyote, or direct electrical stimulation of subcortical limbic structures.

are typical properties of the synesthete's sensations. For persons endowed with colored hearing, for example, speech and music are not only heard, but also a visual mélange of colored shapes, movement, and scintillation is experienced (Cytowic 2002, 16). The narration of the strange experiences that a synesthete could have baffles us and questions our taken-for-granted notions about normality, beliefs, discrete sensory experiences, and body responses that we think we naturally have. Cytowic writes:

> Aside from VE in my original 42-case sample, I have found only one other in whom sight evokes smell; for this man, CLF, "Most things I see or hear have a strong taste as well." Other than my index case MW, in which taste and smell evoked widespread tactile experience, I have encountered one individual for whom smell triggers touch and another in whom taste induces a secondary experience of color. Apart from MW's geometric taste, perhaps the strangest synesthesia is "audiomotor," in which an adolescent positioned his body in different postures according to the sounds of different words. Both English and nonsense words compelled certain physical movements, the boy claimed, which he could demonstrate by striking various poses. By way of convincing himself of this sound-to-movement association, the physician who described it planned to retest the boy later on without warning. When the doctor read the same word list aloud 10 years later, the boy assumed, without hesitation, the identical postures of a decade earlier. (Cytowic 2002, 16)

Studies also show that emotion and the limbic system have a greater role in synesthesia. Emotion, in fact, has a significant role in normal sensory function.[5] Ramachandran's example of the sounds "buba" and "kiki" (Ramachandran 1998) that give an image of smoothness and ruggedness to the listener, perhaps also encourages us to consider if we add emotional valence to sounds in our everyday life. In his historic work, Cytowic (2002) details the extensive studies he undertook to find the basis of synesthesia. What is pertinent in synesthesia, according to Cytowic, is the prominence of intense emotion and strong beliefs. Synesthetic percepts, according to him, are neither a conventional perception nor

5. We will discuss this in more detail below.

an image. They possess a curious spatial extension and dynamism, and are involuntary, automatic, and consistent over time (CYTOWIC 2002, 33). Synesthesia is abnormal only in being statistically rare. He argues that synesthesia is possibly a normal brain process that is prematurely displayed to consciousness in a minority of individuals. Is the brain adaptive to our efforts to replenish it with sensory content in the wake of the failure of one sensory modality? The case of synesthesia suggests the possibility. Synesthesia is usually a genetic condition. But a synesthetic-like experience is not an impossibility with the intervention of modern day research.

For example, work by Peter Meijer on the vOICE apparatus helps the blind through auditory vision, seeing with sound.[6] vOICE allows the blind to represent visual information, to "see," with sounds. The device is a tiny camera, a laptop, and headphones. The camera is mounted on the head and the laptop takes the video input and converts it into auditory information, or "soundscapes." The scene in front is scanned in stereo. The object on the left is heard through the subject's left ear and the object on his right is heard through his right ear. Brightness is translated as volume. Bright things are louder. Pitch tells you what is up and what is down. The image refreshes once a second.[7]

Efforts continue to locate the responsible neural region and explore the potential of auditory vision. A recent announcement from *Neuroreport* says that identifying objects with a visual-to-auditory sensory substitution device is associated with activation of occipital visual areas.[8] When you identify an object's shape, a particular part of your brain called the lateral-occipital tactile-visual area (LOtv) is activated. At first this area was thought to be purely visual. Amir Amedi et al. have shown that

6. In Lakshmi SANDHANA, "Blind 'See' with Sound," *BBC News,* http://news.bbc.co.uk/1/hi/sci/tech/3171226.stm (accessed 24 October 2009).

7. At http://www.nytimes.com/2005/12/11/magazine/11ideas_section3-14.html?ex=1291957200&en=3c72cf9fa46bbb06&ei=5090&partner=rssuserland&emc=rss (accessed 26 October 2009); and see also www.seeingwithsound.com.

8. L. Merabet, L. Battelli, S. Obretenova, S. Maguire, P. Meijer and A. Pascual-Leone, "Functional Recruitment of Visual Cortex for sound encoded object identification in the Blind," *NeuroReport.* 20/ 2, pp. 132–38, January 2009 (http://dx.doi.org/ 10.1097/WNR.0b013e32832104dc).

touch and hearing could also activate it.[9] You can touch and "see" a shape. You can hear and "see" a shape. Amedi suggests a significant finding that the brain is ultimately not interested in the *mode* of input as much as we assume generally. The brain is driven by the *presence* of an object. Whether the input is visual, tactile, or auditory is not reckoned.

The instances narrated above imply that feel is not strictly pre-designated with a sense organ. What we can assume is that there is a feel factor (due to the presence or absence of a sensation) that influences the brain to behave differently either by natural disposition (as in the case of synesthesia) or by non-invasive techniques such as auditory vision. These instances question our standard ways of understanding the working of the brain. They also bring to light the place of the human self that constantly challenges the brain, and seeks adaptability to neural changes, through willpower, the urge to experience, the hope to live better, and emotional richness.

Emotions, Feelings, and the Self

Mainstream neuroscience and neuropsychiatry tend to favour a cybernetic view of human personality where sensation, awareness, and experience are tools for humans to interact with the environment, and improve based on the feedback received from sensations. The standard view about the human brain emerges from the position that brain areas and functions can be chartered, and that the brain behaves in a hierarchical order with the cortex in the lead. Sense organs perceive and produce sensations. The mind builds concepts, and the brain puts them together through formal computational configurations, linguistic rules, and labeling. Much of the work in cognitive science takes this as the standard view.

Is not this itself a poor concept—to divide the brain and human capacities into sensations and concepts? Are we just machine-like, performing

9. A. Amedi, W. Stern, J. A. Camprodon, F. Bermpohl, L. Merabet, S. Rotman, C. Hemond, P. Meijer and A. Pascual-Leone, "Shape conveyed by visual-to-auditory sensory substitution activates the lateral occipital complex," *Nature Neuroscience* 10/6: 687–89, June 2007 (http://dx.doi.org /10.1038/nn1912).

only rule-based cognitive tasks? Is not being a human much to do with the emotions and feelings we give and take, the worries and joys we experience, the hopes and expectations we cherish, the values and visions we build, the constant exploration we engage in to know our true selves?

Richard Cytowic writes:

> [I]t is linear and therefore something like a machine. The metaphoric likening of the brain, reason, and the mind to a machine is well known and extensively written about. The concept of hierarchy makes the cortex the brain's most important part. This part of the standard view says that the cortex is where consciousness, mind, reason, and reality are all located, and that everything below it is literally subservient. An important corollary says that language is the supreme cortical function; therefore, introspection, which is our self-conscious internal talking to ourselves, is a valid way to understand everything that goes on in our minds. Introspection has a long history in the philosophy of mind, but I will show its severe limitations and that we actually have several concurrent streams-of-consciousness running every moment.
>
> (Cytowic 2002, 25)

In recent times there has been greater interest to bring such a position to scrutiny. This interest has been favoured by the narratives and case studies neuropsychiatrists share with the world. Documentation of medical cases, though, is a practice that has existed for a very long time, the books and works produced in the current and last decade take the novel method of storytelling. And, we have a penchant to listen to stories; especially when they are about the strange and curious experiences of our fellow beings. Cashing in on our innate interest in hearing about ourselves, the works come in with interesting titles which would qualify for literary imagination.[10]

Many of these titles though hold on to a hardcore neural and evolutionary description of the self, leaving an open space to wonder if the self will ever become amenable to neural laws and explanations. The persistence to hold a neural reductionism is best seen in the efforts to simplis-

10. See titles such as "The man who tasted shapes"; "The man who mistook his wife for a hat" (Sacks 1985); "Feeling of what happens" (Damasio 1999).

tically label certain cortical areas to be the locus of nuanced emotions and self-expressions. Temporal lobes get to be the deciding factor of all that we can express and have in terms of emotion and imagination; and of course dysfunctions are attributed to the same deciding factors.

Self in many of these discussions is merely a placeholder to put discrete functions into a coherant whole. Terms such as "synaptic self," "proto-self," "narrative self," "autobiographical self," "enduring self," and so forth are used to explain the neural basis of self. Ramachandran writes:

> …enduring self, is neither a separable subject of consciousness nor a homunculus, but it can be mapped anatomically to limbic and other associated structures which 'drive' frontal executive processes.… Even though the notion of a unitary, enduring self may turn out to be a form of adaptive self-deception or delusion … we must consider why the illusion arises. (Ramachandran 1998, 429–57)

According to Metzinger:

> It is just a way of experiencing reality: currently, you *are* someone. What makes consciously experienced selfhood special, and different from all the other forms of experiential content, is the fact that—in nonpathological standard situations and in beings like ourselves—it is highly invariant. It is *always* there. (Metzinger 2003, p. 626)

Damasio is certain about the veracity of neural explanations but quibbles:

> …consciousness is the process whereby a mind is imbued with a reference we call self, and is said to know of its own existence and of the existence of objects around it. (Damasio, 1994, 192)

> A friend of mine who follows the developments of biology with keen interest and is an equally avid seeker of the spiritual in life often asks me if the spirit can be defined and located in neurobiological terms. "What is the spirit?" "Where is it?" How can I answer? I must confess I do not favor the attempt to neurologize religious experiences, especially when the attempts take the form of identifying a brain center for God or justifying God and religion by finding their correlates in brain scans. Yet, spiritual experiences, religious or otherwise, are mental processes. They are biological processes of the highest level of complexity. They occur in the brain of a given organism in certain

> circumstances and there is no reason why we should shy away from describing those processes in neurobiological terms provided we are aware of the limitations of the exercise. (DAMASIO 2003, 284)

The working definitions of self proposed by Ramachandran, Metzinger, Damasio, et al. inspire us to ask further questions. On what premises can we conclude that the self is a delusion and not the rest of the concepts we build or the experiences we have? What is the benchmark for that distinct judgment? Are our "normal" behaviours and life expressions interesting only to the extent that they are not pathological? If we pre-concede the limitations of a method in advance then how can we claim veracity and finality for its hypotheses? Responses to these questions are answered to a great extent by the studies on the brain in the context of the emotional and social self. Damasio perhaps brings in the essential argument of my paper as stated in the title. The self is challenged by the brain and the brain is challenged by the self.

For Damasio, for instance, spiritual experiences are biological and mental processes of the highest level of complexity. To describe them in neurobiological terms has its limitations. But the efforts have to continue. The self and brain mutually reinforce at all times. We might say that to delimit the connections to wholly neurological, mental, or spiritual domains perhaps is putting the cart behind the horse. Perhaps, the truth about each lies in its interactions with the other.

The mainstream studies in cognitive science focus on reason-driven qualities of consciousness. When even a subject matter such as feel is studied in an exclusively rational fashion, DAMASIO (1994, 1999, 2003) and LEDOUX's (2002) approach to integrate emotion into the study of self is noteworthy, though the method is mostly biological. Damasio considers consciousness and emotions as states of the body, more specifically the immune system. He uses Cartesian dualism as a point of departure and argues based on neuroscientific research that reason and emotion are closely linked. He distinguishes feelings from emotions (DAMASIO 1999). Emotion is physical. Feeling is mental. For Damasio, emotions are neural processes that respond to a stimulus. Emotion is the reaction for a stimulus to choose flight-or-fight options. It is also responsible for the homeostatic regulation.

Here too a similar question arises as in the case of qualia. If all that is meant by qualia is to automatically provide organisms with survival-oriented behaviours then why is a subjective feel involved in emotion? Homeostasis and response to stimulus can happen without generating a subjective emotion. But then it looks like emotions' influence is complex, in the words of Damasio himself who formulates a reductive biological theory of emotions and consciousness.

> In organisms equipped to sense emotions, that is, to have feelings, emotions also have an impact on the mind, as they occur, in the here and now. But in organisms equipped with consciousness, that is, capable of knowing they have feelings, another level of regulation is reached. Consciousness allows feelings to be known and thus promotes the impact of emotion internally, allows emotion to permeate the thought process through the agency of feeling. Eventually, consciousness allows any object to be known—the "object" emotion and any other object—and, in so doing, enhances the organism's ability to respond adaptively, mindful of the needs of the organism in question. Emotion is devoted to an organism's survival, and so is consciousness.
>
> (Damasio 1999, 35)

Feeling is a mental representation or mental map of the bodily state. Feeling is a mental awareness, whereas emotion is a visible effect. Emotion is physical and precedes feeling which is mental. Emotion results in a physical behaviour and creates a neural map which in turn leads to the feeling. Damasio echoes William James' idea (1884) that we first react with the body and then we feel. James talks about the transition from an "object-simply-apprehended," through the sense organ, to an "object-emotionally-felt."

> A purely disembodied human emotion is a nonentity.… Emotion dissociated from all bodily feeling is inconceivable.… Emotion is nothing but the feeling of the reflex bodily effects of what we call its "objects," effects due to the connate adaptation of the nervous system to that object.… Emotion both begins and ends with what we call its effects or manifestations. It has no mental *status* except as either the presented feeling, or the idea, of the manifestations.… An object falls on a sense-organ and is apperceived by the appropriate cortical centre; or

> else the latter, excited in some other way, gives rise to an idea of the same object. Quick as a flash, the reflex currents pass down through their pre-ordained channels, alter the condition of muscle, skin and viscus; and these alterations, apperceived like the original object, in as many specific portions of the cortex, combine with it in consciousness and transform it from an object-simply-apprehended into an object-emotionally-felt. (James 1884, 188–205)

Developing the view of James on the bodily origin of emotion, a key hypothesis Damasio offers is the "somatic marker" (Damasio 1994) which highlights the importance of emotional learning in making effective decisions. There is an important role for feelings in reasoning. In a given situation feelings enable us to narrow down the number of possible choices for an action. They help us with consequential thinking and cautions about high risk actions. The idea of somatic markers, according to Damasio, also has potential benefits in therapy for mental health.

> Knowing about emotion, feeling, and their workings does matter to how we live. At the personal level, this is quite certain. Within the next two decades, perhaps sooner, the neurobiology of emotion and feelings will allow biomedical science to develop effective treatments for pain and depression grounded on a sweeping understanding of how genes are expressed in particular brain regions and how these regions cooperate to make us emote and feel. Combined with psychological interventions, the novel therapies will revolutionize mental health. (Damasio 2003, 184)

Through historic medical cases[11] and his own case studies Damasio (1999) demonstrates that impairment to the prefrontal cortical area (the seat of "somatic markers") also impairs the ability to use reason or

11. The historic case study of Gage has led to significant findings. Phineas Gage's accident that destroyed areas of his prefrontal lobe consequentially lead to his loss of emotional and social capacity. His rational capabilities were intact to some extent. The damage interfered with Gage's capacity for planning and deciding a course of action. Damasio narrates the case of Elliot who had a medical condition that affected the frontal lobe. He suffered from poor judgment and lack of insight, though excelled in IQ tests. Patients like Gage and Elliot, though they perform well in cognitive and intelligence tests, show marked deficits in decision making in everyday life.

behave rationally. In short, to make rational decisions we need feelings as well. Emotion and feeling are equally important for the neural machinery, and are the foundation for biological regulation based on homeostatic controls. The neural processes and functions that are behind these mechanisms are distributed over several locations in the brain; their simultaneous working contributes to psychological phenomena. A reduction in emotion could contribute to irrational behavior. Those with dysfunctions in decision-making seem to lack emotion, according to his studies.

Damasio's concept of emotion and the place he gives for the interconnections between feeling and reasoning is a welcome relief from the dominant theories that see the self as a computational or problem solving process. Taking a different route, from the notion that emotion is a remanence of the inheritance of the reptilian or the old mammalian brain, Damasio brings emotion into the forefront of sophisticated self-expressions and also proposes a theory of self. For Damasio, consciousness is a process whereby the mind gets the reference called self. Yet, to understand self is to understand its neural underpinnings and unravel the illusory sense of experience and its owner.

> [C]onsciousness is the process whereby a mind is imbued with a reference we call self, and is said to know of its own existence and of the existence of objects around it. Elsewhere I have explained that in certain neurological conditions there is evidence that the mind process continues, but consciousness is impaired. (Damasio 2003, 192)

> [O]vercoming the obstacle of self, which meant, from my standpoint, understanding its neural underpinnings, might help us understand the very different biological impact of three distinct although closely related phenomena: *an emotion, the feeling of that emotion,* and *knowing that we have a feeling of that emotion.* (Damasio 1999, 10)

> [T]he neurobiology of consciousness faces two problems: the problem of how the movie-in-the-brain is generated, and the problem of how the brain also generates the sense that there is an owner and observer for that movie. The two problems are so intimately related that the latter is nested within the former. (Damasio 1999, 12)

Given that he proposes the illusory nature of self one would not expect

Damasio to go into the details of the different levels of the "illusory" self. However, Damasio distinguishes three kinds of self. There is an interconnected and temporarily coherent collection of neural patterns. These patterns represent the state of the organism, moment by moment, at multiple levels of the brain. This is the unconscious proto-self. The next level is the core self, which is produced whenever an object of any kind modifies the proto-self. The core self does not change much throughout our lifetime, and we are conscious of it. Damasio relates his concept of core consciousness with the views expressed by earlier thinkers like Locke, Brentano, Kant, Freud, and William James. The third level is the autobiographical self, which is based on memory and anticipations of the future. It develops gradually throughout life. A core self is needed in order to acquire an autobiographical self. But the core self can exist without the autobiographical self. In certain cases of brain dysfunctions patients lose their autobiographical self, temporarily or permanently, while their core self is intact.

> If core consciousness allows you to know for a transient moment that it is you seeing a bird in flight or that it is you having a sensation of pain, extended consciousness places these same experiences in a broader canvas and over a longer period of time. Extended consciousness still hinges on the same core "you," but that "you" is now connected to the lived past and anticipated future that are part of your autobiographical record. (Damasio 1999, 195)

The autobiographical self permits the existence of a richer form of consciousness, that Damasio calls "extended consciousness" which is responsible for "conscience" the highest level in this order. Though for Damasio the self is a biological reconstruction and the mind is the body, the layers of the self that he proposes seem to be borne of more imagination than biological reductionism. It is also clear that on one hand Damasio presents a biologically defined self with emotion meant for biological survival; on the other hand, his concept of self and consciousness bears the stamp of an artist or a person who imagines and believes in deeper and finer aspects of self. He writes:

> [C]onsciousness is the critical biological function that allows us to know sorrow or know joy, to know suffering or know pleasure,

> to sense embarrassment or pride, to grieve for lost love or lost life. Whether individually experienced or observed, pathos is a by-product of consciousness and so is desire. None of those personal states would ever be known to each of us without consciousness.
>
> (Damasio 1999, 7)

> Consciousness is, in effect, the key to a life examined,... knowing all about the hunger, the thirst, the sex, the tears, the laughter, the kicks, the punches, the flow of images we call thought, the feelings, the words, the stories, the beliefs, the music and the poetry, the happiness and the ecstasy. At its simplest and most basic level, consciousness lets us recognize an irresistible urge to stay alive and develop a concern for the self. At its most complex and elaborate level, consciousness helps us develop a concern for other selves and improve the art of life.
>
> (Damasio 1999, 8)

Boundaries of Self

The discussion on qualia and emotions are not complete without bringing in the role of self. Ramachandran (2003, 113) considers qualia and the self to be two sides of the same coin though he reduces both to neural processes. What is the self? Can it be defined by its characteristics and functions?

Let us attempt some definitions for the self, though any definition has been problematic since historic times. There is a continuity in all our experiences which brings forth the past, present, and future at the same moment. We are capable of thinking using information from past and expectations about the future. Memories are closely connected and contiguous to all our experiences. Such continuity is felt as adhering to a single unit of consciousness which we call "myself." Contrary to the Cartesian dictum "I think, therefore I am," in our daily lives we first *are*, and therefore able to do many things mental and physical. Otherwise all our physical and mental acts would not have a place to adhere to and would be floating around.

We are able to give interconnected meanings to our experiences, learn from our mistakes, form beliefs, cherish hopes, have insecurities, express

emotions, reflect upon faux pas we make in life—all these rich forms of experiences with an unwavering unity and coherence. The first and foremost features of self are being (to put it more experientially, the "amness"), continuity, adherence, coherence, and unity. All through these several features of self, a common thread that runs through this is that at any point we are capable of different degrees of awareness and reflection. Perhaps in the evolutionary scale what marks the human self as distinct is our capacity to be self-aware at multiple and deeper levels. Our hidden capabilities for complex levels of awareness and reflection are amply dealt with in the eastern traditions: to mention a few—the concept of *samyama* in "Patanjali Yogasutras," *sakshi caitanya* in "Vedanta," *sthitaprajna* in "Bhagavad Gita," *rasa* in "Natyasastra," and so forth.

RAMACHANDRAN, in his five list attributes for self (2003, 113–14), talks about embodiment, agency, and ability to be self-aware as important features of self. We have a sense of belonging or ownership to the body. We exercise freewill. We self-reflect. However, centuries have passed since the connections between matter and consciousness, the body and the self have been debated with unflinching vigor but with no clear solution arising to comprehend the nature of this relation.

Self in the making

The boundaries of self seem to shift and shrink in the case of narratives neuropsychiatrists tell us about brain impairments.[12] The self's capability for expansion and non-dual inclusion seems to be vital for Vedantic and other spiritual traditions. Both, neuroscience and spiritual traditions, give mind boggling accounts of challenges and possibilities for the self, literally and figuratively. And, what is also acknowledged in both accounts is the recognition of mutual challenges between the body and the spirit, the brain and the self. Let us look at the some of the curious challenges the brain can give to the self and the self can give to the brain, causing disturbances to our otherwise natural intuition for proprioception—the feeling and knowledge of the position of the body in space.

12. Brain impairments happen due to lesions—damage or removal of brain areas—as a result of stroke or surgery.

With a novel-like quality Ramachandran (1998; 2003), Feinberg (2001), Damasio (1999; 2003), Sacks (1985), and Cytowic (2002)narrate strange and unthinkable experiences, and traverse through the mind of the patient like a detective to find the route to the cause that generates "irrational" behaviour. The dialogue between the patient and the doctor itself in these narratives provides a wonderful opportunity for readers to get insights about two selves—an impaired one that is being treated, and another intact one setting right the impaired one.

Let us look at a few cases of brain impairments where the self struggles without giving a clue for theories and arguments to make sense of it. The human self in these cases appears to be very fragile.

A phantom limb is an arm or leg that stays in the minds of patients for an indefinite time after it has been surgically removed or lost in an accident. The phantom limb is stimulated by the brain. Patients are aware that the phantom limb is physically absent, but experiences the pain that originates from it. Ramachandran writes the case of one of his patients:[13]

> Tom was not crazy. His impression that his missing arm was still there is a classic example of a phantom limb—an arm or leg that lingers indefinitely in the minds of patients long after it has been lost in an accident or removed by a surgeon. Some wake up from anesthesia and are incredulous when told that their arm had to be sacrificed, because they still vividly *feel* its presence. Only when they look under the sheets do they come to the shocking realization that the limb is really gone. Moreover, some of these patients experience excruciating pain in the phantom arm, hand or fingers, so much so that they contemplate suicide. The pain is not only unrelenting, it's also untreatable; no one has the foggiest idea of how it arises or how to deal with it.
>
> (Ramachandran 1998, p 21)

13. In his book *Phantoms in the Brain,* Ramachandran brings up the fascinating information on Penfield maps. These maps, drawn by the Canadian neuroscientist Penfield in the 1940s and 1950s, show that the whole body is represented on the surface of the brain. The brain representation is disproportionate, with some parts of the body represented in larger areas of the brain, such as the mouth, palms, and feet, and some in small areas, like the trunk of the body. Ramachandran with his work on phantom limbs shows that striking reorganizations in body image occur very rapidly following the amputation of a limb. Phantoms limbs are generated by such reorganizations of body image in the sensory cortex.

Prosopagnosia is a generalized disturbance in face recognition. Patients with prosopagnosia cannot identify anyone by looking at his or her face. Prosopagnosia in severe cases impairs self-recognition in the mirror and also destroys common intuitions such as the immediacy of self-awareness (see RAMACHANDRAN 1998; FEINBERG, 2001).

Asomatognosia is a condition where one's own paralyzed limbs are misidentified for someone else's. The severe form of this impairment is *anosognosia* where the paralysis or the illness is denied. Feinberg cites the work of the neurologist Edward WEINSTEIN (2001, 17) who argues that the manner in which asomatognosic patients refer to their arms as belonging to someone else could be interpreted as metaphorical expressions of their feelings about themselves. He held that patients with asomatognosia who misidentified parts of their body displayed a disturbance in metaphorical speech and tended to express their feelings about themselves metaphorically.

The key point made here by Feinberg, of relevance to the central claim of my essay, is that the use of metaphorical language demonstrated by these patients served to bring order, unity, and predictability to the frequently confusing circumstances of neurological illness. The brain continuously creates meaning and projects the self in that context though it might appear irrational to the onlookers. In support of my central claim here that in spite of the brain impairment, the self somehow copes with the brain challenge and creates a corresponding meaning and integrated sense of what happens, Feinberg says:

> One of the interesting aspects of asomatognosia is that, despite the fragmentation of the self, these patients strive to maintain an integrated self and make sense of their experience. Indeed, to a large extent they succeed. The neglected left side and the misidentified left limb leave a hole, a gap, in the self, that must be filled. The patient may disavow the arm, but something is put in its place, something of personal significance. (FEINBERG 2001, 30)

Hemispatial-neglect is the condition where objects and one's own body parts on one side, on the side opposite a brain lesion—usually the left side—are neglected. Patients with hemispatial-neglect do not simply ignore stimuli on one side but act in a manner as if nothing of personal

significance could occur on that side (Feinberg 2001, 13). If they are asked to draw a daisy it is drawn with the left side incomplete. While having a meal, they ignore food on the left side of the plate. Neglected patients are profoundly indifferent to objects and events in the left side of the world, sometimes including the left side of their own bodies (Ramachandran 1998, 82, 88). Hemispatial-neglect is severe and long lasting after damage to the right hemisphere, according to Feinberg's studies.[14] Asomatognosia, hemispatial-neglect, and anosognosia often occur together, usually as a result of damage to the right hemisphere.[15]

Capgras' and Cotard's syndrome are cases where patients are unable to give an emotional reference to what they see because of disruptions in brain circuitry between eye (or all sense organs) and the emotional centre.[16] In the case of Capgras' syndrome, the patient comes to regard

14. See Feinberg (2001, 12): "The right hemisphere has the capacity to direct attention to both sides of space. When there is damage to the left hemisphere, the right hemisphere can compensate for the loss, and the patient is still aware of both sides of the world and the self. On the other hand, the left hemisphere is much more unilateral in its attentional capabilities, and is best at directing the patient's attention to the opposite (right) side. In the presence of damage to the right hemisphere, the left hemisphere has limited capacity to adapt, and the left side of space and the body may be ignored."

15. Feinberg (2001, 22) narrates the case of Jack: "Jack had asomatognosia and misidentified his left arm. He also had dense anosognosia and insisted that he was in pretty good health. He made this claim, even though he was lying in a hospital bed in a gown, with an intravenous line in his right arm. Jack knew, all too well, that the doctors thought he was ill, that he had suffered a stroke; he even knew the hospital staff thought he could not move his left side. Despite this knowledge, he held to his belief that he was not ill in any way. Jack insisted that all was well..."

16. See Ramachandran (1998, 116): "A better approach for studying Capgras' syndrome involves taking a closer look at neuroanatomy, specifically at pathways concerned with visual recognition and emotions in the brain.... The temporal lobes contain regions that specialize in face and object recognition.... We know this because when specific portions of that pathway are damaged, patients lose the ability to recognize faces, even those of close friends and relatives—as immortalized by Oliver Sacks in his book *The Man Who Mistook His Wife for a Hat*. In a normal brain, these face recognition areas (found on both sides of the brain) relay information to the limbic system, found deep in the middle of the brain, which then helps generate emotional responses to particular faces.... I may feel love when I see my mother's face, anger when I see the face of a boss or a sexual rival or deliberate indifference upon seeing

close acquaintances—usually one's parents, children, spouse, or siblings—as impostors (RAMCHANDRAN, 1998, 115). In Cotard's syndrome the patient will assert that he is dead. RAMACHANDRAN argues (1998, 119) that Cotard's syndrome is an exaggerated form of Capgras' syndrome and probably has similar origins. In Capgras' syndrome the face recognition area alone is disconnected from the amygdala. In Cotard's syndrome all the sensory areas are disconnected from the limbic system, leading to a complete lack of emotional contact with the world.

In these cases too, what strikes us is the self's capacity to make meaning of what is experienced, even when the brain circuitry is severely severed. The person is seen; but no emotion is invoked towards the person seen. But since the brain "sees" the person, the self has to find some meaning and associate relevance to what is seen. Hence the patient connects emotionally (without the corresponding circuitry to the visual area) and identifies the person seen as an impostor. As Ramachandran succinctly says[17] with the disruption in the neural circuitry between the visual and the emotional areas, the patient need only see a face that is not familiar. Why should he impute the meaning of an impostor? The possible answer

---

the visage of a friend who has betrayed me and has not yet earned my forgiveness. In each instance, when I look at the face, my temporal cortex recognizes the image—mother, boss, friend—and passes on the information to my amygdala (a gateway to the limbic system) to discern the emotional significance of that face. When this activation is then relayed to the rest of my limbic system, I start experiencing the nuances of emotion—love, anger, disappointment—appropriate to that particular face..."

17. See RAMACHANDRAN (1998, 116): "After thinking about Arthur's symptoms, it occurred to me that his strange behavior might have resulted from a disconnection between these two areas (one concerned with recognition and the other with emotions). Maybe Arthur's face recognition pathway was still completely normal, and that was why he could identify everyone, including his mother and father, but the connections between this "face region" and his amygdala had been selectively damaged. If that were the case, Arthur would recognize his parents but would not experience any emotions when looking at their faces. He would not feel a "warm glow" when looking at his beloved mother, so when he sees her he says to himself, "If this is my mother, why doesn't her presence make me *feel* like I'm with my mother?" Perhaps his only escape from this dilemma—the only sensible interpretation he could make given the peculiar disconnection between the two regions of his brain—is to assume that this woman merely resembles Mom. She must be an impostor."

is that the self perhaps constantly tries to solve dilemmas even when they are neurally created.

Are meaning-giving and the unification of experiences functions of the brain or the self? We may argue either way. I would like to think that it is the core consciousness (not in the sense of Damasio's "core consciousnesses"), the deeper and complex realms of our being, which are not pervious to our methods of knowledge, that help generate meaning. Because finally, according to Vedantic traditions, meaning is a value—with implications for a lasting existence, and that is identified with the ontology of pure consciousness.

The reason that often the discussions on self take a reductive pattern is because of the general assumption that consciousness is primarily "sensory awareness"—awareness of a sensation. Therefore, the focus of discussion is on implicit perceptions and similar phenomena. But, to equate consciousness to one functional aspect of it is to equate the sea with a drop of salty sea water, and foreclose the potential and the possibility of self.

Self-Correlates of Consciousness

The major puzzle that brain scientists face is the curious play that the brain engages with the self and its tremendous capacity for regeneration and re-mapping. There is something that "tells" the brain to change according to conditions. The brain seems to be a continuously adapting agent based on the cues it receives from what I would call "self-correlates" of consciousness such as love, hope, affective engagement, compassion, happiness, creativity and other such positive qualities. However much we reduce the human self and identity to neural processes, there seems to remain an irreducible, inseparable, core self that is marked by human sensitivities and frailties. These are not just neural functions but signposts that the self creates. The self through some mechanism, unknown to us, has the capacity to overpower the neural limits and act on its own, because at times we are able to defy physical conditions and express without a physical medium. In an article entitled *The Power of Hope,* Dr. Scott Haig writes about his patient with a brain tumor who

makes a spectacular come back from a coma, though only for a few moments, to say "goodbye" to his family. Haig writes:

> David's head was literally stuffed with lung cancer. I was called in to take care of his hip and pelvic bones broken by the growing metastases. His seeming nonchalance about the pain and the surgery was clearly out of concern for his beautiful, young family—his wife Carol, a nurse, and his three kids, who were there every night. He couldn't keep up the carefree charade over the next two weeks, though, as his speech slurred, then became incoherent. He stopped speaking, then moving.... When his doctors rescanned his head, there was barely any brain left. The cerebral machine that talked and wondered, winked and sang, the machine that remembered jokes and birthdays and where the big fish hid on hot days, was nearly gone, replaced by lumps of haphazardly growing gray stuff. Gone with that machine seemed David as well. No expression, no response to anything we did to him. As far as I could tell, he was just not there.... Saturday morning the sun poured in as I checked the room. The bed was at chest height, made up and empty, with clean, fresh sheets over the vinyl mattress. As I turned to leave, I was blocked by a nurse, an older Irish lady with a doleful look on her face. She had taken care of David last night. "He woke up, you know, doctor— ust after you left—and said goodbye to them all. Like I'm talking to you right here. Like a miracle. He talked to them and patted them and smiled for about five minutes. Then he went out again, and he passed in the hour."...
>
> But it wasn't David's brain that woke him up to say goodbye that Friday. His brain had already been destroyed. Tumor metastases don't simply occupy space and press on things, leaving a whole brain. The metastases actually replace tissue. Where that gray stuff grows, the brain is just not there. What woke my patient that Friday was simply his mind, forcing its way through a broken brain, a father's final act to comfort his family. The mind is a uniquely personal domain of thought, dreams, and countless other things, like the will, faith, and hope. These fine things are as real as rocks and water but, like the mind, weightless and invisible, maybe even timeless. Material science shies from these things, calling them epiphenomena, programs running on a computer, tunes on a piano. This understanding can't be ignored; not too much seems to get done on earth without a physical

> brain. But I know this understanding is not complete, either. I see the mind have its way all the time when physical realities challenge it. In a patient stubbornly working to rehab after surgery, in a child practicing an instrument or struggling to create, a mind or will, clearly separate, hovers under the machinery, forcing it toward a goal. It's wonderful to see, such tangible evidence of that fine thing's power over the mere clumps of particles that, however pretty, will eventually clump differently and vanish. (Haig 2007)

In the works of several neuropsychiatrists of recent times we see how they use the first-person account experiences of their patients to understand the construal of agency and experience in challenging situations. These accounts have provided a humanizing picture of the brain and give an alternate perspective to understand the brain and the body. Jonathan Cole in a telling manner narrates the case of patients with spinal cord injury. He explains the neurology and phenomenology of the unusual condition of deafferentation in patients. They have extreme difficulty with movement because of the lack of senses of touch and proprioception below the neck. Cole's narratives (1999) explain how they experience and project their agency.[18]

In *Still Lives*, Jonathan Cole (2004) gives an account of the responses he received from people with quadriplegia due to spinal cord injuries for the question "what it is like to live without sensation and movement in the body?" If the body is dysfunctional, *where* does the self reside? Cole finds that there is no single or simple answer. Studying their experiences, Cole explains in the various chapters of the book perhaps what I could describe as six self-correlates of consciousness: "enduring," "exploring," "experimenting," "observing," "empowering," and "continuing."

These accounts tell us how a hope for betterment and the extra positive effort, in spite of the neural challenge, makes the self stable and help overpower its own slippery and shifting features.[19] The self is studied

18. Books by Jonathan Cole such as *About Face* (1999) and *Still Lives* (2004) look at the social and personal difficulties faced by patients with unusual experiences and how they manage to reconcile and make progress with the help of "sheer effort, will power and an ingenious collection of motor tricks." See "Nailing the Lie: An interview with Jonathan Cole," *Journal of Consciousness Studies* 11/2 (February 2004): 3–22.

19. *Bhagavad Gita* 6:5 says "uplift yourself by your own efforts."

through an engaged self-exploratory method with the intervention of values and positive dispositions. What is significant about such neuropsychiatric literature is the shift in focus from third-person neural data to first person qualities of willpower and self-effort. The first-person qualities are being recognised as pertinent to cope up with challenging physical conditions and to help achieve some (neural and experiential) progress. The detached and reductionist theories of self will not give space for exploring its own possibilities. In DAMASIO's (2003, 287) hopeful words: "Nature lacks a plan for human flourishing, but nature's humans are allowed to devise such a plan."

Self in the brain and brain in the self

Yet another section of medical literature that highlights the scope of the self and the mutual challenges between the brain and the self are the recent studies on the connections (structural and ontological) between the brain and god. These works do not move away from the fundamental (scientific) position that however profound the "god experience," it must be channeled and experienced through the brain.[20] The major hypotheses that underlie these works[21] are the role of "association areas,"[22] the brain and the brain's capacity to distinguish between a self and the rest (not-self) outside it, and also alter or extend this division. NEWBERG et al.'s studies (2001) on the neural correlates of meditative experiences of Tibetan monks have shown change in all the association areas, and in particular, less activity in the orientation association area or the prefrontal cortex.

The studies conducted by Newberg and d'Aquili carve a different space amongst the increasing number of brain theorists on mystical and reli-

20. NEWBERG (2001, 53): "... if God does indeed exist, the only place he can manifest his existence would be in the tangled neural pathways and physiological structures of the brain."

21. See studies by Andrew NEWBERG et al. 2001; and Saver and Rabin, "The Neural Substrates of Religious Experience," *Journal of Neuropsychiatry* 9/3 (1997): 498–510.

22. Association areas are cortical areas where complex processing of information happens. These areas gather information from various parts of the brain. Information from one sensory system is integrated with information from other sensory systems. Association areas connect to emotional and memory centers and thereby give meaning and context for the sensory experience.

gious experience. Their works (d'Aquili & Newberg 1993; Newberg, d'Aquili, & Rause 2001) are notable for certain ideas that do not claim a strict naturalistic interpretation. To enlist some: Newberg and d'Aquili suggest a continuum that ranges between the experience of baseline reality and "profound unitary consciousness" ("absolute unitary being").[23] The absolute unitary being experience is marked by clear neural signs such as increased blood flow to the prefrontal cortex, which is the area of concentration, and decreased activity in the orientation association area in the parietal lobe. The decreased activity in the orientation association area is responsible for the sensation of losing one's self or expanding its boundaries.

While Descartes considers the body and the mind to be completely separate, Damasio (1994) and LeDoux (2002) consider the mind as a derivative of brain function, and Newberg and d'Aquili hold the view that while the mind is derived from the brain, "interaction is much more complex and intriguing" (2001, 191).

The question that comes back to us is "*where* is the self?" Is it a figment of the mind produced in cooperation with brain activity? How does the trio of brain, mind, and self work together? Can their working be explained successfully by neurology? How easy, or in other words, even desirable, is it to naturalise the self, and reduce it to a few physical functions?

Conclusion

The structural anatomy of the brain and the course of its functioning present exciting issues on the scope of the self and its interaction

23. See Newberg (2001, 119–20): "In this state of total differentiation of the orientation area, the mind would perceive a neurological reality consistent with many mystical descriptions of the ultimate spiritual union: There would be no discrete objects or beings, no sense of space or the passage of time, no line between the self and the rest of the universe. In fact there would be no subjective self at all; there would only be an absolute sense of unity—without thoughts, without words and without sensation. The mind would exist without ego in a state of pure undifferentiated awareness.… This state of pure mind, of an awareness beyond object and subject, is Absolute Unitary Being, the ultimate unitary state."

with the brain, for debate and reflection. These issues bring to us the central impasse in consciousness studies such as the subjective and self-preserving nature of the brain. It is almost baffling to think that the brain is capable of not just change and growth but also able to alter its course as a self-preserving system, and "reflect" upon that course with the help of cues from a self which is located nowhere, or perhaps everywhere. It facilitates the mind to think, imagine, and direct action according to newer and challenging contexts.

The "hard problem" of consciousness has crossed the "decade of the brain" and is closing in for another decade. Yet the problem has only vetted newer and newer responses without being able to offer a resolution. Why and how does the quantitative structural input of the brain give rise to consciousness that is possessed and housed by a self whose contours are bordered by deeply subjective qualities?

Damasio's efforts to prove Descartes' dualism wrong and Tedd Feinberg's proposal for "compositional or nested hierarchy" (FEINBERG 2001, 127) suggests that the self and the subjective nature of experience is not an issue to be dispensed with simple naturalistic theories. Perhaps we need to study better the finer aspects of higher human faculties such as introspection, reflection, and contemplation. In mainstream neuroscience the discussion is generally on a fractured self, a self impaired by neurological dysfunctions, or a segregated self. The self discussed from that perspective is already limited to a certain disposition. The self-ascriptions are about the self that is already impaired, or valid only in that context. Such an approach takes away the wholesome personality out of context, and focuses on the dissociative or hallucinating self. There is no adequate discussion on the experience after the impairment is intervened or cured. Perhaps anticipating this significant issue, Metzinger says:

> The issue is not only how a phenomenal self per se can arise but how beings like ourselves come to use this phenomenal self as a tool for experiencing themselves as subjects. We need interdisciplinary answers to questions like these: What does it mean that in conscious experience we are not only *related to the world*, but related to it *as knowing selves*? What, exactly, does it mean that a phenomenal self typically is not only present in an experiential reality but that at the same time it

> forms the *center* of this reality? How do we come to think and speak about ourselves as *first persons*? (Metzinger 2003, 6)

To limit the self-brain interactions to linear and physical processes would foreclose the richness and possibilities that lie hidden. The self-challenged brain and the brain-challenged self reinforce, change, and adjust each other. And through these "adjustments" they create meaning and purpose that we constantly experience in our lives. It seems that the self is the possibility for the brain to look "inward," and the brain is the vantage for the self to look "outward"—a mutually balancing process. Perhaps it is through their complex interrelations that we understand both.

A well-known Upanishadic verse goes like this: the self has no sensory apparatus directed towards itself; since sense organs are directed outwards it can see only the outside and not the inner self; the brave turns his eye inwards, desiring immortality.

If the eye is not turned inwards then you see a struggling self with its boundaries shifting not only because of neural features but also with the challenges received from emotional upsurges, personal insecurities, and social living. Like being in an architectural space, the self who tries to objectify itself is already situated within the self; and hence will never be able to see all of it in one instance. The hidden possibilities of the inner self are revealed when the inward looking eye is favoured.

References

Bayne, T. A. and D. Chalmers, "What Is the Unity of Consciousness?" In E. A. Cleeremans, *The Unity of Consciousness: Binding, Integration, Dissociation,* pp. 23–27. Oxford: Oxford University Press, 2003.

Cole, J. *About Face*. Boston: The MIT Press, 1999.

_____. *Still Lives: Narratives of Spinal Cord Injury*. Boston: MIT, 2004.

Crick, F. H., & C. Koch, "Toward a neurobiological theory of consciousness." *Seminars in the Neuroscience* 2 (1990): 263–75.

Cytowic, R. *Synesthesia: A Unity of the Senses*. New York: Springer-Verlag, 1989.

_____. *Synesthesia: A Union of the Senses*. Cambridge, Mass: Bradford, 2002.

Damasio, A. *Descartes' Error: Emotion, Reason and the Human Brain*. New York: G.P. Putnam's Sons, 1994.

_____. *Feeling of what Happens: Body and Emotion in the making of Consciousness*. London: Heinemann, 1999.

_____. *Looking for Spinoza: Joy, Sorrow and the Feeling Brain*. London: William Heinemann, 2003.

D'AQUILI, E., & A. NEWBERG. "Liminality, trance and unitary states in ritual and meditation." *Studia Liturgica* 23 (1993):2–34.

DENNETT, D. *Elbow Room: Varieties of Freewill Worth Wanting*. Bradford Books, Boston: The MIT Press, 1997.

FEIGL, H. *The "Mental" and the "Physical."* Minneapolis: University of Minnesota Press, 1967.

FEINBERG, T. E. *Altered Egos: How the Brain Creates the Self*. Oxford University Press, 2001.

HAIG, S. "The Brain: The power of hope." *TIME* (19 January 2007), pp. 58–59.

HARNARD, S. "What is Consciousness?" *The New York Book Review* (23 June 2005).

HOFSTADTER, Douglan R., and Daniel C. DENNETT, eds. *The Mind's I: Fantasies and reflections on self and soul*. Basic Books, 1981.

HUMPHREY, N. *Seeing Red: A Study in Consciousness*. The Belknap Press of Harvard University Press, 2006.

JACKSON, F. *Perception*. Cambridge: Cambridge University Press, 1977.

JAMES, W. *What is an Emotion?* First published in *Mind* 9 (1884): 188–205.

LEDOUX, J. *Synaptic Self: How Our Brains Become Who We Are* . New York: Penguin Books, 2002.

METZINGER, T. *Being no One: The Self-model Theory of Subjectivity*. Boston: The MIT Press, 2003.

NAGEL, T. "What Is it Like to Be a Bat?" *Philosophical Review* (1974), 435–50.

NEWBERG, A., E. D'AQUILI, & V. RAUSE, *Why God Won't Go Away*. New York: Ballantine Books, 2001.

RAMACHANDRAN, V. A. *Phantoms in the Brain*. New York: William Morrow, 1998.

_____. *The Emerging Mind*. London: The BBC in association with Profile Books Ltd., 2003.

SACKS, O. *The Man Who Mistook His Wife for a Hat and Other Clinical Tales*. Summit Books, 1985.

SEARLE, J. "Consciousness: What We Still Don't Know." *The New York Review of Books* (13 January 2005), 52/1.

SEARLE, J. R. "Minding the Brain." *The New York Review of Books* (2 November 2006), 53/17: 51–55.

TYE, M. *Ten Problems of Consciousness: A Representational Theory of the Phenomenal Mind*. Bradford Books, Boston: The MIT Press 1995.

_____. *Consciousness and Persons: Unity and Identity*. Boston: The MIT Press, 2003.

Weiskrantz, L. *Blindsight: A Case Study and Implications.* Oxford University Press, 1986.