Review Article International Journal of Science and Consciousness
Access online at: www.ijsc.net July 2015, 1(1), 1-6

Physiological approach to human consciousness

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Abstract

Consciousness has been taken as a phenomena of alertness or awareness to the outer world, sensory information input as well as inner self. It is exhibited in different forms of behavior. It has been presumed by the philosophers as well as neuroscientist that the processes of consciousness are being operated by brain and it has a definite neural activity involvement. But what are the exact neural correlates of consciousness and how body physiology is linked with the phenomena of consciousness is still not clear. In the present article the views of several Philosophers, Neuroscientists and Physiologist have been quoted and reviewed in trying to understand basic nature and physiological significance of consciousness.

Key words: Human consciousness, Physiology, Mind–body interaction

Article Received: 04-08-2015, Accepted: 09-08-2015

Conflict of interest: None declared

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International Journal of Science and Consciousness (IJSC): a Bio-Psycho-Spiritual approach
Published by: Foundation for Science, Spirituality & Consciousness, Uttarakhand, India

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Introduction:

Consciousness may be defined as awareness subjectivity, sentience, wakefulness and the state of awareness of an external object and also awareness of something within oneself (1, 2, 3). It may also be expressed as any such thing making ability to experience or to feel with executive control system of mind causing optimum control over mind – body communication system (4). In early clays consciousness was viewed with skepticism by several scientists but in recent times it has been become a focal theme research in medical physiology, neurology and neurophysiology. The main emphasis is now on to understand the neural and physiological correlates of consciousness in relation to human health. In modern medicine the state of consciousness is being evaluated in terms of level of arousal and responsiveness, alertness and comprehension, meaningful communication and response to a particular stimuli (5). In physiological view consciousness is taken as a unitary concept which is being understood by a kind of intuition by majority of people, while few are of the opinion that it is beyond simple intuition (6).

Types of Consciousness:

Ned Block has classified consciousness in two categories. (I) Phenomenal (P- consciousness), (II) Access (A – Consciousness (7). P – Consciousness, according to Block, is simply raw experience: it is moving, colored forms, sounds, sensations, emotions and feelings with our bodies and responses at the center. These experiences, considered independently of any impact on behavior, are called qualia. According to him A – consciousness is the phenomenon where by information in our minds is accessible for verbal reports, reasoning, and the control of behavior. So, when we perceive, information about what we perceive is access conscious; when we remember, information about the past is access conscious, and so on. Daniel Dennett has disputed this categorization and Daniel Chalmers has produced the argument the A – consciousness can in principle be understood mechanically but understanding P-consciousness is rather more challenging task and he named it the hard problem of consciousness (8, 9). William Lycan stated eight types of consciousness namely organism consciousness, control consciousness, state dependent consciousness, reportability, introspective consciousness, subjective consciousness, self consciousness and consciousness of (10). Even this nomenclature goes on without any significant distinction.

Mind – Body Interaction and Consciousness:

It may be observed that consciousness resides within a specific immaterial domain, termed as arena of thoughts which is invariability linked with domain of material things. These two domains, in reference to human being, may be termed as mind body duo. Interaction between these two domains occurs inside the brain which is a vital organ of human body. This shows that consciousness is closely related to mind-body communication and interaction process. Some philosophers as well as scientist from Physiology discipline feel that consciousness could be well explained in purely physical and physiological terms, that is why most modern influential physical theories of consciousness are based on physiology and neuroscience (11-13) by elaborating the fact that most of the events related to consciousness are the sum total of neural events occurring within the brain. At the same time, computer scientists working in the field of artificial intelligence have pursued the goal of creating digital computer programmes that can simulate or embody consciousness (14). A few physicists have advocated that traditional physics seems incapable of explaining the holistic aspects of conscious. They opines that quantum theory of consciousness may provide the missing ingredients (15). Some of these quantum theories although offer very limited description

of phenomenal consciousness, as well quantum interpretation of access consciousness but none of such theories have been proved by experimental evidence.

Major scientific studies related to consciousness consists of those which examine the fundamental relationship between the subjective experiences and simultaneous activity taking place in the brain which may be termed as the neural correlates of consciousness. It may be an optimistic approach to detect vivid activities in a part of brain attributed to conscious behavior. This may be substantiated by evidence obtained by using several brain techniques such as EEG and fMRI (16). A new concept has drawn the attention of scientists that consciousness is associated with high frequency oscillation in brain activity which may be linked with information in different parts of the brain into a unified experience called consciousness. Modulation of neural responses may correlate with phenomenal experiences. Such modulation responses may surprisingly correlates with fragmented electrical responses well with an important aspect of consciousness i.e. phenomenal experience of stimulus intensity. Subjectively perceived experiences may correlate with the modulation of firing rates of neurons while few others may correlate with the modulation of neural synchrony (17). An fMRI investigation suggests that such correlation may be very limited up to primary visual areas where changes in firing rates and synchrony can be considered as neural correlates of *qualia*.

States of consciousness:

There are some brain activities in which consciousness seems to be absent, including dreamless sleep, coma, and death. There are also a variety of circumstances that can change the relationship between the mind and the world in less drastic ways, producing what are known as altered states of consciousness. Some altered states occur naturally; others can be produce by drugs or brain damage (18). Altered states can be accompanied by changes in thinking, disturbances in the sense of time, feelings of loss of control, changes in emotional expression, alternations in body image and changes in meaning or significance (19).

The two most widely accepted altered states are sleep and dreaming. Although dream sleep and non-dream sleep appear very similar to an outside observer, each is associated with a distinct pattern of brain activity, metabolic activity, and eye movement; each associated with a distinct pattern of experience and cognition. During ordinary non-dream sleep, people who are awakened report only vague and sketchy thoughts, and their experiences do not cohere into a continuous narrative. During dream sleep, in contrast, people who are awakened report rich and detailed experiences in which events form a continuous progression, which may however be interrupted by bizarre intrusions (20). Thought processes during the dream state frequently show a high level of irrationality. Both dream and non-dream states are associated with severe disruption of memory: it usually disappears in seconds during the non-dream state, and in minutes after awakening from a dream unless actively refreshed (21).

There has been some research into physiological change in yogis and people who practice various techniques of meditation. Some research with brain waves during meditation has reported differences between those corresponding to ordinary relaxation and those corresponding to meditation. It has been disputed, however, whether there is enough evidence to count these as physiologically distinct states of consciousness (22).

Neural Elements of Consciousness:

The researchers from neuroscience have made sincere efforts to investigate that how perceived information is being transferred inside the brain. They have classified the whole process in two parts – (1) step by step acquisition of sensory inputs, to memorize all

those information. In fact all the signal coming from sensory organs are converted in the brain in its original form where it is analyzed and then stored in one way or other, (2). Thereafter at a particular junction those are brought from the memory chamber and constitute a level of awareness called consciousness. Memory consolidation leads the integration of information thereby promotion of consciousness (22). Despite the large amount of information available, the process of perception and its final culmination remains mystery. A great deal is the known about the signal processing through sensory organs, but how such sensory inputs interact each other and then that interaction is being deal by cerebral cortex (particular frontal part) are yet to be clearly understood (23). Several researchers have opined that may a times information is distributed across the brain and being expressed in the form unified consciousness (24).

From medical science point of view consciousness bears a practical orientation only. These it is linked with the treatment of those patients whose brain function has been impaired because of any disease, physical damage to brain, toxins and any drugs. Medical approach to consciousness focuses on the amount of alertness an individual bears. In medicine consciousness is being assessed in terms of awareness ranging from full alertness, semi consciousness, unconsciousness, coma and brain death. Consciousness has also been a matter of concern for both doctors and patients. Physicians and surgeons may perform several interventions related to consciousness and patient need to bear those interventions such as sleep and anesthesia, similarly neuroscientists undertake the evaluation of level of consciousness in the patients suffering from impaired conscious level with the hope of gaining information about the pathway of brain function (25).

Consciousness can be altered by changes in the structure or chemistry of brain. Hence, it may be inferred that consciousness is a physiological function, just like other behavior. We can speculate about the origins of this self-awareness to go simultaneously. Under the ambit of split brain concept the parts of brain involved with perception are also associated with the parts dealing with behavior and all jointly responsible for the state of consciousness (26).

Consciousness is the subject of mind and brain is the seat of so called subjective mind (27). It is difficult to answer the puzzle of mind–body communication leading to various states of consciousness. Physiological psychologists are trying hard to study the human nature by adopting empirical, practical and monistic approach. Once we understand fully the working nervous system, the mind –body communication will be automatically resolved. Then we will be able to explain how we think, remember, act and behave, that will be the final answer to various questions to consciousness. In any event there is no way to study the nonphysical phenomena of consciousness in the laboratory. All that we can assess with the help of physical world–matter organs and laboratory equipment are the manifestations of physical world – wealth and energy.

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Cite this paper as: Mishra, J.P.N. (2015). Physiological approach to human consciousness. ***International Journal of Science and Consciousness*****; 1(1): 1-6.**