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Consciousness: A rapidly moving Scientific Discipline?

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Abstract
Is consciousness a discipline of Philosophy/Theology or Science? Since time immemorial, consciousness has baffled us, bewildered us and sometimes even mystified us. The question still remains that can consciousness be really studied as a rigorous scientific discipline? It is indeed true that the study of consciousness has been now open to various scientific disciplines mostly within the last twenty to thirty years. This has been the case because of the rise of disciplines like neurobiology, cognitive science and even evolutionary biology. Rigorous scientific disciplines have now started considering studies relating to consciousness as not only important but rather imperative towards understanding the brain-mind relationship.
In this research paper, I have outlined the main scientific theories that, in my view are studying consciousness rigorously. The first broad scientific discipline that studies consciousness is that of cognitive science and within the broad discipline of cognitive science the main theories are namely, Global Workspace Theory by Bernard Baars, Multiple Drafts Model by Daniel Dennett, Intermediate Level Theory by Ray Jackendoff and finally Information Integration Theory by GuilioTononi and Gerald Edelman. The second broad discipline that studies consciousness scientifically is that of Neurobiology and within the discipline of neurobiology, the main theory would that be of finding the neural correlate of consciousness as proposed by Christof Koch and Francis Crick. The third discipline would also include that of evolutionary biology and within that discipline the most recent work is that of Antonio Damasio and more specifically his book titled *Self Comes to Mind.*

Consciousness: A rapidly moving Scientific Discipline

All of us can agree to the fact that we exist and the nature of this very existence is what seems to us as something intriguing. In fact, not only we humans but also animals and insects can be said to be living. The nature of living entities seems to be quite different from that of the non living entities for example a rock, a chair, etc. The former seems to possess something extra which the latter seems to be missing. Almost all forms of life have some level of subjectivity involved in them which can be deduced from observing their behaviors. Hence, from this we can divide whatever exists in the universe into living and non living entities. Even amongst the living entities we observe that there are different levels of existence in terms of the physical and behavioral complexity of the various living beings. In fact, the behavioral complexity depends upon the physical complexity of the organism and both of them are said to be related through the mental. The mental is said to generate the behavioral through the physical. Hence, in order to know more about the nature of the universe or about its existence, the study of the mental or the mind is considered as a highly

important discipline.

We know for a fact that all of the conscious mental states are accompanied with a subjective perspective of experiencing the particular mental state. These mental states which are inherently conscious are said to be "phenomenally conscious" by certain philosophers like Ned Block. What it's like subjectively to undergo a given phenomenally conscious mental state is known as the phenomenal character of the mental state (Tye 2007, p 23). In everyday life we attribute consciousness to ourselves with our individual selves being conscious of objects in the world (for example, being conscious of a pen, etc) and of certain facts (for example, that the pen is used for writing) which are related to the world. This kind of consciousness is generally known as "creature consciousness". Some philosophers also claim that there is another kind of consciousness that attaches to some mental states simply by virtue of their being certain sorts of information processing. This kind of consciousness is known as "access consciousness" (Tye 2007, p 23; Block, 1995). Exactly how these three are related to each other is still a matter of debate but in this dissertation the main focus would be on phenomenal consciousness and creature consciousness. In fact, it is the phenomenal character of consciousness which makes consciousness seems so elusive.

Consciousness has always been a topic of philosophical enquiry but only recently consciousness has become the favorite topic of scientists as well. The reason for this is quite clear since we can see that recent studies in neurobiology and cognitive sciences has made it possible to study consciousness from a scientific set up.

Probably, the most important approach which established a scientific enquiry of consciousness is the cognitive science approach to conscious experience. Out of the many thesis and hypothesis that this approach provides us with, there are mainly four most influential contemporary accounts regarding the cognitive theories of consciousness. The first and foremost is the influential cognitive theory of Bernard Baars named The *Global workspace theory* (GWT) of consciousness. Baars also talks of the theater metaphor of consciousness. In my opinion, the Global Workspace Theory would be able to provide a possible answer to the "problems" of consciousness comprehensively. This theory mainly relies on the metaphor of how a theater functions which is related with the entire process of conscious experience or the mental. According to Baars, in the theater of consciousness a "spotlight" of attention is focused on the stage as a bright spot. The spotlight on the stage reveals all the conscious contents of the mind, whereas the audiences watching the play are left in the dark. Kept without the spotlight of attention also are the various scriptwriters, stage designers and the like. All of these including the audience represent the unconscious aspect of the mental apparatus which are very vast in number as compared to just the spotlight of attention being focused on one particular scene on the stage. Hence, the conscious contents of the mind are limited to the bright spotlight of attention on the stage and working memory refers to the other area of the stage which is not lit up from the spotlight of attention and which is partially kept in the dark (Baars 1997) .

The second cognitive theory of consciousness is called as the *Intermediate level theory* of consciousness as originally proposed by Ray Jackendoff (See Jackendoff 1987). According to Jackendoff, consciousness is not associated with low level or with high level representations but rather with those implying intermediate level of processing. This theory is mainly rooted in Jackendoff's analysis of different cognitive systems such as vision, language or music and the subsequent observation that consciousness does not arise anywhere within these systems as well (Gardelle, Konider 2007). According to this cognitive theory, consciousness does not comprise of a disunified picture of visual features, rather it is composed of specific and bound instances that are believed to be computed at the intermediate level of representation. Another important aspect of this theory relates to the notion of attention during conscious experience. Jackendoff acknowledges that merely the activation of intermediate level of representation cannot be a sufficient condition for consciousness to occur; rather it is the amplification of intermediate level of representations by attention or along with attention that is necessary and sufficient condition for consciousness. Hence attention is considered to be an important aspect for consciousness to occur, according to this theory.

The third important theory in the cognitive approaches to consciousness is known as

Information integration theory has been proposed by GuilioTononi and Gerald Edelmann (See Tononi2004 ,2008). It originated from Tononi's work with Edelmann and the observation that consciousness has two fundamental properties; it is both integrated and differentiated. Conscious states are considered to be highly differentiated because for the occurrence of a particular state, the conscious data is actually selected from a huge repertoire of possible conscious states (Tononi 2004). At the same time, conscious states are integrated as an experience of something unified. The Information integration theory is mainly interested in the question of how any kind of physical system which consists of both integrated and differentiated information can lead to conscious experience. According to this theory, the more a system exhibits integrated and differentiated states the more it is conscious.

The fourth most important cognitive science theory is proposed by Daniel Dennett which is known as the *Multiple Drafts Model* of consciousness (See Dennett 1991). The multiple drafts theory is quite influential since it helps in eradicating the problematic assumptions of a cartesian theater or a homunculus. The theory emphasizes on the fact that there is no "one" observer in the mental apparatus that would receive all the information and hence present a single and unified narrative of consciousness. Rather, according to Dennett, there are multiple processes which are on going and out of these processes some of them have more impact so as to influence behavior and lead to conscious experience one after the other. In Dennett's model the draft which becomes conscious out of all the drafts available is considered by him to be something like a "fame in the brain" or a kind of "cerebral celebrity" (Dennett 2001, 2005). Hence, there is no requirement for a conscious observer or homunculus in the brain for Dennett.

After assessing all the major cognitive theories of consciousness, we come to the neurobiological theories of consciousness. In philosophy of mind, these theories can be considered to be a part of materialism or identity theory of mind which states that the mental aspect is the physical aspect. In my opinion, if we consider consciousness as a "riddle" or a "problem", it is only through a rigorous enquiry into the cognitive and the neurobiological aspect of consciousness that one can find answers to these seemingly puzzling phenomena of consciousness. In my view, two main theories in the materialist school deserve special mention here. The first is neurobiological trhgeory of consciousness as propounded by Christof Koch and Francis Crick and the second is evolutionary biology approach to consciousness as propounded by Antonio Damasio.

The first to be considered are the neurobiological theories of consciousness. The neurobiologists working on this problem consider consciousness to be a specific biological problem. The first and the most promising neurobiological theory of consciousness came from the duo Christof Koch and Francis Crick. This theory is concerned with finding the *Neural Correlate of Consciousness* (NCC). The NCC is defined by Koch as "The minimal set of neuronal mechanisms or events jointly sufficient for a specific conscious percept or experience"(Crick and Koch 1990). This theory is based upon the empirical fact that every state of experience is simultaneously correlated with a brain state or in other words, there is a direct correlation between the physical neuronal interactions in the brain and experience or qualia. This neurobiological approach consists in contrasting conscious and unconscious processes in order to characterize their neural features. An example consists of comparing the physical cerebral activity in the brain when individuals are presented with stimuli they cannot report (unconscious) with that of visual stimuli that they can report (conscious processing). In other words, to understand the link between consciousness and the brain, it mainly consists in finding out which brain area or neural components are specifically related to conscious processing but not related to unconscious processing. According to them, the best strategy for a neurobiological science of consciousness to proceed is to find the NCC.

The other important neurobiological theory or rather if I may say an evolutionary biological approach to be considered in this dissertation is proposed by the neurobiologist Antonio Damasio (See Damasio 2010). Damasio, in his proposal, talks about the concepts of life regulation and biological value. For Damasio, we can get useful insights into the functioning of human mind and consciousness by carefully studying the life regulatory behaviors of certain simple organisms. Damasio then talks about the human brain's distinctive ability to make maps and images. For Damasio, even the concepts of emotions and

feelings of emotions would also take us back to these very concepts of life regulation and biological value. For Damasio, consciousness by definition is the adding on of a self process onto an already existing mind process. Therefore, Damasio tries to explain consciousness by bringing in the concepts of evolutionary biology which further explains how there is not too much of a difference between human beings and other animals. For Damasio, even the self is built up in three stages; the first stage is called the proto self, the second is the core self and the third or the final stage is known as the autobiographical self (Damasio 2010). Damasio also gives a thorough explanation as to how and why consciousness has prevailed.

Despite much progress and research done, consciousness seems to be still quite elusive. Some difficulties have been resolved but new ones have materialized. At the beginning of the nineteenth century there was little distinction between consciousness and life itself, with both depending upon vital essences that were not amenable to experimental study (Frith and Rees, 2010). The monster that was created in Mary Shelley's famous novel Frankenstein showed that a "walking dead" creature can have not only life but a superb sensitivity to human experience and suffering as well. Science gradually dispelled the need for vital essences to explain life but consciousness still remained unexplained. But by the early twentieth century in the James Whales version, the created monster lives but is only very slightly conscious. By the end of the century the monster has evolved into a plague of zombies (Horne, 1992) while having no consciousness at all. These creatures have come to be called in more contemporary terms as zombies. More so the philosophers are interested in a special kind of a zombie which is molecule by molecule physically identical to us, but is not conscious. Neurobiologists and cognitive scientists, on the other hand, are more interested in another kind of zombie that is not conscious but in which the cognitive unconscious is intact (Crick and Koch, 2001). Now the possibility of both kinds of zombies is slim at the moment but with the rapid advancements in science and technology along with the highly evolving discipline of consciousness, both the philosophers and the neurobiologists are simultaneously hopeful about their own models.

Apart from these varied approaches to the study of consciousness there have been many skeptics or philosophers who have raised certain problems concerning consciousness while certain others who have denied that any such problem exists in consciousness. Out of the latter category the most famous and influential philosopher is Daniel Dennett. Dennett believes that the notion of Cartesian dualism which states that there is an area in the brain where "all of the different phenomena comes together" is an ill founded and one of the most tenacious ideas of our time. The multiple drafts model is in fact put forward by Dennett as a replacement for the Cartesian theater where "it all comes together". The multiple drafts model avoids falling into the traps of believing in a single, unified stream of consciousness; on the contrary it proposes that instead of there being a single narrative, "There are multiple channels in parallel pandemonium creating multiple drafts" (See Dennett 1991). He also states that "all varieties of perception or thought are accomplished in the brain by parallel, multi track processes of interpretation and elaboration of sensory inputs. Information entering the nervous system is under continuous editorial revision" (Dennett 1991). He is primarily concerned with providing a philosophy of mind which is grounded purely on empirical research. Therefore, Dennett also tries to explain the first person phenomena through the third person phenomena. Hence, it is but natural for him to have presented various arguments against qualia or subjective experience which makes him a direct adversary to the dualists, mainly David Chalmers. Dennett also ridicules the hard problem of consciousness as proposed by Chalmers and considers the problems associated with consciousness as "illogical and unfounded".

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