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## Patrick McNamara: The Neuroscience of Religious Experience

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**Patrick McNamara: *The Neuroscience of Religious Experience*. Cambridge University Press 2009.**

The emerging literature on neuroscience and religious experience is thought-provoking, to say the least, and may well revolutionize our understanding of religious experience. The focus in this review will be on religious experiences and the relevant neuroscientific structures and processes, as well as the central claims made about religious experience itself and its relationship with such structures and processes; important work in the book on the 'self', practices and rituals, various concepts of God, ecstatic states and so on, and the things that may be external to, or *follow or flow from*, religious experience, will not be the focus of this review, due to necessary restrictions on length.

McNamara argues that religious experience highlights the relationship between oneself and God: 'self and God are intimately connected at the cognitive and psychological levels' and the 'level of experience can be measured to some extent by looking at brain and cognitive mediation of religious experience' (p. 80). If this is correct, and if religious experience can be understood in terms of this kind of relationship, then neuroscience might illuminate the nature of this relationship. Moreover, if certain regions of the brain are 'implicated' in religious *experience*, then one might find some clues about the functions of religious experience also (p. 81). Now much depends on the question

that is being addressed here. For example, is the highlighting of this relationship an answer to the question of what religious experience is (the nature of religious experience) or an answer to the question of what comprises religious experience or an answer to the question of the functions of religious experience. Much depends too on what *implicated* means; if religious experience involves brain (neural) processes and some thinking, and if brain regions are *implicated* in thinking, then these regions of the brain will be implicated in religious experience, to some extent. But what would be true of the neural processes associated with thinking would not necessarily be true of the religious experience as a whole, since it is an experience that a person reports (not merely an act or process of thinking). Attention to potentially tricky language is crucial.

A number of cases are presented. The suggestion is that the right prefrontal and temporal lobes are 'indeed involved in religious expression' (pp. 87-88). This may be true. But there is some ambiguity again: 'involved' in what sense? (Thinking is a part of religious experience as a whole, possibly, in so far as neural and brain structures are associated with thinking and inasmuch as thinking occurs at some stage in a religious experience; but even so, a religious experience is not the same thing, logically or empirically, as 'religious expression'.) So what is true of 'religious expression' (such as someone uttering the words, 'I love God and God loves me!') need not be necessarily true of 'religious experience', as an experience of this kind often goes well beyond mere 'expression'.

McNamara argues that 'the sense of Self, language meanings, and abstract visual analysis are all handled by the same region of the neocortical networks that gives rise to religious experience' (p. 88). So it would seem that our sense of who we are, the things we say and mean when we speak about this, and 'abstract visual analysis' correspond with (the meaning of 'handled' is not entirely clear here) 'the same region' that 'gives rise' to religious experience. But in what sense does this region 'give rise' to an experience, let alone a religious one?

If 'gives rise' means 'causes' then there seems to be a confusion here between *the* cause of an experience in a subject (which is religious) and a cause of some kind of signalling and processing in relation to the thought processes that may occur when the subject is having the experience itself, if one grants that such an experience can be a genuine one. However, it is difficult to see how observing increased oxygenation or activation in certain brain regions or neural

circuits can show that the signalling and processing are actually, and on their own, 'giving rise' to the experience itself.

The problem here is the slipperiness of 'experience' which the book rarely, if ever, slows; 'experience' normally means encountering or seeing or hearing or perceiving (and so on) something, such as an external object or phenomenon (of course not all religious experiences are like this, but many are, especially in the Judaeo-Christian tradition); the fact that one is having such an experience then does not necessarily mean that neural processes and structures in the brain alone are 'giving rise' to religious experience, and certainly not in the sense of generating the religious experience, for the imaging technologies do not actually *show* this relation in any kind of obvious or clear way. The observer, to be sure, does not *see* one thing *giving rise* to another thing (that is, a religious experience) in this context; what the neuroscientist sees is a pattern of oxygenation or activation (and other such things) for example, in a region of the brain, and then interprets the correlation or correspondence in a certain (pun not intended!) kind of way.

But the precise nature and meaning of the correlation or correspondence is open to more than one interpretation. One cannot deduce from the existence of such a correlation or correspondence that neural signalling and processing, and *only these*, are causing or creating ('giving rise' to) religious experience. A lot more care needs to be taken with the inferential and interpretive steps here in order to avoid leaping to unjustified conclusions. It is important to be more precise and clear at this stage.

McNamara argues that 'the literature on TLE-related religiosity gives us an initial clue as to brain circuits that normally handle religious material — namely, the right sided temporal and prefrontal networks as it is these networks that attach religious concepts to the impulses originating in the amygdala' (p. 93). This may be true but there are significant problems. The question of who, or what, 'attaches' concepts to impulses needs to be explained clearly. One might argue that it is the thinking, reflective subject who 'attaches' concepts to things, or better, employs concepts to make sense of things, even if this is not the whole story about the relation between concepts and impulses or, better, perceptions and more broadly, experience (consider these three difficulties: what do our *observations* tell us about the connection between impulses and concepts in certain networks in the brain, how exactly does a

network in the brain ‘attach’ a ‘concept’ to an ‘impulse’, and what sorts of observations would show this to be the actual process, and the only one or the main one in terms of religious experience?)

McNamara makes an analogous claim: he notes ‘the extent and role of the hippocampus and the amygdale in *creating* religious content’ (p. 93). This is ambiguous; it suggests either that these structures are crucial in ‘creating religious content’ (emphasis added) or that they are primarily responsible in some sense for ‘creating’ such content. But it is not clear what the relation is between ‘religious content’ and ‘religious experience’ (the former could conceivably go well beyond the latter). The question of what ‘creates religious content’ is also unclear: religious experience is ‘created’ in the sense, perhaps, of being brought into being by the unfolding relation between a subject, generally conscious, an event or an encounter (or some such thing) and a grasp or an understanding of this relation, as well as (conceivably) a change in one’s understanding. It is difficult to see how all of this (and more!) can be accounted for only in relation to brain structures and circuits, and neural phenomena. So an important question arises: are the amygdale and hippocampus active because they are ‘creating’ religious content or are they active because ‘religious content’ of some kind is a part of the subject’s unfolding (religious) experience and thinking, or indeed, because (for the purposes of argument) an experience of a religious kind is taking place? In our *observations*, do these structures and their activation correlate with the unfolding of an experience of this kind? This question is not an insignificant one.

McNamara is refreshingly open about the fact that the issue here is ‘hyperreligiousness’ and in ‘patients’ with ‘brain disorders’ (p. 105). After considering religious delusions, mania and so on, McNamara concludes that the limbic system and other structures (for example, parts of the basal ganglia and prefrontal cortex) are ‘the crucial nodes in a brain circuit that mediates religiosity’ (p. 105). There is no attempt here to link rigorously the phenomena of hyperreligiousness associated with some brain disorders, on the one hand, with the phenomena and content of religious experience more generally, which is reported not by patients or by subjects with brain disorders; there is no necessary logical or empirical identity between a patient suffering from a neurodegenerative disease and delusions (who reports having a religious

experience) and a person whose brain functions and circuits are functioning normally, and who reports a religious experience.

A similar question arises a little later. Though it may be true, as McNamara argues (p. 105), that when this circuit 'is stimulated in the right way, you get religious ecstasy' nonetheless the implied analogy between religious experience and religious ecstasy is not demonstrated. So, when the 'circuit is overactivated, you get various forms of religiously tinged aberrations' and 'when limbic and basal ganglia sites play the leading role, you get changes in ritual behaviors as well as increased interest in religious practices such as prayer and other rituals' (p. 106). There is at least one question that arises and it does seem to be part of an emerging but problematic picture: 'religiously tinged aberrations', 'changes in ritual behaviours', 'prayer and other rituals' are not necessary parts of religious experience. To his credit, McNamara seems to be aware of some of the limits here: 'beyond this meager summation, little more can be said with any degree of confidence' (p. 106). Indeed.

McNamara then turns to 'healthy' individuals. He discusses functional imaging techniques (SPECT, PET, fMRI and so on) and the study of brain function in 'normal, living humans' so they might shed further light on 'phenomena considered unique to human beings, like religious behaviours' (p. 107). The studies 'converge on the conclusion that the circuit of brain sites that we identified as crucial for religiosity from the clinical data (orbitofrontal, right temporal, limbic system... the serotonin and dopamine systems, etc.) also appear consistently in the neuroimaging findings of healthy persons performing religious practices. This is a remarkable fact' (p. 127). Such structures 'all appear to undergo increased levels of activation during the religious practice' (p. 127). One can see why this 'fact' seems to be 'remarkable', though it should be noted that the 'fact' concerns 'religiosity' and 'practice', a very broad set of terms, and not specifically, religious experience. One would indeed expect activation levels to increase if one is *practicing* something intentionally and one's brain circuits are functional (for example, a ritual). But what needs to be established is that such *practicing* is necessarily related to, and is a necessary part of the nature of, religious experience.

McNamara offers a welcome 'tentative synthesis' (p. 127). He claims that 'there is a network of brain regions that consistently are activated when a person performs a religious act' (p. 127). There is a 'circuit that mediates reli-

giousness' and McNamara seems to think that there is a correlation between this kind of work and the work of authors who study 'potential brain correlates of religiosity' (p. 129). Their work is based on an 'impressive' body of data on 'temporal lobe epileptics who exhibit hyperreligiosity' (p. 129). These provide models of 'brain correlates of religious experience' and they are all helpful (p. 130). Yet McNamara adds, wisely, 'we need additional data gathering... and model building efforts in this area' (p. 130). We also need a stronger focus on the precise nature of the relationship, if any, between 'religious acts', 'religiousness', 'religiosity', 'hyperreligiosity' and religious experience.

He argues justifiably that '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' (p. 130); but it is also difficult to see how even a better picture could demonstrate that what is true of religiosity in general is also true of religious experience, especially if the study is focussed on brain circuitry and function in epileptics. McNamara repeats a key point (and a key ambiguity re-emerges): there is a 'consistent set of brain structures that modulate religiosity' and when these structures are 'chemically addressed' they may act as a 'single functional unit' (p. 130). But do they 'modulate' 'religiosity' in general, 'mediate' it in general, or just provide evidence of neural correlates of something which may or may not be genuinely 'religious'? There is much to be disentangled.

McNamara turns to the neurochemistry of 'religiosity'. The 'religion circuit' is regulated by chemicals and the activity of neurochemicals in the brain is influenced by a number of things ('Mind', emotion, cognition and so on, p.137). So 'it would not be surprising to find that manipulating brain levels of selected neurochemicals in selected brain sites would yield religious experiences' (p. 137). 'Chemically activating' this 'circuit', then, '*produces*' (emphasis added) religious experiences (in susceptible individuals) that are quite similar to religious experiences 'induced by other means such as devotional practices, ascetical practices, traditional religious practices and so forth' (p. 137).

Well, it is not clear here that it would be unsurprising. 'Traditional religious experiences' do not seem to be 'produced' by chemical activation *alone*. 'Produces' is quite ambiguous here: one could mean some kind of essential causal efficacy or that it is because of chemical activation, amongst other things, that religious experience unfolds; or that chemical activation plays a

fundamental role in its emergence. Not all who have a 'religious experience' claim that their 'religious circuit' is 'producing' it, in the sense of 'causing' it; there is a fundamental confusion here between some external object that acts as a cause (for example, a vision people see or a voice people hear) and some internal (neural) circuit that becomes (more) active during this kind of experience. The question that needs to be addressed here is whether the 'religious circuit' is 'producing' the experience or whether the experience and the corresponding activation of the circuit constitute a demonstrative and *sufficient* causal relationship.

Things are made more problematic when one considers that someone (whose brain circuits are functioning normally) who has an authentic 'religious experience' would not generally say 'the chemical activation of a brain circuit is producing this religious experience that I am now having'. This would sound odd. And they would probably not say: 'to explain and understand this religious experience that I have had, it is sufficient to explain and understand the chemical activation going on inside me at the same time'. This too sounds odd. Such utterances would not mean that they are right, but would mean rather that an understanding of the whole content of the experience and its meaning would go well beyond an understanding of images of their brain or of neural networks and activity. The *conscious, experiential* and *meaning-making* dimensions of the experience combined, if it is authentic, would tend to take us beyond physical structures, neurons, chemicals, chemical activation and brain circuits, and talk of only these kinds of things. In the case of a genuine religious experience, which we, say, witness with functioning imaging technologies, it would also sound odd if that person said: 'this is what I am experiencing now and these are the chemical interactions and neural circuits that are producing it'. There is a risk of committing the fallacy of composition.

Of course, strictly speaking, they/we cannot always know, and the neuroscientist also cannot always know, what a person's 'religious circuit' is doing when some religious experiences occur (for example, on a mountain) or what the precise nature of the relationship is between activated circuits, chemicals and the content of the experience as a whole. If religious experience is, to some extent, an *experience of* something, and if one cannot have an experience of one's own 'religious circuit' under the influence of chemical activa-



tion, then it seems perplexing to claim that religious experience is 'produced' (only or essentially) by mere chemical activation.

The point can be reinforced: if we have a person who has had an authentic religious experience (say, on a mountain in relation to an object, on Sunday), and if we could chemically activate their 'religious circuit' now, it would certainly be surprising to find the same 'religious experience' unfolding. This would suggest that there is more to the initial experience than the mere conjunction of certain chemicals, neural networks and brain circuits. In short, these neurophysiological phenomena would play a role, conceivably, but would not be sufficient for us to give a sufficiently comprehensive causal account of what is 'producing' the experience or what it is that is contributing to the emergence of the experience as a whole. The precise nature of this kind of causality cannot, strictly speaking, be *observed or observed wholly* at the neural or biochemical level, neither by the neuroscientist nor by the person who is having the experience, nor by a witness nearby, when an authentic religious experience is taking place, or even when it is being replicated. So, the proposition that 'the chemical activators themselves in conjunction with certain brain circuits are "producing" the experience' seems not only a little imprecise, but also genuinely underdetermined.

If all of this is correct the role played by chemical activators becomes quite questionable if the focus is on the things that 'produce' the experience. One could argue that the chemical activators are producing an effect (of some kind at the neural level or in a brain circuit) but that effect and the (authentic) religious experience need not be one and the same thing. The effect in question here is a *chemical and physiological* one. It presumably *accompanies* an experience (that is to say, when one observes brain or neural circuits in a subject who is undergoing an authentic *religious* experience, there is some clear evidence of chemical activation taking place though there is no physiological evidence at that moment necessarily that the experience is being understood in a certain way, for example, as a religious experience rather than as a merely irregular one) without a range of external (non-chemical) things (objects, phenomena, relations, communication, and so on), coming into play. It is therefore difficult to see how we can get from the mere fact of a chemical activation to a full-fledged religious experience. If chemical activators alone

are sufficient to *produce* religious experiences, there would presumably be no need for such external factors at all.

McNamara offers a 'provisional model of neurochemical regulation of religious experiences' (p. 143): a religious experience begins with a 'reduction in intentionality or a turning over of the will to God' (p. 143), this reduction is 'transient in normal religious experiences'; after this reduction or suspension, 'images and affects' follow. Their meaning is grasped and 'insight and gratitude/joy' occur (p. 143). He 'contends' that many religious experiences do contain all of these elements, but fails to note that some non-religious experiences do too. It may be true that this kind of model can help one 'link religious experiences with brain sites' and processes, but then again, other (non-religious) experiences can also, so long as they are genuine experiences, have some sort of 'reduction in intentionality', some order of 'images and affects', some meaning and some insight or joy or gratitude, and so on. The elements in the model do seem to be insufficient, and some may be unnecessary. Further work needs to be done to produce a more rigorous model and a deeper understanding of religious experience and the things that make it distinctive.

The reduction in intentionality may have clear neurochemical pathways (for example reduced 'serotonergic activity in the prefrontal and anterior temporal cortices', p. 143) and the suspension of intentionality may correspond with transient reductions in dopamine activity in prefrontal structures 'at the onset of religious experiences'. The task however is not to show that this reduction happens in some cases; the task is to show that it happens in cases where religious experience begins to occur (p. 144). He contends that when the physiological changes are 'extreme', the condition 'mimics psychosis' (p. 144). The strangeness of this observation does not attract deep analysis. The analogy between psychosis and religious experience is not examined with sufficient clarity or rigor; as a consequence a number of questions arise, for example, the suggestion that the difference is a question of degree rather than of kind is quite problematic. Taken literally, it implies that there is a continuum between religious experiences and psychosis in so far as these physiological changes are concerned. But it is clear — and McNamara grasps this point — that not all who have a religious experience have psychosis. (Certainly, the analogy is not demonstrated.) This much is clear because psychotic

states tend to entail a disjunction between the subject and reality (as we know it), and McNamara himself observes the distinction between 'normal, living humans' (p. 107) and their understanding of reality, on the one hand, and psychotic patients and the way in which their understanding of reality differs markedly from the understanding of 'normal, living humans', on the other hand.

Finally, the studies cited by McNamara (from 1975 onwards) often leave something to be desired; for example, they often have less than 35 subjects; many have less than 10 subjects (hardly a sufficient sample from which to draw convincing conclusions about religious experience). Some studies do not examine a religious experience at all, or only a meditative state, or listening to a biblical text or to a 'religious statement', or a recollection (for example, of a 'mystical state'); some examine schizophrenia or 'hyperreligiosity', or prayer. There is some potential for confusion here. There are important philosophical questions that are not really explored: for example, the extent to which a subject can believe that they are having a certain kind of experience, and say so, and yet be mistaken; or the question of whether the subject's experience (and description of it) can be *entirely* a question of bodies, chemicals, (neuro-)physical circuits and structures; and so on. That said though, this is an important book and one of the most engaging and thoughtful studies of its kind. It is to be hoped that a further volume, in which these questions and others can be addressed, will be forthcoming.