

Neurotheology: challenges and opportunities

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Summary

During the last decades of the twentieth century scholars have proposed “neurotheology” as a new subdiscipline of the neurosciences. This article presents a review and discussion of different interpretations placed on neurotheology, and attempts to estimate the extent to which neuroscience is a challenge and/or an opportunity for theology and (for the study of) religion. On the neuroscientific side, neurotheology can be split into a reductionist and a religionist neuroscience of religion. On the theological side, it can be split into apologetic and integrative approaches. The appraisal of these different interpretations and of the relevance of neuroscience for the study of religion is conducted from three points of view: philosophy and theology, cognitive science, psychology of religion and sciences of religions.

Key words: neurotheology; neurosciences; scientific study of religion; philosophy of religion; cognitive sciences; psychology of religion

Introduction

Fuelled by the “convergence of three previously unrelated areas of scientific endeavour” – experimental psychology, comparative neuropsychology, and brain-imaging techniques – neuroscience has been amongst the most rapidly growing areas of scientific enquiry in the late twentieth and early twenty-first centuries [1–2]. This emphasis on the recent rapid expansion of neuroscience is not of course to deny its significant “prehistory” [3–4]. But the rapid development of brain imaging rendered possible the observation of brain activity in a way unthinkable until then. The consequences of this expansion have been spelt out by its practitioners, most famously by Francis Crick, whose “astonishing hypothesis” is framed explicitly as a direct challenge to the legitimacy of non-neuroscientific accounts of the human person: “The Astonishing Hypothesis is that ‘you’ – your joys and your sorrows, your memories and ambitions, your sense of personal identity and free will – are in fact no more than the behaviour of a vast assembly of nerve cells and their associated molecules” [5]. Today, neuroscience seems unescapable if we wish to understand the nature and significance of the human person. It is neuroscience that tells us who we really

are. In order of emergence, these synthetic or subdisciplines include neuropsychology, neurophysiology and neurophilosophy, to which list has recently been added “neurotheology”. The present article will concern itself with this emergent discipline, presenting first a review of the different interpretations placed on it, followed by a discussion of these interpretations from the viewpoints of philosophy and theology, cognitive science and the psychology of religion and religious studies.

Neuroscience: a challenge and/or opportunity for religion and theology

The rise of neuroscience is both a significant challenge and an exciting opportunity for religion and theology. On the one hand, neuroscientific research into the nature and functioning of the brain seems to threaten traditional religious and theological assumptions, especially concerning the soul and religious experience. Conversely, advances in neuroscience seem to offer previously unparalleled resources for the study of religious beliefs and activities, as well as providing both scientific support for theological claims or creative resources for their development. The ambiguity of neuroscience for religion and theology is reflected in the variety of ways in which “neurotheology”, or the application of neuroscience to religion and theology, has developed. The publication in 1984 of an article on neurotheology by a theologian-turned student of neuroscience, James Ashbrook, contributed to rendering the term more popular [6]. The claims of that article were further developed in a book-length treatment [7]. Whilst the term has become widely used, it has not been universally accepted; there is no agreed standard definition, beyond the affirmation that it is concerned with the potential to be derived from bringing neuroscientific research into contact with religious and theological questions. Indeed, even Ashbrook seems uncomfortable with the term: his first use of the word is immediately followed by the disclaimer “for want of a simpler label”. Central to the complexity of the label is the distinction between two types of enterprise, both of which are frequently presented as neurotheology. Firstly, neurotheology can be understood as the neuroscientific study of religious phenomena (beliefs, behaviour and practices) – *neurotheology* as a form of neuroscience. Secondly, however, neurotheology can be understood as neurologically informed theological reflection – *neurotheology* as a form of theology. Within both of these main types further distinctions can be drawn.

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Reductionist or religionist approaches

The neuroscientific study of religion can be split into reductionist and religionist schools [8]. Reductive neuroscience of religion aims to disprove the reality or importance of religion and to replace it with non-mysterious neurological functions (or malfunctions). Typical of the reductionist form of neuroscience of religion is the work of Michael Persinger [9–10]. For Persinger, “God” is simply the name given to a supposed external cause of sensations and sentiments that are, strictly speaking, no more than neurological accidents. The domain of “the religious” is, accordingly, characterised as one that is generated or projected by the brain in order to account for a set of mental activities for which the causes are unclear to the conscious brain. Persinger’s experiments locate “every-one’s religious/mystical experience” in a residuum of a particular biological activity, namely an epileptiform seizure with foci in the temporal lobes, particularly the amygdala and hippocampus. These microseizures involve both positive emotions such as peacefulness and meaningfulness, but also negative emotions like anxiety and fear. Chemical consequences of stress, such as hypoglycaemia, fatigue, hypoxia (lack of oxygen) or anxiety, can trigger such accidents. Persinger maintains that these experiences were critical for the survival of the human species. Faced with the terror of personal extinction provoked by an imminent danger, our ancestors simultaneously had a God experience. During this experience, their fear disappeared and they were ready to die. The central thrust of this approach is clearly to explain religion by revealing its neurological underpinnings. Persinger aims to demonstrate that all religious beliefs in a transcendent Other are illusory. In that perspective, theology has no future.

By contrast, religionist neuroscience of religion is concerned with manifesting the underlying neural bases of religious phenomena – by showing that there is a “genuine” neural occurrence that accompanies such phenomena. This approach is epitomised by the most common interpretation of the work of Eugene d’Aquili, whose experiments with Andrew Newberg on meditating Buddhist monks and Franciscan nuns purport to demonstrate the authenticity of religious consciousness [11]. Using single photon emission computed tomography (SPECT scans), they observe changes in regional cerebral blood flow. The data collected in these studies are images of brain activity at the point in time where the meditators reported reaching religious or mystical experiences. D’Aquili and Newberg unhesitatingly liken these images to “photographs of God” [12]. In contrast to Persinger, Newberg and d’Aquili come to the clear conclusion that religious or mystical experiences are irreducible to other neurological states. Therefore, religious or mystical experiences are not a product of distraught or dysfunctional minds and cannot be explained away as the results of epileptiform seizures or psychotic hallucinations. On the contrary, mystical experiences are observable neurological events which, while unusual, are located in our brain and constitutive of its abilities. According to Newberg and d’Aquili, it is possible to provide a map showing which parts of the brain are active or passive during self-reported mystical or religious experiences. These experiences occur when the hippocampus

blocks neural flow in the parietal lobe and consists of unitary sensations with loss of the differentiation between self and non-self. Despite their opposite view to Persinger concerning the neurological specificity of religious experiences, Newberg and d’Aquili, like him, are determined to replace theology with the new scientifically real understanding of religion achieved through neuroscience. Theology is unscientific and hence must be replaced by the new discipline of neurotheology, considered as neuroscience of religion. Religion is to be saved at the cost of theology.

Apologetic or integrative theological approaches

While some scholars understand neurotheology as a subdiscipline of neurosciences, others identify it with a theological interpretation of the data provided by them. This second type of neurotheology can also be further subdivided into the “apologetic” and the “integrative”. For the apologetic approach, the evidence of neuroscience is used to confirm or justify theological claims. The work of James B. Ashbrook, and in particular the book he published with Carol Rausch Albright in 1997, exemplifies this approach, which can be read as an apologetic “natural theology of the brain” [13]. Ashbrook and Albright’s central claim is that the structures and distinctive features of the human brain are descriptive not only of the human mind, but also of our knowledge of God. The study of the human brain (the most complex organ of them all) teaches us that it is “suited to receiving and processing relevant information in other realms of knowledge”. It follows that it is also “suited to perceiving some real attributes of the Ground of Being that undergirds our immediate reality”. In other words, the human brain is able to perceive God’s attributes.

The second theological interpretation of neurotheology can be characterised as the integrative approach. According to this approach neuroscience is to be integrated into its tenants’ theology at a fundamental level in order to enable a creative reimagining of the theological enterprise. The work of Newberg and d’Aquili is also a good example of this approach. Indeed, whilst accepting that as neuroscientists of religion they must maintain a certain theological agnosticism regarding the object of the mystical and religious experiences they have recorded and analysed, they nonetheless venture beyond these limitations and make distinctly theological claims on the basis of their neuroscientific work [11]. They do not stop at the scientific study of neurological processes associated with mystical states; rather, they extend beyond the pure neuropsychology of religion to theological explanations as to what constitutes the core of every religious experience. Central to this more theological dimension to their work is their discussion of what they term “cognitive operators”. Different operators are understood as localised in different areas of the brain. With regard to religious experiences, Newberg and d’Aquili identify two key cognitive operators as particularly important: the causal and the holistic. The causal operator (which is localised in the inferior parietal lobule in the left hemisphere, the anterior convexity of the frontal lobes primarily in the left hemisphere and their reciprocal interconnections) ascribes causal order to sense perceptions, even when the sequence seems alea-

tory. In self-reported religious experiences this causal operator is particularly heightened. In clearly locating the principle of causation within the human brain rather than ascribing it to the divine, Newberg and d'Aquili interpret causal order as a quality of the perceiving mind rather than (or in addition to) a quality of the natural world itself. In doing so, they differentiate theirs from a purely natural theology. Likewise, according to Newberg and d'Aquili, in experiences designated as religious the holistic operator (localised in the posterior superior parietal lobule and adjacent areas in the nondominant hemisphere) is particularly active, specifically in bringing about what are designated as the purest of religious experiences, namely states of so-called "absolute unitary being" (AUB). "As the quiescent and arousal systems both surge, the mind is overwhelmed by simultaneous floods of calming and arousal responses" [12]. This results in the deafferentation of the orientation areas and the loss of the subjective sense of self. Definitive boundaries become dissolved, "without thought, without words, and without sensation" [12]. The state of AUB is understood by Newberg and d'Aquili to be the underlying state of all religious experiences. For Newberg and d'Aquili, theological concepts are not determinative; rather they are derivative from prior mystical experience. That is why new knowledge brought by neuroscience must lead to drastic changes in theology. A new theological discourse must be reconstructed on the basis of a definition of religion which is founded on a neurological knowledge of the mystical mind.

Neurotheology from the viewpoint of philosophy and theology

After this review of different ways of understanding neurotheology, it is time to discuss these different approaches. Religionist neuroscience of religion wishes to "demytify" or (to use a much-abused technical term) "demythologise" religion without in any way denying its value and meaning – indeed the very opposite. From the viewpoint of philosophy it is perhaps interesting to note that the roots of the schism between reductionist and religionist approaches of the neuroscientific study of religion can clearly be seen in the ambivalent reception of Hegelian philosophy of religion, from which so much of the modern science of religion is derived. Whilst it is clearly something of a simplification, it is possible to argue that the left-Hegelians are the initiators of the "reductionist/explaining away" side, while the right-Hegelians embody the desire to bring a greater clarity of understanding to religion by explaining it in terms other than those native to it. Which of these two approaches is true to Hegel himself is, of course, something of a moot point; the more significant conclusion being that this ambiguity is woven into the very foundation of the sciences of religion as they have developed in the nineteenth and twentieth centuries.

Concerning the theological approaches of neurotheology, Ashbrook and Albright's neurotheology comes down to a revived version of a natural theology in which conclusions about the existence and nature of God can be derived from the specific features of a particularly significant aspect of nature – in this case the human brain, described as "far and away the most complex entity known in the universe"

[13]. Far from being the future of a creative neurotheology, this is rather apologetic natural theology of the weakest kind – theology that attempts to reassure itself by finding itself confirmed in the language of science. Continually interweaving neuroscience and theology, they are not so much studying religion from the perspective of neuroscience as using neuroscience as a means of doing their theology. As a result, there are actually very few "revolutionary" theological implications (this is in spite of the bold affirmations to the contrary on the back cover of the book), precisely because what they are writing is above all traditional natural theology, albeit in a new (neuroscientific) key. By contrast, Newberg and d'Aquili, with the introduction of cognitive operators and the notion of absolute unitary being, are speculating – neurotheologically – about what might be the basis of religious experience. It is, in other words, an attempt to think about the transcendent through the integration of neuroscience into theology. However, as Anne Runehov argues, brain scans are unable to detect any object of experience. They refer to neural activity. "In other words, the blue or red or yellow spots that the neuroscientists see on the screen of the SPECT when scanning the brain of a meditator experiencing Absolute Unitary Being or eating apple pie are pictures of *neurochemistry* and not pictures of *God or pie*" [14].

Discussion from the viewpoint of cognitive science

Cognitive approaches to religion are chiefly engaged in an enterprise similar to reductionist neurotheology. Their objective is to show that religious phenomena (beliefs, rituals, intuitions) emerged because of the way our minds process information. The difference from neurotheology lies in the importance assigned to subintentional psychological processes instead of the cerebral mechanisms underlying the phenomenological experiences characterised as "religious". Their explanatory cognitive models of religion are therefore quite different.

Schematically, these approaches can be organised according to two analytical dimensions. On the one hand, religion has, from a naturalist point of view, to be integrated into the theory of evolution. The aim is to explain how certain phenotypic properties, by endowing organisms with a better fitness, have been selected through the history of the species. In this perspective, religious thinking and behaviours can be seen as adaptations either at an individual or collective level. Not many contemporary thinkers defend the idea that religion directly contributes to fitness at an individual level. Much research tends to indicate that practising a religion could be correlated with better health, but these results are strongly questioned elsewhere [15]. For some, the emergence of certain mechanisms linked with religious beliefs could be due to the development of consciousness itself. Being too aware of our own destiny, and of our own unavoidable death, is fundamentally depressing. Hence our cognitive and affective system has been subjected to selective pressure that favoured the selection of hypnotic processes in order to be usefully "ignorant" and to accept more promising, hopeful religious narratives [16–18]. A much more popular way to defend the idea that religion can be seen as an evolutionary adaptation is proposed by David Sloan Wilson,

who argues that evolution has to be considered at the level of groups, which function as adaptive units [19]. From that perspective, religion solidifies moral systems and ensures better collaboration between the members of the group (for example in threatening that cheats will be punished in another world). From that collective standpoint, groups structured by religious beliefs and principles are better adapted than groups deprived of religion; their evolutionary success will therefore be greater and religion will be selected for in the long run.

On the other hand, many authors do not believe that religion is an adaptation and would insist on the stunning diversity and heterogeneity of religious beliefs and practices [20]. To them it seems very doubtful that religion could be an adaptation *per se*. It is much more reasonable to see religious beliefs and behaviours as what Gould and Lewontin [21] called “spandrels”, i.e. some phenotypic characteristics that are a byproduct of the evolution of some other characteristics rather than a direct production of adaptive selection. Traits cross-culturally associated with religion (afterlife, beings with special powers, rituals, revelation, etc.) have been successful because religious thoughts can be seen as “an emergent property of our standard cognitive capacities” [22]. Within this “cognitive science of religion” [23], two main explanatory strategies can be singled out. One paradigm can be described as “counterintuitivist” and it has its origin in Dan Sperber’s criticism of classical anthropology [24]. Sperber insists on the fact that symbolic representations are not fully understood by the believers and, therefore, not literally believed. The question is then to explain why religious representations are so “contagious” [25]. Pascal Boyer’s hypothesis is that their impact on human minds is grounded on the fact that religious representations violate commonsense expectations concerning ordinary things, beings and processes [26]. For Boyer, the cognitive and social success of religious representations is due to a “cognitive optimum” between ontological violations (spirits can walk through walls) and inferential power (if you displease them, they will be angry and resentful) [20]. From this perspective, religious concepts and activities are said to “hijack” our cognitive resources (as do art or fashion) because they provide super stimuli to the mind [22, 27].

Another position can be called “intuitivist”. Firstly, it underlines the difference, if not the gap, between theologically correct beliefs (like God’s omniscience) and the way people spontaneously reason on religious entities [28–29]. Secondly, it highlights the fact that many religious beliefs are in fact intuitive. For example, it is very hard *not* to think that some psychological properties continue after death [30]. By showing how children spontaneously develop all kinds of intuitions about their environment (physical, biological, social), developmental psychology plays a central role in the intuitivist paradigm. According to Paul Bloom [31], for example, human beings come into the world with a predisposition to believe in certain specific supernatural phenomena. Children are, for example, spontaneously dualist: they see the world of objects as separated from the world of minds [32]. They also tend to infer goals and desires where they do not exist [33–34], and to infer that the world should have a purpose and a Designer [35–36]. As these intuitions con-

tinue to live in adults’ cognitive systems, “religion seems here to stay” [37].

Recent cognitive models tend to integrate these apparent theoretical contradictions. Religious concepts and beliefs may have initially developed as “spandrels” but then motivated and inspired morally-relevant norms and values, thereby increasing the fitness of the groups’ members sharing these beliefs [38]. In other words, once religious beliefs emerged, and we have seen that our brains/minds are prone to generate them, they can facilitate and even stabilise cooperation within groups; as such, religious phenomena could have been the target of cultural selection [39]. Cognitive models therefore tend to integrate neurological data into a broader framework in order to explain the planetary success of religious beliefs and rituals.

Discussion from the viewpoint of psychology of religion and sciences of religions

The great merit of neuroscience is the demonstration that nothing can be perceived and thought in addition to neural activity of the brain. Religious experience, like every other possible human experience, does not exist without brain activity. But religious experience cannot be reduced to brain physical structures and processes. Religious experience is a complex setting of thoughts, memories and emotions that arise in the mind to interpret the perceptual processes of the brain. The mind’s task is to integrate our (new) experiences in the broader meaning-system that we have elaborated through our previous experiences and the learning of various symbolic systems like languages. The principal criticism that we can address to neuroscientific studies of religion concerns their definition of “religion”. Neuroscience is interested in deep elementary structures underlying complex and various human experiences. Newberg et d’Aquili, for instance, look for an invariant “essence of religion”. They write that the “road to God is paved with many stones: metaphor, poetry, music, ritual experiences, prayer, and meditative experiences.” (...) But it is AUB “which gives religious poetry and metaphor its meaning” and it “is real in an absolute, ultimate and unconditional way ...” [11]. Neuroscientific studies of religion try, each in their own way, to establish a one-to-one relation between brain activity processes and subjective experiences. This depends on two controversial presuppositions: the universal structure of complex brain and mind processes and the identical subjective interpretation of these processes by all human beings. This is akin to supposing that the same basic brain process lies behind every love story! But it is obvious that, between platonic love and short-lived sexual intercourse, the human race may well have access to quite a repertoire of love experiences which probably have no common denominator in neural functioning. On the contrary, it is language that allows everyone to connect, by means of a common symbolic system, various experiences to the same universe of sense. Each culture has its own symbolic system for mapping the language of love. The same is true of religious discourse. Scholars specialised in the study of religion are accustomed to translation problems. Intercultural comparison frequently encounters the impossibility of establishing one-to-one re-

lations [40]. For these reasons, there is every chance that behaviours and beliefs related to a specific religious system will have no or simply a marginal link with epileptiform or mystical experiences. Observing rules of purity, adopting behaviours that show group belonging, reciting prayers, to give just a few examples, are distinct religious experiences which are connected with various brain areas. Newberg himself recognised that glossolalia arises from other parts of the brain than ABU experiences [41] and so “undermine[s] the idea that one particular brain module or wiring system produces religious experiences” [42]. That is why, instead of trying to find the origin of religion in neural activity, it would be more suitable, if the aim is the study of religion, to study how religions have tried to propose interpretations for altered states of consciousness so that these unusual experiences could be integrated in an holistic meaning system. The sciences of religion must integrate neuroscience; but the way is to integrate neuroscience in an interdisciplinary and religiously pluralist approach rather than building a neurotheology, because religious systems take shape not only in the subjective interpretation of brain activity but also through the interaction between individual brain and mind activity and linguistic elaborations based on highly complex cultural symbolic systems.

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