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Neural Correlates of Self and its Dissolution: A Neuroanthropological Study

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Abstract: Neuroanthropology looks for the comprehension that what culture means for our brain and furthermore the way in which brain shapes our way of life. This is an understanding of human culture via neural pathways.From theperspective of Indian contemplative practices, the elucidation of Self (I-ness) is firmly established. Recent developments in neuroscience have improved our knowledge of how the Self develops and how it interacts with the outside world. The development of human selvescan be explained in neural terms. The self-dissolution that is the main goal of the contemplative traditions can be comprehended from a neuro-scientific perspective.

Keywords: Neuroanthropology, Contemplative Practice, Self, Attention.

Introduction

The study of the relationship between socio-cultural paradigms and the human brain is the subject of the relatively new field of study known as neuroanthropology, which combines cognitive sciences and anthropology as a method (Wajman, 2018). Many scholars have argued in favour of collaboration between anthropology and neuroscience(Mason 2005; Dominguez 2007, 2012, 2015; Brown and Seligman 2009; Losin et al. 2009; Dominguez et al. 2009, 2010; Campbell and Garica 2009; Dias 2010; Northoff 2010; Lendeand Downey 2012a, 2012b;Vidal and Ortega 2017; Gardner et al. 2018).

Dominguez (2007) argued for the integration of anthropology and neuroscience within the discipline of neuroanthropology, which he defined as"the study of the experiential and neurobiological aspects of cultural activity".

Neuroanthropologists argue that by focusing on nervous system enculturation, neuroanthropology illustrates unique research questions, providing more solid ground for anthropological theory and opening up opportunities for interdisciplinary collaboration (Seligman and Brown 2010).

Over the last 60-70 years, contemplative practices such as meditation and mindfulness have received a great deal of attention from academics, researchers, and the general public, and have gained a lot of popularity in various ways. The scientific community is becoming increasingly interested in these practices because they are linked to well-being (Deolindo et al. 2020).

There's no doubt that science has changed the way people see themselves in many ways during last one and half century. Developmental psychology, immunology, information theory, cell and molecular studies, reproductive technology, genetic engineering, synthetic biology, epigenetics and microbiology has given different forms to identify the biological self, from IQ to the distributed self (Silverstein and Rose 1997; Wolputte 2004; Comfort 2019).

In scientific writings the terms "consciousness", "mind" and "self" are used interchangeably. Consciousness is considered as waking awareness, mind as a brain and self is still in question. Most of the time word Sanskrit term "Atman" and Pali "Atta" is translated as "self" which refer to eternal self or witnessing consciousness in Indian Yogic system (Fasching 2010). In present paper the term "Self" meant for the distinct sense of "I-ness" that every person experience throughout their lifetime.

One of the most astonishing outcomes of being human is having a self that I am aware of. Except for humans, there is no indication that any other species' members are able to imagine how others would perceive them even though there are an increasing number of species that can successfully complete the mirror test of self-recognition (Edwardes 2019).

The I, Me, and Mine are the three elements that make up selfhood (Thompson 2015). "I" refers to the individual who, at that precise moment, believes that he is a "self". It exists physically and is capable of feeling, being aware of, knowing, acting, and taking on various roles. "Me" refers to the subject's own self. Events happen to me on a physical and mental level. "Mine" represents our clinging, greedy, and possessive selves. All personal ideas, judgements, and body parts are "Mine" (Austin 1998, 2006).

"Each individual, regardless of location on the planet, is actually hard-wired to view their own self not just as a simple hub, but as the entire physiological axis around which the rest of the world revolves" (Austin, 1998). Much of this result from a single, basic fact that the sites representing our own sovereign physical self are created to receive greatest priority as sensory impulses enter the brain from outer realm (Austin 2009).

Self can be described on two levels – one at physical and other at mental level. These two elements of the self were best described by two Greek terms – Soma and Psyche. Soma alludes to the body, which is its observable physical representation. The term "psyche" describes the mental aspects of the Self. This crucial contrast between physical (tangible) and mental (intangible) attributes are also reflected in the functional anatomy of the brain (Austin 2014).

The Neural Foundation of Self-formation

It is considerably important that we are not born as selves, but have to learn to be selves (Popper and Eccles 1985). From the deeper subcortical levels to the superficial cortical levels, nerve cells and circuits serve as building blocks for the self's gradual construction. Our adult selves are housed within vast, dispersed nerve networks. They code for a sensual physical body, feel visceral needs, think, know, and act in this world, remembering the past and imagining a future from it (Austin 1998).

Minimal consciousness is the characteristic of a newborn baby. The beginning of neural underpinnings of a newborn's primitive self initiate in deep midline regions and extends from midbrain up into the diencephalon. A new born simply display basic leaning or avoidance responses to pleasure or pain.By the end of a year, child corresponds to recursive consciousness, the next level of consciousness, she starts perceiving, recognizing and labeling her early autobiographical experiences by pointing towards objects and expressing few words. By the age of 18 months and 2 years arrival of symbolic thought emerges as an obvious self-consciousness. The child starts recognizing her own self in a mirror, uses personal pronouns and expresses shame and other self-consciousness feeling (Austin 2006).

The visual cortex at the back of the brain wrinkles first in the foetus. After that, it favors the visual paths that precede it. When a baby's brain is just three months old, the earlier nerve fibers that lead to the visual

cortex are covered in white layers of fatty insulation. The infant's white matter matures further ahead in the central region between the parietal and frontal lobes only at eight months (Dietrich et al. 1988).

Our brains can remain immature for as long as a year (Austin 1998). It still lacks the personal because it can only convey the basic framework of our personal identity. Our long subcortical association pathways eventually connect all of our lobes around the age of 18 months. We can now tell the difference between "me" and "you," between self and others (Anderson 1984; Austin 1998).

We begin to act self-consciously sometime between the ages of fifteen and twenty-four months. We also begin to project our own mental states onto other people around the age of two. The majority of the brain will have finally covered its insulated wiring by the end of that first decade and both hemisphere gets well connected.Deep inside us we start becoming aware, from our childhood, of a persistent self as personal imperative. This self, begin with a physical nucleus, arising from sensations from our head and throat, surrounded by a vague layer of the thoughts originates in our central person superimposed next by self-feeling, self-esteem, self-seeking and self-preservation. Our skin serves boundary between inside and outside, and much thicker than skin we as a children setup the barrier of self and other (Austin 1998; Bahrick et al. 1996).

The child becomes familiar with his surroundings; however, the most significant things in his environment are people. He eventually realizes that he is a person himself because of people's interest in him and knowing of his own body (Popper and Eccles 1985). We build our personal self on countless memories and associations and attach our sentiments by extending it as possessive and reminiscencing selves (Austin 1998).

Our brain stems are where a large portion of this early, unconscious, bodily self-centering is first developed. The midbrain, which is its top level, receives input from the accessory optic system. The pons immediately receives information from the vestibular system below it, whereas proprioceptive signals from the head and neck muscles enter the brain stem on several levels. Finally, after going through the cortex, thalamus, and midbrain, these hidden, axial components of our sensate physical self start to make their way into consciousness. Other sensory messages that are encoded for more subtle aspects of our physical self are located higher up in the brain (Strehler 1991).

The brain will eventually connect several networks at such higher levels, combining our concepts of self into a "omniconnected anatomical structure." We are eventually able to combine the aspects of our sensorimotor self with those of our thinking, knowing, emotional, and psychic selves inside these ensuing huge distributed networks (Strehler 1991; Austin 1998).

Inborn disposition and social experiences are component of making a self. A newborn child has many tendencies and ways, inborn and to be develop, of acting and responding, among these is a tendency to develop into a person conscious of himself. But without social interaction a human child cannot attain a full consciousness of self (Popper and Eccles 1985, 111).

Attention Network and Processing of Self

Our attentional system, divided into dorsal and ventral, carry important implications for our perception of the world through our body. Primary somatosensory cortex, lies behind the central fissure and in front of the parietal lobe, receives sensation relays from the body parts and determines its location in the space. Somatosensory association cortex articulates all the sensory messages arriving from different body parts resulting in a three-dimensional personalized construct. Posterior intraparietal sulcus (pIPSUL) module of

the brain with the frontal eye field (FEF) module makes the dorsal (top-down) attention system. This attention system works when we see thing to our near space. Temporoparietal junction (TPJ) and the inferior frontal gyrus (iFG) makes the ventral (bottom-up) attention system for seeing distant object or upper part of the space. Inferior frontal gyrus (iFG) with middle frontal gyrus (mFG) are regions of executive overlap helping the integration of the functions of the two subdivisions. This manages the sudden shifting of attention. Outside regions of our brain represent our physical body while networks along inside surface of the brain represent our autobiographical functions of the self (Simpson 1984; Fox et al. 2006; Austin 2014).

There is never a blur when our head and eyes move. Instead, the brain's auxiliary optic system instantaneously recognizes and adapts to the way every new visual image from the outside world continues to stimulate the retina. Such unnoticed, spontaneous visual procedures support our ingrained belief that we have a distinct physical self. This visual system is enhanced by our vestibular system. It communicates with us through the inner ear, telling us about our movements and the pull of gravity. The aforementioned cues typically serve as more than just a means of maintaining our head and eyes in place. We view them as evidence of our existence (Simpson 1984; Austin 1998, 40-41).

Dissolution of Self

Our psyche's omni-self appears from a bigger matrix of networks. There are various anatomical levels where they are present. Nevertheless, two significant cortical regions, the medial prefrontal cortex (mPFC), in front and very large part of the medial posterior parietal cortex, do the fundamental higher processing tasks that are associated with the majority of our individual psyches (Austin 2006, 2014; Kim and Johnson 2012).

Thalamus and its connectivity with limbic and cortical regions of the brain are crucial in the understanding of self-related processing and its disintegration. The pulvinar is the largest thalamic complex in humans, which is also widely connected to the cerebral cortex and contribute to larger human attention-controlling network (Barron et al. 2015). The angular gyrus and the pulvinar also have specialised functional connections. When we focus our spatial attention, these are especially enhanced (Buchsbaum et al. 2006). The significance of the pulvinar's signals in shaping our limbic system's habitual emotional processing is further emphasized by its separate projections to the amygdala and cingulate cortex (Young et al. 2007). There are two main divisions of subnuclei in the pulvinar and many of the pulvinar's regular operations are also divided between these two major, ventral and dorsal, groups of subnuclei and resembles previously mentioned similar functional divisions of the cortex for attention (Austin 2006).

With regard to the representations of the Self and Other, it is especially interesting. The dorsal thalamic pulvinar and cortical interactions enable us to act in the outside world. The ventral other-referential stream connects with the inferior pulvinar. Along the dorsal tier of the thalamus, there is a distinctive cluster of thalamic nuclei. They align themselves directly in front of the lateral posterior nucleus and pulvinar. A variety of impulses rising from limbic system influence emotional responses of the cortex and processed here in limbic nuclei of the thalamus (Simpson 1984; Austin 2006, 2009).

Resulting thalamocortical interactions assist us in creating and storing numerous self-relational memories. These narratives remain deeply ingrained in our psyches, being primarily represented at subconscious

levels. Without our knowledge, they easily distort our perceptions of reality and drive us to undesirable attitudes and behaviours (Austin 2006; 2009).

An omni-self like this can get rid of its self-centered bias, free itself from the compulsions imposed by its over-conditioned limbic system, and become more selfless.Gamma aminobutyric acid (GABA) is brain's inhibitory neuro transmitter that keeps in control the excitatory processes of the nervous system. It is responsible for the one third of synaptic transmission and is part of 40 percent of nerve cells population (Austin 1998, 208-209; Ochoa-de la Paz et al. 2021). Contemplative practices increase GABA level in the brain (Guglietti et al. 2013, Krishnakumar 2015).

It is important to understand the role of GABA in thalamus. An inhibitory gate thalamic reticular nucleus (TRN), a shell-shaped GABAergic nucleus, surrounds the thalamus.The GABAergic Nucleus receives thalamocortical and corticothalamic inputs and transmits inhibitory efferents to all dorsal thalamic nuclei (Ferrarelliand Tononi2011). GABA nuclei with two smaller nuclei, zona incerta and anterior pretectal, can exert a strong, selective influence that interferes with the activities of the higher-order thalamic nuclei. The oscillations that typically flit back and forth between the cortex and the thalamus can be altered by their inhibitory functions (Austin 2006).

"In a variety of ways, many practices help diminish the upsetting impact that unwholesome cortico - limbic emotional reverberations can have on the normal operational integrity of our psychic and somatic self" (Austing 2014). Contemplative practices apply a comprehensive approach in its long-term meditative training. Our physiological predisposition has been to maintain a constant tilt toward displaying our most self-centered activities in our two frames of self/other reference. By selective inhibition of thalamo-cortical and thalamo-limbic impulses through contemplative practices our inner compass could now deviate from its usual polarised, self-referential inclinations. The new mental field could now expand into what appears to be a brand-new dimension of other-consciousness rather than maintaining an attitude that directs all communications inside, into a self-centered awareness. This new state of consciousness seems to be able to perceive clearly and directly at this point. It has been cleansed of any previous limbic linkages connected to the old, over-conditioned I-Me-Mine that were maladaptive.

In another approach the contemplative practices directly affect our attention system. On its parietal trajectory, our egocentric processing stream overlaps with our dorsal attention system's functions and allocentric stream with ventral attention pathway. The nature of this other or allocentric frame of reference is more global. The lower occipital region is where its visual path begins. It flows into the lower frontal lobe after passing through the temporal lobe. The right temporo-parietal junction and the right inferior frontal gyrus house the main modules of this lower attention system. Right temporo-parietal junction works as a circuit breaker. It can disengage attention from its previous topic. Once detached, attention can shift automatically in the direction of the reprocessing of the subsequent, more prominent stimulus. The areas that participate in our Self-centeredness and those that represent our attention typically have an inverse relationship. On activation of external attention networks, self-referential regions get shut down. Innermost frontal and posterior parietal regions get deactivated when our attention system activated (Fox et al. 2006; Austin 2014).

Unhealthy cortico-limbic emotional reverberations can have a negative impact on the normal functioning integrity of our psychic and somatic self. Contemplative practice helps us recognize how our everyday thinking is stirred by the randomness of expanding associations and abstractions of thoughts. This

nonstop mental chatter revolves around the dichotomy of self and other centered concerns.It doesn't allow much time for calm, precise reasoning. Contemplative practice helps in developinga distinct consciousness that transcends all unreasonable thoughts and irrational worries.

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