Exploring Consciousness: Integrating Physics, Neurophysiology, and Iqbal's Insights into Self and Religious Experience

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ABSTRACT

This article aims to develop a unified theory of ego (consciousness, mind, and self), synthesizing insights from metaphysics, neurophysiology, and modern science. Building upon discussions of Iqbal's philosophy, especially his exploration of religious experience and self-discovery, the article explores the structural and functional aspects of the brain, specifically the Prefrontal Integration Modules (PIMs). These modules integrate sensory and motor information and play a crucial role in consciousness and behavior regulation. The article delves into recent advances in neurophysiology and examines how the PIMs contribute to sensory processing, motor actions, memory, and decision-making. Drawing from the works of prominent figures like Eccles and Popper, the article compares dualistic and monistic approaches to consciousness. Eccles' dualistic theory of interaction between an immaterial self and the material brain is highlighted, along with the concept of a self-field acting probabilistically on brain functions. These ideas are critically compared with Iqbal's philosophical framework, emphasizing the intersection of metaphysical insights and neurophysiological findings. The article also discusses recent advances in consciousness studies, including theories that relate quantum mechanics to the emergence of consciousness. Notable thinkers like Penrose and Bohm offer perspectives on quantum indeterminism and its connection to the brain's processes. Ultimately, the article seeks to align Iqbal's vision of the self and consciousness with emerging scientific discoveries, highlighting the ongoing relevance of metaphysical considerations in understanding human consciousness.

To develop a unified theory of ego (encompassing consciousness, mind, and self) that can be tested against both metaphysical and scientific frameworks, we have explored Iqbal's perspectives on the rationality of both normal and religious experiences. In his analysis of "Is Religion Possible?" Iqbal identifies three stages of religious adherence: (a) the collective acceptance of religion as an unconditional command, without rational understanding (the theological approach), which may have social and political significance but does little for individual inner growth; (b) the rational understanding of religious discipline and authority (the scholastic approach), which borders on metaphysics and seeks a logically consistent worldview with God as part of it; and (c) the shift from metaphysics to psychology, where life aspires to direct contact with ultimate Reality. According to Iqbal, this final stage occurs when an individual, freeing themselves from the constraints of law, discovers the true source of law within their own consciousness (ego). These categories, as defined by Iqbal, are difficult to contest. However, the last phase has historically posed significant challenges to scientific understanding. The words of a Muslim Sufi, who states that "no understanding of the Holy Book is possible until it is actually revealed to the believer, just as it was revealed to the Prophet," may be of interest to religious scholars. This notion of the connection between the finite and the infinite has been central to our discussion, and we will continue to explore this theme. In this paper, we aim to review recent advances in physics and neurophysiology, which may enhance our understanding of consciousness (ego, mind, and self), with a particular focus on Iqbal's emphasis on inner religious experience.

An understanding of neural networks between these structural elements (afferent and efferent) may give us a possible clue to the operational mechanism of consciousness as explored by neurologists. (Pico 2000)[1] has presented an excellent account of the same in his book: "Consciousness in Four Dimensions". For our purposes we will present a simplified version of the same for comprehending the hypothesis involved. Some parts of the brain which may be of interest to us include: the neocortex, the prefrontal integration modules (PIMs), the somato-sensory areas of the cerebrum, the thalamus along with hippocampal complex, the amygdla, the subiculum and the reticular nucleus. The transfer of afferent

(sensory) and efferent (motor) messages between thalamus and neocortex has already been emphasized. *However, of utmost importance is the prefrontal area, one in each frontal lobe which has been identified as the site of integration of all sensory and motor activities of the brain. Each prefrontal area is comprised of three modules designated as prefrontal integration modules (PIMs). The PIMs are interconnected within the same prefrontal area and also with PIMs of the corresponding prefrontal area in the other hemisphere of the brain*. The hippocampal complex (which includes subiculum, amygdla and reticular formation) is for storage and retrieval of all kinds of memory based on learning and experience. With these structures in our mind we can now appreciate how the PIMs play their integration role in computing sensory and motor activities when the sensory messages converge upon it and motor messages emerge from it. It must be re-emphasized that the computational code employed by the PIMs is in no way identical to computational code of a machine like the computer. In spite of several advances in neurophysiology, the neural code has yet to be discovered, although some preliminary indications for this are available in the theories of Hebb[2], Eccles[3] and Watson[4].

Based on the neurophysiological and behavioral evidences, we can visualize the basic inventory of potential afferent (sensory) axon sources reaching the PIMs. These include (a) sensory projections from association neocortex, parietal, temporal and prefrontal cortex; (b) hippocampus, (c) memory system projections from subiculum, entorhinal and para hippocampus regions,(d) thalamus and (e) brain stem reticular nuclei and basal forebrain projections. Thus, the afferent stimuli converging on the PIMs arrive from external and internal three dimensional (3D) sensory worlds, spatial environment, recent and past sensory moments (memories) and the coordinating functional activity of thalamus. As these sensory messages are computed in the PIMs they are transmitted for necessary action to the efferent fibres which emerge from the PIMs. These include: (a) those connecting the adjacent PIMs, (b) those connecting the homologous PIMs, (c) those connected with neocortical regions, (d) those connected to entorhina-hippocampus complex (spatial), (e) those connected to memory cortex system and (f) those connected to subcortical thalamus and basal ganglia. A complete understanding of this diagram is a *sine qua non* for a fuller appreciation of the computing and integrating role of the PIMs, since some of the theories advanced by physicalists as well as neurophysiologists rely heavily on the pivotal role of PIMs in brain function, and possibly on consciousness.

On the basis of above description, it may be argued that there is one complete operational cycle between the stimulus (sensory) that arrives at the PIM from various parts of the brain and that which leaves (motor) the PIM. If such is the case then one can easily conclude that there should be a time lag between the incoming (sensory) and outgoing (motor) activities regulated by the PIMs. This has been worked out by Pico (2000) through an equation in terms of efferent representation. Now, since PIMs have an intimate relationship with the memory system of the brain, it has been suggested that: *"the converging past and present information may be highly similar, resulting in a positive correlation between afferent (sensory) and efferent (motor) representation in the PIMs." On the other hand, "if the afferent inputs of the past contain very different or contradictory representations, a negative correlation is computed by the PIMs."* Accordingly, PIMs may influence behavioral action (at that moment) with strong inhibition or slight inhibition; strong reinforcement or slight reinforcement, as the case may be, depending on no past experience. In this way fields of PIMs produce a millisecond to millisecond influence on the exiting state of the overall nervous system operation. It may, however, be realized that nature invariably provides escape mechanism and it may not be construed that PIMs performing the major integrating function is the only brain area assigned with this task. It appears that "the PIMs have the capacity to bind in time only higher order sensory representations which do not fall within the purview of sensations of light, sound, touch or taste, lying outside the bounds of brain stem. The following quotation on this count from the same author (op. cit.) may be illustrative:

> What occupies the PIMs in an informational structure carried in wavefronts of neural activity that conveys the current contextual parameters derived from two dimensional or three dimensional combination of internal and external sensory energies (stimuli) and their historical beneficial or decretory (non beneficial) impact (obviously based on past experiences and memory).

In summary then, at a given time, the incoming sensory influence and the outgoing motor action proceed at a pace which has a direct relation with (a) the genetic code; (b) the association (assemblies) of neuron which become functional during development, and (c) the nature of the stimulus. Apart from this no other computational analysis is necessary for the nervous system to continue its moment to moment function. Nevertheless when higher order informational comparison of context and memory that cannot be performed anywhere else in the nervous system, the PIMs" computational output may create an efferent code (motor) that has a significant

biasing role on the ongoing behavioral flow of life. This leads to the conclusion that efferent outflow of a PIM either reinforces various behaviors or internal functions, modifying them, or, at most, inhibiting the continuation of a previously ongoing behavior. Thus, when such multidimensional computations are involved embracing past to future movement calculations, the PIM subserves all those activities which fall under the definition of such terms as working memory, attention, understanding, social awareness and moral judgment (Pico 2000). Now the question may be raised that "for all their convergent and higher order computation activity, where in the fields of PIM activity do we need to invoke a focal PIM of consciousness for a given activity at a given moment?" In answer to this question a functional shifting of the dominant focus from PIM to PIM across neural activity time has been proposed.

Viewed in the perspective of evolutionary time scale we can consider the emergence of human consciousness from a preconscious animal brain in a four-dimension time-space reference, resulting from genetic modifications. The complicated yet efficient manner in which prefrontal integration modules organize awareness through input (sensory) and output (motor) computational integration is posited by scientists as the seat of consciousness (physicalist view). However, whereas consciousness and prefrontal integration modules have evolved in parallel and have added to the survival value of human species as claimed, it is difficult to conceive that consciousness and PIMs constitute a single package, since consciousness, for all intents and purposes, does not occupy any space, Nor do we know about the computational code operating in the nervous system. This is further complicated by the non-linear nature of action potentials as they move along the axons pushing the messages past the synaptic zones. More important, however, is the question raised by John Searl (1995)[5] as to *"What Does Evolution Really Tell us About the Function of the Mind?"* Whereas he identified the intentionality of thought as a key element in consciousness, the same does not fit well with evolutionary theory and for this reason to reduce (explain) the mental activity of intentional thought in terms of some non-mental process e.g., physical brain events, and/or evolutionary advantage, cannot succeed. On the same subject, a secular neurophysiologist, M. Glynn (1993)6 offered the following skepticism about consciousness which appeared in the Biological Reviews of the Cambridge Philosophical Society: I want to discuss a problem which was first posed a century ago, which is important, which is still not solved, and yet which is very largely neglected.

Glynn certainly does not subscribe in his discourse to the idea that consciousness is simply an epiphenomenon of the brain and an evolutionary artifact of Darwin's struggle for existence. For these reasons we continue to maintain, in agreement with Iqbal that coming into existence of the universe was the result of élan vital, or what he calls the 'Directive Force (Amr). It is the same force which, a priori, unleashed the evolution of the organic from the inorganic and of the living from the organic. The Directive force continues to operate unabated in the arena of genetic modifications during each cycle of human development in a probabilistic quantum mechanical manner. We will have more to say about this when we deal with higher consciousness and inner religious experience. Now having examined the status of brain structure and function especially the PIMs, we may revert to some recent studies on consciousness (self and ego) which encompass both monistic materialism (reductionism) and dualism. Materialistic monism is the philosophical view which states that there is no reality other than of space-time, matter, energy, universe and that there is no immaterial or spiritual reality. On the other hand, dualism is the philosophical view holding that material and spiritual domains have real existence.

This is how the two opposing philosophies have dominated the human mind during the last few centuries. A monistic solution of the mind brain problem is taken to be the proper scientific goal of neurophysiology, by a majority of researchers in this field. They believe that scientists must always believe or at least work under the assumption that everything in the universe has its full explanation in the properties of atoms, and the laws of physics and mathematics (Iqbal's own thesis contradicts pure physicalism). Such an inflexible position taken by physicalists is at best limited, if not erroneous. Conception of science - a conception based on prejudice against the God of the Qur'anic Muslim Faith or the biblical Christian Faith. The prejudice of physicalist is abundantly evident, for example, in the article of Nobel Laureate, F.H.C. Crick (who received Nobel Prize for his discovery of DNA structure in 1959)[7]. In one of his articles: "The Brain", he observes:

> Is there any idea we should avoid? I think there is at least one: The fallacy of the homunculus (i.e., the hidden personal intelligence in the brain) ……. The reason is that we certainly have (merely) the illusion of the homunculus: the self.

It was Descartes who proposed that mind and brain interact in a mysterious way. This dualistic interaction philosophy was like a beacon of light to guide many neuroscientists through the complexities encountered in studies on consciousness. Our poet-

philosopher's thoughts in the early twentieth century were not different. Reading carefully through the *Reconstruction* the dualist approach of Iqbal becomes obvious, especially, when he continues to distinguish between the reality both of normal experience (verifiable) and religious experience (ordinarily not verifiable). However, as predicted by Iqbal, we now have streams of new thought supporting dualism in spite of an onslaught of materialistic monism. See for example S. Searle (1995)[8]; Glynn (1993)[9], and Watson (2003)[10]. The bias expressed by Dr. Crick, a public atheist, is revealed when he declares that a monistic solution to brain-mind problem is the only possible one for a scientist, though this position is considerably weakened when he accepts that he has no explanation for his 'illusion' of a heomunculus. In the same vein whn Dr. Crick published his book: *The Astonishing Hypothesis* (1994)[11] supporting materialistic monism as the only solution to understanding consciousness. J. J. Hopfield reviewing Crick's book in the Journal, "Science" (1994)[12], pointedly referred to the following comments of another Nobel Laureate– Physicalist Richard Feynman:

> Richard Feynman, who throughout his life had spent considerable time pondering the question of how his brain worked, replied that consciousness was a fascinating subject that he had not been able to define in an operational sense. It was therefore not amenable to experiment or to mathematics and thus lay beyond the confines of the science.

Again, Hopfield concludes his review of the "Astonishing Hypothesis" in the following words:-

> The Astonishing Hypothesis is full of contradictions …. In my view until an operational definition is given to 'awareness' independent of the brain of humans, there is no way a science can be made out of consciousness. I side with Faynman in that regard. Crick in side stepping this issue, in the long run defeats his own programme. Like many acts of heroism, this one fails to reach its good.

On the strength of the critique on materialistic monism from various renowned physicalists and neurophysiologists, it can be safely assumed that dualism is as yet not a dead philosophy. It has its own adherents with equally forceful evidences which we will now proceed to examine. In doing so we will keep in view the thoughts of Iqbal, while exploring at the same time the new avenues, hitherto unattended by the students of ego (consciousness).

It is now positively recognized that great progress in understanding of biochemical and neurological mechanisms has not yet led to the comparable progress in understanding of higher cognitive functions of the mind (consciousness, ego, self). Nor, so

far, we have been able to evolve a unified theory of cognition. Attempts have been made by students of artificial intelligence to provide a human face to computational sciences. Yet, the model of John Anderson (1975)[13] constructing high level cognitive phenomena or the one started by Xerox PARC Company to design Model human processor have met with little success. Similar caveats have been cited in the "unified theories of cognition (Newell, 1990)[14]. At best, using the computational neuroscience some success has been achieved which is restricted to low level cognition (Amit, 1989; Churchland, 1992; Murze, 1992)[15,16,17] In spite of these advances, understanding about consciousness has remained elusive and primarily maintained at a philosophical level (Hofstadier, et. al.; Dennet, 1991)[18,19]. Some exceptions which apparently seem successful, however, may be of help in a futuristic time frame (Baars, 1988; Edelman, 1989; Taylor, 1991)[20,21,22]. Notwithstanding this advanced literature; consciousness as Iqbal originally conceived cannot be referred to anything particular. "It is not a thing; it is rather an experience or many different experiences that we label as consciousness. What then is the real problem, and how should it be tackled? (Duch 1995)[23]." He makes an incisive comment on the understanding of consciousness in the following words:

> Some physicists think a unified theory of everything (TOE) will explain consciousness together with everything else, for example, Penrose (1994) writing on consciousness, quantum gravity and unified field theories concedes that consciousness is indeed some thing. It is not clear what they mean. Of course such a belief goes along the respected reductionist tradition …. However, in case of consciousness this is not and will never be sufficient! The reason is rather subtle and not hard to follow. Understanding depends not only on the ability to draw logical conclusions but also on relation of these conclusions to our experiences.Understanding of classical physics agrees with our sensory experiences. Understanding in quantum mechanics refers to abstract objects, such as the wavefronts, and since these objects are not directly accessible to our senses the feeling that we really understand is very hard to achieve ….. understanding of the mind in abstract physical terms derived from quantum mechanics or quantum gravity is not satisfactory because we have direct precept of mind while we do not have such perception of quantum wavefunction.

This bold assertion of a computer scientist, pointing in a forceful and logical manner the inadequacy of the sciences to the understanding of consciousness through reduction, throws the field of consciousness (ego) in the lap of psychologists, and philosophers, but more-so, with those who advocate the veracity of inner religious experience based on revealed knowledge (for example Iqbal (1930)[24];

Eccles (1994)[25]; Watson (1993)[26]. Let us now turn to some recent views on the subject and try to explore the requirements for a good theory of consciousness and also find out as to what extent these views support Iqbal's thesis.

John Eccles was a young medical student when he applied himself to Descartes *dualism* because, as he thought, separating *res extensa* and *res cognita* "gave a secure status to human soul or self." He, however, did not fully subscribe to dualist dictum of Descartes, yet he continued to adhere to dualist interaction as Iqbal did between non material self (consciousness, ego) and material brain. But his approach was different. In 1963, he received the Nobel Prize for his pioneering work on 'Action Potentials' and Synaptic (where axons meet the dendrites) neurophysiology. This monumental work is fully explained in his Nobel lecture delivered on December 11, 1963. However, more precise contents of his theory of self-consciousness are available in Popper and Eccles (1977)[27], Eccles (1994)[28]. Popper a well known philosopher of modern times, and Eccles a physicist jointly authored a book entitled: The Self and Its Brain (An argument for interactionism. The research was a deft binding of Popper's philosophical insight with the scientific knowledge of Eccles. Popper stated comprehensively that:

I wish to state clearly and unambiguously that I am convinced that selves exist.

Extending this statement he proposes the hypothesis of three worlds: **World one** according to him is the objective world of Schrodinger. This is the universe of physical entities in which the interaction between physical objects is governed by laws of physics and mathematics. It is this world in which a reductionist resides. **The second world** lies beyond the inner self of ideas: pain, joys, sorrows, love, schemes, striving and songs that are jumbled together with memories of the past and hopes and fears of future, The inner reality belongs to this world. **The third world** is the world of human culture. It includes all the products of human mind such as stories, myths, scientific theories, problems, social institutions and works of art. These categories are almost identical to those proposed by Plato and reproduced recently by Penrose (1994)[29]. Having described this, Popper makes an interesting statement which we quote from Alwyn (1995)[30]:

> Careful consideration of world three can illuminate the mind body problem. He presents three arguments to support this view and the first is this: Although world three's objects are abstract, they are also real, for they can change world – 1. But world 3 affects world-1, only through human intervention, because it involves a world-2 process. we therefore

have to admit that both world 3 objects and the processes of world 2 are real – even though we may not like this admission, out of deference, say, to the great tradition of materialism.

Further, two points may be noted. First, the world 2 belongs to the "states of soul" as envisaged by Plato. Second, any definition of self must include all the three worlds but intervention of the World 2, either way, has a significant involvement. Yet, what is crucial, and what has still remained elusive so far is the space-time relationship of world 2. Iqbal identifies that this is understandable as it happens in the serial time. Implicitly, Iqbal also identifies the inner experience of the self in world 2 with what lies beyond worlds 2 and 3 which, according to him, happens in Divine time and Divine space. Soon, we will revert to this issue. For Popper, there is nothing mystical about 'self' and he states that "the integrity and identity of the self have a physical basis. This seems to be centered in the brain." It remains to be examined, however, whether the self as recognized by Iqbal and that identified by Popper are the same? Perhaps not? Popper in support of his argument provides evidence that "flawless transplantation of a brain, were it possible, would amount to transference of the mind, or the self." Perhaps on this point both physicalists and non-physicalists would agree (Scott, 1995)[31].

Whereas Popper is in favour of monistic materialism assigning the behavior of mind-self to the brain, Eccles has different views, somehow closer to dualism. His work may be appreciated on two counts. **Firstly**, his contribution to the physics of neurons and synapses, and **secondly** his theory of dualism in which by generalizing intentionalism, he proposed interaction of two distinct entities – the spiritual self (world 2 of Popper) and the material brain (world 1 of Popper). About his physical theory of neuronal activity and the way the message is conveyed from one neuron to the other, he made a breakthrough contribution by showing how at the nerve end where axon branches come in contact with the dendrons or muscle fibres, the gap at the junction is bridged by the release of chemical substances which convey the stimulus from one side of the gap to the other side. For this pioneering work, which is now an accepted physiological principle, Eccles received Nobel Prize in 1963 (those interested in further details are invited to read his Nobel lecture delivered on December 11, 1963). In spite of being an empiricist by training, he became a dualist interactionist, when in 1994 he published his book: "How the Self Controls its Brain." However, his work neither follows nor precedes the philosophic doctrine of dualist-interactionism in the form postulated by

Descartes. Nor does his work reflects or support dualism's currently popular alternative material monism. For a better understanding of Eccles dualism, let us examine some of the major features of his theory and then subject it to critical analysis. We must, however, bring to the attention of the reader that by the empirical approach of Eccles one may not be misled that he subscribes in any way to monistic materialism. Indeed, if anything, he rejects it philosophically. We summarize below the important features of his dualism theory:

(i) Some electric processes in the cortex are quantum mechanistically probabilistic. The substances released at the synapses are delivered in probabilistic quanta;

(ii) The self (the mind) is a probabilistic field not a material entity in space and time. It acts on the brain through what he calls "self field';

(iii) Poppers ontology of three worlds is presupposed in the theory;

(iv) World 2 is the equivalent of self and it interacts with World 1.

(v) World 2 throws light on the mind-brain problem through the hypothesis that the non-material mental events relate to the neural events of the brain (the world 1 of matter and energy) by actions that are in conformity with the physics of quantum theory;

(vi) Self does not carry any mass or energy but exerts effective action at micro-cites in the brain;

(vii) The probabilistic field of self alters the release of chemical substance, released at the synapses in the cortex (interaction of immaterial self with material brain;

(viii) The self starts the brain's behavior; it controls the brain's behavioral output;

(ix) Self survives after death;

(x) Since the self is immortal, the physical conservation laws are not broken. This removes the major obstacle in the way of dualism;

(xi) All mental states and experiences, in fact the whole of the sensory inner and outer experiences are composite of elemental or unitary mental experiences at all levels of intensity and each of these mental units is linked in some unitary manner to a dendron. The proposed mental units have been named psychons. *Psychons are experiences in all their diversity and uniqueness. It is the property of psychons to link together in providing a unified experience (1994). This constitutes the binding hypothesis within the framework of the theory.*

Since the time when the *Reconstruction* was written, a voluminous literature has appeared on two opposing philosophies of monistic

materialism and dualism. In each case, consciousness has occupied the central stage in the minds of researchers. As we study the history of thought in philosophy and science we find only Eccles work, who, being a physicist and therefore an empiricist, has thrown his full weight in support of dualism (the approach, of course, being somewhat different from that of Descartes). Now comparing the work of Eccles prepared in the company of a philosopher of Popper's fame, we find abundant similarities between Eccles and Iqbal on the subject of self, ego and consciousness. We have chosen to bring out the comparisons, and also the contrast, if any, between the two in order to visualize what aspects in the two can be retained for developing a unified theory of consciousness, ego and self (Table – 1). It may be noted, however, that whereas Eccles fully subscribes to the three worlds proposed by Popper, Iqbal does not clearly bring out this distinction, though by implication, his several views spelled out throughout the *Reconstruction* lead to the same vision as that of Popper (1974). Additionally, Iqbal recognizes a fourth world, beyond perceptive boundaries of Worlds –1 and 3 of Popper. The world 2 of Popper is almost identical with that of Iqbal. This world 2 being reminiscent of Plato's "states of the soul."

Table 1: Comparison of Eccles' (1974, 1995) and Iqbal's (1930) approaches to dualism.

	Theoretical Framework	**Eccles**	**Iqbal**
1.	Three Worlds of Popper	Yes	Yes, but only by implication. Also, recognizing the fourth world beyond the three worlds.
2.	World 2 of Popper (soul, self, ego and consciousness)	Yes	Yes
3.	World 2 (soul etc.) important for interaction of Worlds 1 and 3.	Yes	Yes. But also interaction of World 2 with World 4.
4.	Electrical Process in the brain; substances released at synapses; both are probabilistic (quantum physics)	Yes.	No indication.
5.	The self is a field not a material unity in space	Yes	Yes, but not that self is a field and acts probabilistically.

	Theoretical Framework	**Eccles**	**Iqbal**
	and time. It acts on the brain		
6.	Self does not have mass and energy but exerts actions on the brain.	Yes	Yes, but Iqbal proposes it as a Directive force (Amr.)
7.	The probabilistic field of the self alters the release of chemicals at synapses quantum mechanisti-cally.	Yes	No
8.	Self controls brain's behavioral output.	Yes	Yes
9.	Self is immortal (Quantum laws not applicable, possible survival after death.	Yes	Yes
10.	Mental units are composite of various mental experiences.	Yes	Yes
11.	Theoretically proposed mental elements are psychons which unify all experiences (binding).	Yes	Not in this form.

Note: Being an empiricist, which Iqbal was not, Eccles use of the properties of self as a field which acts on the brain, and psychons as binding forces is to relate the non-material state with quantum physics. This is an attempt to remove the objection of modern physicists.

The study of the contents of Table 1, will reveal that, on the basics, there are no differences in Iqbal's conceptual framework, and that of Eccles on self, ego and consciousness. Both agree that self (ego) is immortal. Both agree that self (ego) survives death. Both agree with World 2. Both agree that self controls the brain. Both agree that self has no mass or energy, since it is not a substance in time and space. Where then lie the differences? The **first** difference which may be noted lies in the fact that Eccles was a physicist and being so he had to satisfy the physicalists and thus had to evoke the quantum physics approach to the properties of self. This is why he used the word "self-field" which acts probabilistically on the brain. Same is true of the chemicals released at nerve endings, which, in turn, depend upon the strength of the stimulus under the sway of "self-field". As a product of the action of the self-field *psychons* have

also been proposed to suggest a novel, though hypothetical, mechanism of binding for all experiences, past and present, into a unitary response. On the other hand Iqbal was a philosopher of unmatched understanding of Islamic thought and had only limited access to the new physics which was in the process of making at that time and, more so, the structure and function of the brain. Even then, it is amazing to note the elegance with which he used physical engineering to construct the theory of self; drawing inspiration at the same time from the revealed knowledge in the Qur'an. Eccles theory of the self coming out as late as 1995 after Iqbal's *Reconstruction* (1930) is simply an advancement of Iqbal's own masterly treatment of the subject. One may wonder at the similarities between the approaches of Eccles and Iqbal! Some may attribute it intellectual compatibilities. Yet, the answer may lie in the simple fact that Eccles was a devoted Christian and Iqbal was a devoted Muslim. Both had complete faith in the spiritual aspects of life ordained by God. However, Iqbal presents a more logical thought on association of metaphysics of the Directive force (Amr) with ego (self, consciousness) which we have already discussed.

Notwithstanding the ingenuity of Iqbal and Eccles, as described above, there are a number of alternate proposals (both positive and negative) which bring into discussion several aspects of consciousness. However, some amazingly attractive views published recently have a merit to be discussed here. For example, Watson and Williams (2003) have written an excellent critique on Eccle's Model of the Self Controlling its Brain. The critique is based on Watson's own theory of Enformy (1993, 1997)*[32,33]which he named as "The Theory of Enformed Systems (TES)". (Watson 1997, Watson *et. al*; 1998; Schwartz; *et. al.,* 1998)[34,35,36]. The conceptual origin of TES is that "there exists a fundamental conserved capacity to *Organize*, denoted by his term enformy. This may be compared with Law of entropy. In this way disorganization is opposed when enformy organizes and sustains four dimensional fields of randomness (this is called enformation). The fields and domains are called SELF, sustained by enforming and capable of reproducing and evolving.

This SELF apparently corresponds to the "Self" described by Eccles. In simple words "self" of Watson (1993) simply means linking by memory of conscious states which are experienced at various times during the lifetime.

It is presupposed in the continuity of mental states, particularly the continuity bridging the gaps of unconsciousness. For example, the continuity of our self is resumed after sleep, and after temporary amnesia (loss of memory) during concussion and convulsion.

Furthermore, the "SELFS" are not limited to humans. They correspond to the organization inherent in all coherent systems, ranging from photons to humans and beyond. Because they are continuous in space-time, but discontinuous in three dimensional spaces, their fundamental behaviors account for the non-local phenomena observed in parapsychology, for instance, telepathy (Watson, 2003)[37].

> This brings out three features of the self: (1) organizing its own state at a given time; (2) organizing various states of selves, and (3) organizing past and present in space-time. The last named attribute accounts for telepathy, remote viewing, precognition and psychokinesis.

Now let us find out how Watson (2003)[38] uses TES for testing the validity of Eccles model. **First,** as mentioned above, in principle the 'self-field' of Eccles seems identical to "SELF" of Watson, because like the former it organizes elements of matter and energy-mass (in this case brain) to submit to and conform to the organization (enoformy) of the SELF. SELF is thus a guiding map (what Eccles calls fields) for physical systems in time and space, which is the basis of origin of life (remember life originated by enformy (organization) of organic molecules which according to Iqbal is part of the *élan vital* in perpetuation). **Second,** Watson turns to the "self field" of Eccles by stating that organization of SELF (enformy) can be modified, augmented or effaced. They contain the memory that provides the continuity of mental experience as conceived by Eccles. Thus, brain is not necessary for memory content– "this is why searching for it in the brain has proven futile (Schecter, 1996)[39]. Like Eccles, Watson reaches the same conclusion that SELF, in the TES, replaces "self-field" of Eccles thus solving time old mind-brain problem. Watson (1993, 1996)[40,41] on the basis of these arguments concludes that "under TES, neither mind nor body is a primary topic of interest, yet the theory inheres a comprehensive stratagem for consciousness. That is, by explaining the organization of all holistic systems– including their fundamental properties and behavior– TES explains all the elements attributed to "mind" and "body", and life itself, quantum physically, and parapsychologically. It therefore satisfies both the binding problem and the mind body problem (Watson, 1973, 1997 b)[42].

Eccles also made a brilliant theoretical contribution when he postulated the theory of psychon fields. It appears to us that the updated theory of Watson described above falls in line with the concept of Eccles. It also receives support from other sources as well. For example, Sheldrake's study of morphic fields (which applies

to biological systems in general) including mentality, is defined by him in the following words:

> A field within and around a morphic unit which recognizes its pattern of structure and activity; morphic fields are shaped and stabilized by 'morphic resonance' from previous similarly morphic units, which were under the influence of fields of the same kind. They consequently contain a kind of cumulative memory and tend to become increasingly habitual.

This description of biological 'morphic fields' can exactly be superimposed on psychon fields. In the same way Eccles' psychon theory appears to be a special case of the Egon theory of Christy and Jones (1998)[43], who apply their concept of egons not only to biological and psychological phenomena but to non-living systems as well. It is interesting, and a lot more difficult for physicalists to understand and accept that Egon theory which regards "all of the identities in nature as minds and their properties as communication of those minds." Thus, we can confront a physicalist (reductionist) that "Physics can be understood intuitively as a hierarchy of consciousness, and that nature consists of nothing but conscious experience". (Christy and Jones, 1998)[44].

In summary then, all what has been described above brings Iqbal's viewpoint on higher consciousness, ego and inner religious experience closer to the fringes of science, as if waiting for its fuller realization through experimental verification. Sherdrake suggests that "consistent with Platonic theory of creativity, all possible morphic fields exist timelessly, awaiting their expression in physical systems." This is what Iqbal calls Amr Rabbi (Directive force). However, we have yet to establish the process of conservation of these fields. Not surprisingly, as of today we do not find such a phenomenon of conservation, for example, in the electromagnetic fields (Watson 2003)[45].

Now, physical approach to consciousness appears in several guises. There are a number of new studies ranging from one extreme to the other. Important among them include Baars (1993)[46]; Chalmers (1995)[47]; Crick (1994 a,b)[48,49]; Dennet (1992)[50]; Eccles (1992)[51]; Harth (1993, 1995)[52,53]; Hebb (1942, 1980)[54,55]; Penrose (1994 a,b, 1989)[56,57,58]; Searle (1992)[59]; Strapp (1993), Watson (1924). The reader may refer to these works for further extending his information. However, a few of these studies are of significance for our discussion on physicalism and dualism. If recent intellectual history is any guide then, as is claimed, materialism remains the only rational way to approach the study of mind. John Searle remarks:

> Modern materialism appears in a variety of guises ranging from the claim that mental states do not exist (eliminative materialism), to the view that a computer that successfully mimics human behavior must have thoughts, feelings and understanding (computer functionalism).

For Searle, this attitude is implausible. In spite of this he takes a position with physicalists when he concludes that "the existence of consciousness can be explained by the causal interaction between elements of the brain at the micro level, but consciousness itself cannot be deduced or calculated from the sheer physical structure of the neurons without some additional account of causal relations between them." This in our opinion is another form of reductionism with several logical inadequacies inherent in the statement. On the subject of consciousness some bold assertions have been made by Penrose (1989, 1994a. 1994b) in his best selling books; "The Empors New Mind" and "Shadows of the Mind". Penrose himself a reductionist, confronts the physicalists with a number of interesting and logically valid ideas. **First**, without attempting any definition of consciousness, he rejects the physicalists belief that "everything (including consciousness) is a digital computer." **Second**, he presents powerful arguments to reject the claim made by functionalists in the artificial intelligence community that what the brain does can be reduced to an algorithm and duplicated 'in principle', on a digital computer. For him the activity of brain is non-linear and therefore only non-linear mathematics has to be applied in order to conform to the putative methods of physics and mathematics. This is why he asks the questions: (a) can computer have a mind (from the examples of chess games he has given – the answer emerges – 'No'), and (b) where lies the physics of mind? (the answer is that physics and mathematics of mind have yet to be discovered). **Third**, philosophically, any mathematical idea perceived makes contact with Plato's world, the world 3 of Popper. For example, "when one sees mathematical truth, his consciousness breaks through in the world of ideas, and makes direct contact with it (accessible via intellect)". "This be so, it must be noted that man has not created mathematics, he has only discovered it. **Fourth**, considering awareness as a preliminary to consciousness, "awareness can be evoked by physical action of the brain, but this physical action cannot even be properly simulated computationally". The major conclusions he then draws from his ideas include: (a) since the physical activity of the brain cannot be simulated on a computer, therefore, the extent of physical laws may lie outside the purview of physical organization of the brain, and (b) the non-computable physics, according to him, (starting with the single cell paramoccium, who uses his cilia for getting awareness of surrounding obstacles) can be found in the micro-tubular structure of paramoccium. He concludes his arguments in the following words:

> Let us then accept the possibility that the totality of microtubules in the cytoskeleton of a large family of the neurons in our brain may well take part in the global quantum coherence– or at least that there is a sufficient quantum entanglement between the states of different microtubules across the brain – so that an overall classical description of the collective actions of these microtubules is not appropriate.

Whereas, the validity of this hypothesis has yet to be established to any reasonable extent, a student of biology, however, sees some merit in it. The merit lies in the fact that emergence of consciousness, reaching its climax in the human species, can be explained on the basis of a widely accepted view that the process of organic evolution has gone through a four-dimensional time frame. Furthermore, it is unlikely that physical actions like the one proposed by Penrose in the microtubules cannot be simulated. There is little doubt that so far we have not touched even the threshold of this reductionist approach.

In his interesting book: 'The Creative Loop' (Harth, 1993) presents an attractive analysis of consciousness, starting with the incisive remarks that "being familiar with the quantum theory, which denies predictability at the atomic level, and the theory of relativity, which mixes the concepts of time and space, physicists need not be overly impressed with philosophical conclusions that are based on scientific perspectives of nineteenth century". After identifying several characteristics of consciousness (selectivity, exclusivity, chaining and unitarity), he presents a theory essentially based on Hebbs concept of cell assemblies (previously discussed), through which he constructs the loop of consciousness, starting with afferent sensation (e.g. light) through nerve cell assemblies. Interestingly enough, for him (Harth, 1993), dualism is not quite as dead as some would have us believe. He, like Penrose dismisses the idea of physicalists that "even a most powerful computer cannot think, but perform a prescribed computational task in the service of client." Another physicist – Henry Stapp- in his book: Work, Mind, Matter and Quantum Mechanics (1993) came up with an intriguing set of arguments. He thinks, that it is a wild goose chase to find answer to consciousness in classical Newtonian dynamics, since "Nothing in classical physics can create something that is essentially more than an aggregation of its parts. For this reason he turns to Hisenberg's formulation of quantum mechanics for an explanation of the properties of consciousness. Without quantum mechanics he states the evolution of the physical units would be exactly the same whether subjective conscious experience exists or not." The process of evolution *per se* is generated by quantum mechanics, because of

choosing one possibility from the other (Natural Selection). "This is attributed to the wavefunction for the universe in the perspective of Heisenberg's principle or in conformity with Schrodinger's deterministic equation. Both appear to control the universe. He seems to agree with Eccles' probabilistic solution according to Quantum Mechanists in fields of neuronal-axonal-synaptic complex. The wave function can collapse at any of these stages.

We have been repeatedly referring to the relationship between consciousness and quantum theory. We have noticed that the theory in the hands of physicalists as well as dualists has taken different interpretations. One such interpretation, which is of interest to us, and which is likely to be of some significance when we make an attempt to up-date Iqbal's views on consciousness, ego and self, has been put up recently by Pratt (1977) in his article: 'Consciousness, Causality and Quantum Physics'. The standard interpretation of quantum physics assumes (a) indetermination; (b) quantum systems exist objectively only when they are being measured or observed; (c) the claim that mathematical description of the quantum world allows the probabilistic or experimental results to be calculated with high degree of accuracy, yet there is no consensus as to what it means in conceptual terms. Thus, according to the "uncertainty principle the position and momentum of a subatomic particle cannot be measured simultaneously with accuracy greater than that of Plank's constant", (d) the particle can never be at rest, but is subject to constant fluctuations even when no measurement is taking place, and that

> these fluctuations are assumed to have no causes at all.

In conclusion, it follows from (a) – (d) that quantum world is believed to be characterized by "absolute indeterminism, intrinsic ambiguity, and irreducible lawlessness.

> Taking exception to this classical view of quantum physics (Bohm and Hiley, 1993; Bohm and Peat 1989), have expressed the view that abandonment of causality had been too hasty: "It is quite possible that while the quantum theory, and with it indeterminacy principle, are valid to a very high degree of approximation in a certain domain, they both cease to have relevance in new domain's below that in which the current theory is applicable.

In our opinion, this is a highly intriguing statement which plunges us from science straight into metaphysics. This means nothing but an ontological interpretation of quantum theory, rejecting the two major assumptions of the theory, namely, absolute indeterminism and objective existence of quantum systems only when they are measurable and observable. Does this mean, as Bohm *(op. cit.)* suggests "that the quantum events are partly determined by subtler

forces (presently unknown) operating at deeper levels of reality? We believe that this concept of Bohm brings him closer to the concepts of Eccles (synaptic fields) and that of Iqbal (Directive Forces).

Physicalists tell us that a quantum system is represented mathematically by a wavefunction which is derived from Schrodinger's equation. The wavefunction can be used to calculate the probability of finding a particle at any particular point in space. However, if wavefunction is assumed to provide a complete picture of quantum system, then this would mean that between the measurements the particle dissolves into nothingness of quantum world, and is probably present in different places at once. It has been agreed that wavefunction collapses in a mysterious way– violating the Schrodinger equation. This has no explanation in the classical quantum theory at the micro-level; though, it operates precisely at the macro-level. We have brought this concept into discussion for the reason that theorists claim that "collapse of wavefunction (in the brain) is caused by consciousness thereby creating reality." The theory also emphasizes that "only self conscious beings such as ourselves can collapse wavefunction". In view of the above, it should be legitimate to assume that "the whole universe must have existed as 'potentia' in some transcendental realm (Directive Force) of quantum possibilities until self conscious being evolved and collapsed themselves and the rest of the branch of their reality into material world and the objects remain in a state of actuality only so long as they are being observed by humans" (Goswami, 1993) The other view that even non self-conscious organisms or even electrons can cause wavefunction collapse has also been put forward (Herbert, 1993). Whatever may be the case, the fact remains that the idea of wave packets spreading out and collapsing is not based on hard experimental evidence. This is why we are inclined to go along with Bohm's ontological interpretation that wavefunction gives only ill-defined and unsatisfactory notion of wavefunction collapse. Alternately, he suggests the real existence of particles and fields:

> Particles have a complete inner structure and are always accompanied by a quantum wave field; they are acted upon not only by classical electromagnetic but also by a subtle force, the quantum potential determined by quantum field (Bohm and Hiley 1993, Bohm and Peat, 1989; Hiley and Peat, 1991) See also Eccles (op. cit.)

We cannot go into a detailed entanglement of Bohm's arguments, however, suffice to state that particles are guided by quantum potential and provide connection between quantum systems. This represents a vast energy pool, recognized by standard quantum vacuum, underlying the material world. Very little is known about

quantum vacuum (zero potential field) but its energy density is astronomical (10^{108} J/Com^3). On this basis he postulates that:

> It is quite possible that while the quantum theory, and with it the indeterminate principle, are valid to a very large degree of approximation in a certain domain, they both cease to have relevance in new domains below the ones in which current theory is applicable.

It is noteworthy that, according to his view, observation is not required to confirm the existence of the quantum world when it falls beyond the scope of measurable phenomena, i.e., below the recognized quantum realm. He thus rejects the positivist notion that "what cannot be measured or precisely known cannot be said to exist." In essence, he draws a clear distinction between epistemology and ontology. In alignment with Iqbal, we cannot help but echo Karl Popper's statement: I wish to state clearly and unambiguously that I am convinced that selves exist.

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