

The neural correlates of religious experience

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ABSTRACT McNamara's claim that there is overlap between the brain sites implicated in religious experience and those implicated in the sense of self and self-consciousness rests on two postulates: (1) that the "executive Self" can be identified as a neural entity in specific regions of the brain; and (2) that the neural correlates of religious experience can be identified as a consistent set of activations in these regions. Although McNamara is clearly well informed in terms of functional neuroanatomy, he fails to make a convincing argument for his first postulate regarding the existence of the self as a controlling entity at the neurological level. This is unfortunate because his claim that religious experience decenters the self from its control over body and cognition in order to contemplate and optimize the self rests on this assumption. Furthermore, with respect to his second postulate, since the data currently available do not afford a description of religious experience as a uniform category, it is difficult to see how this evidence can support McNamara's general understanding of the nature and function of religious experience. McNamara may be right that some religious practices are intimately related to the transformative processes of the self, but only future studies can tell whether this idea can be supported by the neurosciences.

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In the preface to his book *The Neuroscience of Religious Experience*, Patrick McNamara opens with the intriguing proclamation that his theory is based on the finding that there is "anatomical overlap between the brain sites implicated in religious experience and the brain sites implicated in the sense of Self and self-consciousness" (McNamara 2009: xi). It is this anatomical overlap that explains how religious experience can facilitate the transformative process of the self. Therefore it is fair to assume that the evidence presented in his chapters on the neurology of the self and of religious experiences are crucial for his argumentation. McNamara's notion of anatomical overlap rests on two postulates: (1) that the self can be identified in specific regions of the brain as a neural entity; and (2) that the neural correlates of religious experience can be identified as a consistent

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set of activations in these regions. Let us therefore take a look at McNamara's neural evidence to see how well these postulates are supported.

55 **The neurology of the self**

McNamara begins his chapter on the neurology of self with two important insights. First, the self seems involved in virtually every higher-order function. Second, the nature of the self is largely unresolved. These insights are strongly supported by his review on the neuroanatomical regions implicated in self processing, which show that self-related processing is associated with activation in very widely distributed neural networks including the anterior temporal and prefrontal cortex (McNamara 2009: 61). He further points to structures like the orbitofrontal cortex, the anterior cingulate, the insula, and the precuneus in his attempt to identify the neural basis for self-processing. It is not clear how these findings support McNamara's assumption that the self is a neural entity that *controls* rather than simply *consists of* the cognitive functions being processed in these regions. Note that higher order cognitive functions like attention, movement, planning, beliefs, desires, emotions, memories and decoupling, as well as the activation of their neuro-anatomical correlates have all been observed relatively independent of a subject's awareness given the right context and circumstances. This makes their relation to a controlling self vague and unclear.

McNamara specifically points to the right frontal/anterior temporal cortex as especially important for the so-called executive self because lesions in these regions result in behavioural disinhibition and involuntary movements, both aspects that the executive Self would be likely to control. However, the fact that this region is involved in voluntary movements and behavioural inhibition does not automatically point to the existence of an underlying executive Self. Although McNamara is clearly well informed in terms of functional neuroanatomy, he fails to convincingly argue for his postulate on the existence of the self as a controlling entity in the brain. This is unfortunate because McNamara's claim that religious experience decenters the self from its control over body and cognition in order to contemplate and optimize the self rests on this assumption: "The decentering process decouples the self from its control over executive cognitive functions. It takes the Self offline and then repairs it by integrating it into a higher, more complex Self entity" (McNamara 2009: 74).

Nevertheless, McNamara's second postulate, that religious experience modulates the same regions that are involved in self-referential processing, is intriguing and especially plausible if religious experience is understood narrowly, as McNamara seems to do, namely, as an experience related to self-referential processing. Let us take a look at the neural evidence.

95 **The neurology of religious experience**

In his chapter on neurology of religious experience McNamara reviews evidence on the relation between religious experience, brain disorders and functional neuroanatomy. If there is a consistent set of brain regions implicated in religious experience, he argues, "then we can look at what is known about the functional roles of these particular brain regions to gain clues as to the functions of religious experience" (McNamara 2009: 81).

Indeed, if the evidence points to a consistent set of brain regions implicated in religious experience this would be an extraordinary finding, and the functional roles of these brain regions would likely give us important insights on the nature and perhaps even the functions of religious experience. Personally, I feel that
 105 McNamara may be too ambitious here. I do not know of any other culturally transmitted behaviour whose functions have been explained via insights on brain function, and the complexity of religious experience does not make it a likely first candidate. But aside from this concern, let us see if the neural evidence in fact points to a consistent set of neural regions involved in religious experience.

110 McNamara first takes the reader through a number of fascinating clinical case studies that offer exciting evidence on the relation between various brain disorders and religiosity. Again McNamara demonstrates a vast knowledge about the intricate symptoms and mechanisms involved in mental disorders like epilepsy, dementia, schizophrenia and obsessive-compulsive disorder, and his analysis and discussion of these make for enlightening and enjoyable reading. Various
 115 brain disorders influence religiosity in ways that correspond to the abnormal activities in specific brain regions, namely, regions that are also implicated in self-processing. One of many interesting examples of his analysis is the relation between hyperreligiosity and hyposexuality observed in temporal lobe epilepsy. The epileptic seizures release spikes of amygdalar activation that hyperstimulate the right anterior temporal and prefrontal cortex implicated in the executive Self. This hyperstimulation triggers an intense experience of the self in line with
 120 McNamara's general theory of religious experience (McNamara 2009: 90). The overactivation of the amygdala at the same time leads to an inhibition of the hypothalamic regulation of sexual behavior which causes hyposexuality. In support of this interpretation, McNamara notes that the opposite pattern of symptoms can be seen in Klüver-Bucy syndrome, which involves bilateral removal of the temporal lobes including the amygdala.

130 McNamara summarizes the clinical data in a schema of disorders that enhance religious experience in ways that correspond to how they affect regions implicated in self-referential processing, regions he collectively identifies as the "religious circuit". The variety of ways this circuit can activate leads McNamara to a rather simplistic dichotomy of religious experience (McNamara 2009: 106): If the cortical
 135 regions are overactivated you get ideational changes in belief systems, e.g., delusional states, whereas if the limbic and basal ganglia regions overactivate you get increased interest in religious practices, e.g., prayers and rituals. Perhaps a bit surprisingly in light of his theory he further cautions, "Beyond this meager summation, little more can be said with any degree of confidence" (McNamara 2009: 106).

140 He then turns to neuroimaging studies of the healthy brain to see if they reveal insights compatible with the clinical evidence. As he rightly points out this approach is relatively new and lacks systematic effort. Existing studies have measured widely different practices performed by widely different practitioners from widely different traditions. More importantly, many of these suffer from serious methodological and theoretical issues including problems with experimental design, technological limitations, ecological validity, proper controls, problematic contrast and baseline conditions, weak statistics, and controversial interpretations of data (for a critical review see Schjoedt [2009]).

150 McNamara nonetheless concludes from these studies that he sees a strikingly consistent set of brain activations in his so-called religion circuit. Diverse

meditation techniques, glossolalia, recalled mystical experience, formalized prayer and improvised prayer all seem to recruit at least parts of the widely distributed network of regions implicated in self-processing. This should not come as a surprise since many of these regions primarily process cognitive functions that are likely to subserve these practices in very basic ways, e.g., attention, memory, reward and emotion. However, because McNamara believes that these functions are implicated in the processing of the self entity, he interprets the data as support for a specific network that modulates these functions in order to alter the subject's sense of self. In other words, the data supposedly point to a relatively uniform category of religious experience. In my opinion, this interpretation is too speculative.

I agree with McNamara that analysing the brain regions recruited in various religious thoughts and behaviors is a promising new approach to the study of religion which may contribute important insights on the nature and perhaps even functions of particular thoughts and practices. However, the data currently available do not afford a description of religious experience as a uniform category, and I fail to see how this evidence can support McNamara's general understanding of the nature and function of religious experience. McNamara may be right in his idea that some religious practices are intimately related to the transformative processes of the self, but only future studies can tell whether this idea can be supported by the neurosciences.

I also agree with McNamara's concluding remarks about the current state of affairs in the neuroscience of religion:

The adventitious approach to data collection about brain and religion correlates means, however, that no systematic efforts to document relationships between particular brain regions and particular aspects of religious cognition have yet been attempted or accomplished. We have no way of knowing, therefore, whether the clinical and neuroimaging data are giving us a biased picture of the true state of affairs with respect to brain mediation of religiosity. (McNamara 2009: 130)

This is perhaps more true than McNamara admits. He certainly seems to ignore this critical matter of fact in the following chapters where he treats the "religion circuit" as a well-defined network that can be turned on and off by psychoactive drugs and various religious practices (McNamara 2009: 135).

It is my opinion that McNamara's use of neurological data feels awkward at times. He claims that his theory is based on brain function, but his theory has already been fleshed out in the chapters prior to his neurological analyses. In his discussion of the neurological evidence he cautions about its poor current state, but then ignores this fact in the following chapters. I believe McNamara has written a fascinating book which is well worth a read if you have an interest in the psychology of religious experience, but I also believe his theory would stand a lot stronger had he refrained from making too bold claims on brain function, e.g., the self entity, the uniform category of religious experience, and the anatomical overlap between the two.

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