

Neural Correlates of Religious Experiences: A Systematic Review

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ABSTRACT

Religion and religious beliefs have always been a matter in which great philosophers, thinkers, academicians and researchers have taken great interest since antiquity. A lot many theories have been given different thinkers for development and continuation of religion. After the Industrial Revolution, it was thought that in this modern world religion will slowly and gradually be done away with. However, it is not the case. Many researches have also pointed out to the role of some brain structures in human beings developing religious beliefs and the idea of supernatural being. From philosophical speculations, the focus has now moved to employing scanning techniques to identify brain areas associated with religious experiences. The paper mentions some of the most sought-after researches in this area and tries to paint a holistic picture. Future suggestion for the readers is to replicate these researches on people who follow non-Abrahamic religions, some Naturalistic type of religions and on Atheists.

Keywords: *Neural correlates, Religion, Brain areas*

Around 88-93% of the world population believes in God.^[1] (Zuckerman, 2007) Religion is one of the most prominent features of the modern human's life, even though many scholars and thinkers had propounded otherwise. Marx^[2] and Freud^[3]—along with innumerable anthropologists, sociologists, historians, and psychologists influenced by their work—expected religious belief to wither in the light of modernity.

The presence of religion in all of the cultures indicates that it is something that comes intrinsically to us as a species. This question has baffled academicians for a very long time. Boyer explains this phenomenon by considering some cognitive faculties that predate religion. This means that our brain has some structure(s) that made us develop religions and makes us believe in superior entities.^[4]

A great deal of experiments proves that children, even when not fed with the thought of presence of a God, develop some idea of a God on their own.^[5]

Hood postulates the presence of a cognitive schema which he calls supersense. This supersense helps us generate the idea of supernatural, which gets further nuanced by the culture that one is a part of.^[6]

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Received: June 17, 2024; Revision Received: October 30, 2024; Accepted: November 04, 2024

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The evidence of this Cultural modification can also be validated with the work of Margaret Evans, who, in her studies, found that irrespective of the upbringing, children are more likely to give a creationist view of natural things than their parents. ^[7]

In the Indian school of thought, religion is different from what has west conceptualised. The Indian Dharma is not an apt translation of the word religion, as Dharma focuses more on righteousness and fulfilment of one's duties that one ought to perform in different spheres of one's life. Belief and Knowledge are not two separate entities in such schools.

In West, however, there is a sharp cleavage between thoughts and beliefs. Descartes (1641) professed that knowledge is greater than belief as knowledge is based on rationality. ^[8] Hume (1711) on the other hand, says that both knowledge and belief stem from human experiences that are subjective in nature. ^[9]

Britton (Britton, 2010, p. 197) 2003 suggests that human beings acquire strong beliefs through the process of acculturation. Collective states of mind are more powerful than individual ones, as groups can adopt extreme positions. ^[10]

DISCUSSION

There can be many approaches as to how a researcher wants to examine the neurology of religion. This can be based on many factors such as observations, personal experiences and previous scholarly works.

Many studies have found that prayers can lead to a decrease in neural functioning of certain brain areas. Consider this study by Newberg et. al. (2002). They found that spiritual practices slow down the neural processing, in a way creating a temporary lesion in the cortex. They proposed three stages of the neural impact that meditative practices have. They are-

- Attention activation in Dorsolateral Prefrontal Cortex – This leads the activation of Lateral Prefrontal Cortex – This in turn leads to the arousal of Mesolimbic Cortex and diminished processing in Posterior Superior Parietal Lobes. ^{[11] [12]}
- This diminished processing is what has been termed as 'temporary lesioning'.
- In a study using SPECT technique on 8 Tibetan monks Newberg et al found the activation in Dorsolateral Prefrontal area- a region associated with abstract reasoning and top-down attention.

Benson et. al. (1990) found that meditation and prayers are associated with a fall in metabolic rate, enhanced activity in the right hemisphere, and an overall in beta activity. Based on these findings, he deduced that the effects of meditative practices and prayers ultimately lead to relaxation. ^[13]

Dewhurst and Beard (1970) attempted to identify the seat of religious experiences in the human brain. They, in their observations, found that patients with Temporal Lobe Epilepsy have powerful religious experiences. They concluded that such disturbances of the temporal lobe in healthy brain provides a base for strong religious convictions. ^[14]

Michael Persinger, a Canadian neuroscientist attempted to test this hypothesis. In his experiment to verify this claim, he employed a method of magnetic stimulation that hampers with the neural pathways in non- pathological subjects.

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In one such trial, 80% of the participants reported to have sensed something peculiar. ^[14] However, Persinger's claims were refuted by Granqvist (2005). He repeated the experiment but with two alterations. First, he had a control group, and second, he did not tell the subjects that what exactly is being assessed. He came to the conclusion that Persinger's results were obtained because of researcher's biasness. ^[15]

Six Christians and six non-religious subjects were studied by Nina Azari et. al. (2001) using Positron Emission Tomography (PET) scanning technique. The scan was done under four conditions-

- Recitation of Bible
- Recitation of a children's rhyme
- Recitation of a neutral text
- Rest

The religious subjects showed higher activity in dorsolateral prefrontal regions during Bible recitation as compared to other conditions. ^[16]

Sam Harris et. al (2009) used fMRI technique to assess changes in brains of 30 subjects- 15 devout Christians and 15 non-believers. The task they were given was to evaluate the truthfulness of falsity of some religious and non-religious statements.

Their finding was surprising in the sense that the difference was not observed was not on religious lines but in terms of belief or disbelief. ^[18]

They found that for both the groups and both the categories- the brain region associated with belief was ventromedial prefrontal cortex. This area is also associated with behaviour that propels one to achieve goals. ^{[19] [20]}

Using the findings of this study, it can be concluded that religious beliefs are not any different, at least on a neurological level, from other beliefs that we firmly hold.

Lazar et. al (2005) assessed the thickness of cortex of 20 participants who practiced insight meditation. The data was compared with non-meditating subjects matched on age. ^[21]

It was found that regions in prefrontal cortex and right anterior insula had more cortical thickness in meditating group. This is in line with the concept of Neuroplasticity. The part of brain that we use more changes structurally. Functional changes lead to structural changes in the brain. ^[22]

Such alterations are associated with changes in the dendritic arbor, spinal density, number of synapses, size of the synapse, cortical representation, structural thickness and grey matter density. ^[23]

In a study Beaguard and Paquette (2006) used fMRI to find neural correlates of religious experiences in 15 Carmelite nuns.

The scanning was done when the participants were made to remember experiences of oneness with God and unconditional love. Non- religious subjects were, on the other hand, asked to remember joyful memories.

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The scan for nuns showed heightened activity in orbitofrontal cortex, temporal cortex, anterior cingulate cortex, superior parietal cortex, inferior parietal cortex, caudate nucleus insula, medial prefrontal cortex and brain stem. [24]

Schjoedt (2009) did a study on young Danish Christian Protestants and found that they employ those areas of brain which are used in areas of socio-cognitive processes during their personal prayer. This implies that praying to God is an intersubjective phenomenon akin to our day-to-day interpersonal interactions. It provides an awareness about theology, wherein the Christian principles on God's nature inculcate concepts as God's omnipresence, omniscience, omnipotence, the Trinity and the Holy Spirit. Interestingly, in terms of brain function, their findings suggest that in the perception of the participants, God is like another person, and not like a supreme being. [25]

Limitations And Future Implications

The studies that were found during the process of review are more often than not focused on religious people of Christianity. However, religions such as Hinduism or other locally followed religions whose doctrines differ from Abrahamic religions have a completely different way in which the devotee associates herself/ with the God. Then there are religions that worship natural elements such as rain and Sun. Followers of such religions are distinctly different from the religions which have a notion of supernatural God because they are in constant touch with what they worship. They have a more visceral connect.

So, the further studies can focus on these religions and see what brain areas are related with their religious experiences.

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Conflict of Interest

The author declared no conflict of interest.

How to cite this article: Singh, M.V. (2024). Neural Correlates of Religious Experiences: A Systematic Review. *International Journal of Indian Psychology*, 12(4), 894-898. DIP:18.01.083.20241204, DOI:10.25215/1204.083