

BOOK REVIEW

God, theologian and humble neurologist

When I look at your heavens, the work of your fingers, the moon and the stars that you have established; what are human beings that you are mindful of them, mortals that you care for them? Yet you have made them a little lower than God, and crowned them with glory and honour. You have given them dominion over the works of your hands; you have put all things under their feet, all sheep and oxen, and also the beasts of the field, the birds of the air, and the fish of the sea, whatever passes along the paths of the seas.

(New Revised Standard Version, Psalm 8: 3–9)

On November 23, 1654, Pascal experienced God. His servant later found the mathematician's account of his 'night of fire' on some parchment sewn into the lining of a discarded doublet:

From about half-past ten in the evening until half-past twelve. FIRE. The God of Abraham, the God of Isaac, the God of Jacob. Not of the philosophers and intellectuals. Certitude, certitude, feeling, joy, peace.

(Bishop, 1936)

This paradoxical fragmented certainty about the ineffable seems to be a common human experience, expressed famously by Albert Einstein.

The most beautiful and most profound emotion we can experience is the sensation of the mystical. It is the sower of all true science. So to whom this emotion is a stranger, who can no longer wonder and stand rapt in awe, is as good as dead. To know that which is impenetrable to us really exists, manifesting itself as the highest wisdom and the most radiant beauty which our dull faculties can comprehend only in their primitive forms - this knowledge, this feeling is at the centre of true religiousness.

(Barnett, 1964)

This is the religious impulse, the spark of something beyond empiricism that inspires 'religion', which could perhaps be defined as an ordered set of beliefs, practices and morals based on the divine. Whilst much of institutionalized religion is clearly human-made, there remains this central claim: that humans experience the unknowable God. From where do these feelings originate? A gift from God? An epiphenomenon of our evolutionary history? A manifestation of our psychological vulnerability?

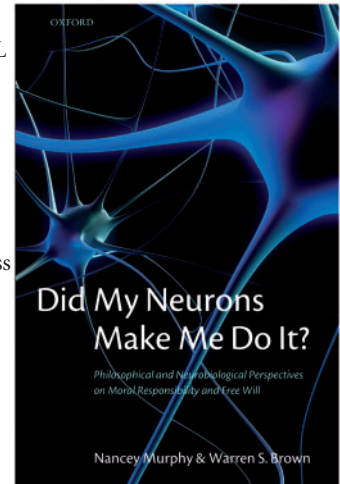
DID MY NEURONS MAKE ME DO IT?: PHILOSOPHICAL AND NEUROBIOLOGICAL PERSPECTIVES ON MORAL RESPONSIBILITY AND FREE WILL

By Nancey Murphy and Warren S. Brown
2007.

Oxford: Oxford University Press

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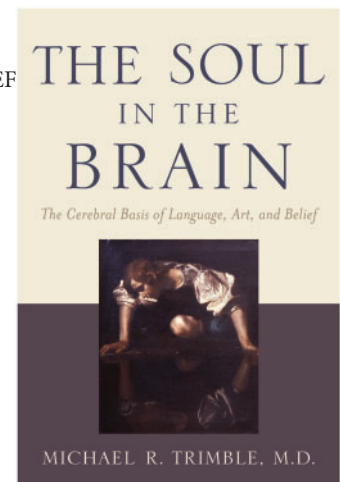


THE SOUL IN THE BRAIN: THE CEREBRAL BASIS OF LANGUAGE, ART AND BELIEF
By Michael R. Trimble
2007.

Baltimore: Johns Hopkins University Press

Price \$35.00

ISBN: 978-0-8018-8481-8



The cries of a disembodied soul trapped in a bodily prison? Or a random spark of temporal lobe activity?

The 20 century started out hopefully for a distinct contribution of neurology to the understanding of the relationships between brain, psyche and God. William James opened up the discipline with his monumental *Varieties of religious experience* in 1902, the first chapter of which is entitled 'Religion and Neurology'. Less well known, but possibly more important was *The psychology of religious mysticism* (1925) by James Leuba. A key focus at this stage was 'ecstatic' seizures. These rare types of

temporal lobe seizures are most sympathetically described by Dostoyevsky; first in the character of Prince Myshkin . . .

there was a moment or two almost before the fit itself . . . when suddenly amid the sadness, spiritual darkness, and depression, his brain seemed to catch fire at brief moments, all his doubts and worries seemed composed in a twinkling, culminating in a great calm, full of sense and harmonious joy and hope . . . a blinding inner light flooded his soul . . . (The Idiot, 1869)

. . . and in writings about his own epilepsy

You are all healthy people . . . but you have no idea what joy that joy is which we epileptics experience the second before a seizure . . . I do not know whether this joy lasts for seconds or hours or months, but believe me, I would not exchange it for all the delights of this world. (Dostoyevsky, quoted in Gastaut, 1978)

In 1970, Dewhurst and Beard published a series of cases in which religious conversions had occurred following seizures, for instance in this bus conductor:

In 1955 at the end of a week in which he had been unusually depressed . . . in the middle of collecting fares he was suddenly overcome with a feeling of bliss. He felt he was literally in heaven . . . On admission to hospital, he said that he had seen God and that his wife and family would soon join him in heaven; his mood was elated, though disjointed and he readily admitted to hearing music and voices. He remained in this state of exultation, hearing divine and angelic voice for two days (Dewhurst and Bread, 1970).

Wilder Penfield induced religious feelings by stimulating the temporal lobes (Penfield, 1955) and Waxman and Geschwind (1975) proposed a neurological basis of interictal hyperreligiosity in temporal lobe epilepsy. The great Jack Eccles walked and talked around the Vatican gardens with Karl Popper in the early 1980s and produced an account of divine action in the brain in their seminal *The self and its Brain* (1984).

But something has gone badly wrong. In the 1980s, a small group of neuroscientists arrogated for itself a new field of ‘neurotheology’ which has become—not to put too fine a point on it—an embarrassment. In privatized discussions, over-interpreted accounts of poor experiments are recycled to construct grand schemes to explain religious experience. The theologians have done much better. John Bowker’s *The sacred neuron. Discovering the extraordinary links between science and religion* (2007), reviewed in *Brain* (129: 278–81) an excellent summary. Even better is the magisterial study of the Princeton theologian, Wentzel van Huyssteen. He sets himself the task of understanding just what it means to say that humans are unique from the perspective of theology, paleoanthropology, ethnography and neuroscience. He carefully crafts a space for this interdisciplinary dialogue, using a ‘post-foundationalist’ hermeneutic, effectively cutting through dogma. *Alone in the world? Human uniqueness in science and theology* arose from

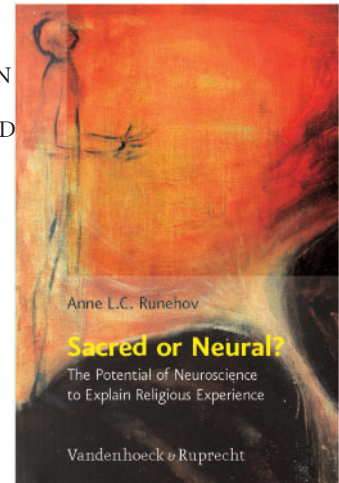
SACRED OR NEURAL?: THE POTENTIAL OF NEUROSCIENCE TO EXPLAIN RELIGIOUS EXPERIENCE (RELIGION, THEOLOGIE UND NARTURWISSENSCHAFT)

By Anne L. C. Runehov
2007.

Göttingen: Vandenhoeck & Ruprecht

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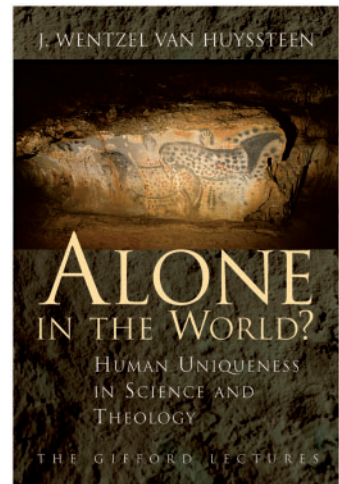
ALONE IN THE WORLD?: HUMAN UNIQUENESS IN SCIENCE AND THEOLOGY

By J. Wentzel Van Huyssteen
2006.

Grand Rapids: Eerdmans

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his Gifford lectures at the University of Edinburgh in 2004. Lord Gifford founded these lectures in 1885 to promote the scientific study of religion:

I having been for many years deeply and firmly convinced that the true knowledge of God . . . and the true and felt knowledge . . . of the relations of man and of the universe to Him, and of the true foundations of all ethics and morals . . . I have resolved to institute lectureships . . . promoting . . . the study of Natural Theology in its widest sense of the term . . . [and the lecturers should] treat their subject as a strictly natural science, the greatest of all possible sciences, in one sense the only science . . . without reference to or reliance upon any supposed special exceptional or so called miraculous revelation, I wish it to be considered just as astronomy and chemistry is.

Previous lecturers have included Hannah Arendt, Niels Bohr, Etienne Gilson, Werner Heisenberg, William James, Donald MacKay, Max Mueller, Iris Murdoch, Reinhold Niebuhr, Albert Schweitzer, Charles Sherrington and Alfred North Whitehead.

Imago dei: God's law and the law of the mind

The Christian claim is that humans are unique because, unlike any other of His creations, they are made in the image of God (Genesis 1: 27) and only a little lower than God Himself (Psalm 8: 5). But, paradoxically, the creation narrative warns humans against striving to become God. The consequence of the first humans' disobedience is the acquisition of God-like moral knowledge and the possibility of eternal life, which God cannot countenance (Genesis 3: 22–3). So they are ejected from the garden, conscious of their disobedience, their nakedness, their rationality and their separation from God. They and we are left 'alone in the world', self-conscious, moral and sinful, so memorably described by Paul:

I do not understand my own actions. For I do not do what I want, but I do the very thing I hate. Now if I do what I do not want, I agree that the law is good. But in fact it is no longer I that do it, but sin that dwells within me. For I know that nothing good dwells within me, that is, in my flesh. I can will what is right, but I cannot do it. For I do not do the good I want, but the evil I do not want is what I do. Now if I do what I do not want, it is no longer I that do it, but sin that dwells within me. So I find it to be a law that when I want to do what is good, evil lies close at hand. For I delight in the law of God in my inmost self, but I see in my members another law at war with the law of my mind, making me captive to the law of sin that dwells in my members. (Romans 7: 14–23)

The human predicament is to be born with a weak capacity for good, easily overcome by desires, yet at the same time conscious of both ourselves and what could be better, not as rational construct but in some way as the pleasure of God, who is a transcendent interventional 'other' connected, but separated, from humankind.

Understandings of *imago Dei* have been complex and varied over the millennia, but a key proposition emerged with Augustine's and Aquinas' neo-Platonic suggestion that the uniqueness of humans was God-given rationality:

Since man is said to be the image of God by reason of his intellectual nature, he is the most perfectly like God according to that in which he can best imitate God in his intellectual nature. Now the intellectual nature imitates God chiefly in this, that God understands and loves Himself. Wherefore we see that the image of God is in man in three ways. First, inasmuch as man possesses a natural aptitude for understanding and loving God; and this aptitude consists in the very nature of the mind, which is common to all men. Secondly, inasmuch as man actually and habitually knows and loves God, though imperfectly; and this image consists in the conformity of grace. Thirdly, inasmuch as man knows and loves God perfectly; and this image consists in the likeness of glory... The first is found in all men, the second only in the just, the third only in the blessed. (Aquinas *Summa Theologica* Part 1, q.93, a4, Fathers of the English Dominican Province, Trans. 1920)

van Huyssteen, with many contemporary theologians, rejects such 'esoteric and baroque abstract notions of human uniqueness' and appeals to a return to 'embodied notions of humanness where our embodied sexuality and moral awareness are tied directly to our embodied transcendence as believers who are in relationship with God' (p. 219). van Huyssteen rejects disembodied soul and makes a theology of our bodies. So how can biology inform human uniqueness? van Huyssteen carefully surveys the evolutionary views and concludes that human cognition supersedes determinist Darwinism. For, clearly, knowledge and beliefs may promote survival without genetic change.

It is in this sense, when considering the nonadaptive aspects of our cognitive drives, that we can say that in human knowledge, in moral awareness, in aesthetic appreciation, and in religious awareness we transcend our biological origins. This perspective helps us to see human cognition as the mediator between biology and culture, and cultural evolution as requiring explanations beyond the biological theory of evolution (p. 97).

It seems that our 'embodied transcendence' lies in our cognition. From where did that come and why?

Homo sapiens and the caves of Lascaux

van Huyssteen turns to paleoanthropology and especially the 'Upper Paleolithic Revolution' that occurred in Europe some 30–40 000 years ago, at the end of the last Ice Age. *Homo sapiens*, anatomically identical to modern humans, had evolved some 80 000 years before, probably in Africa. Yet, it was not until they arrived in Europe, living alongside the Neanderthals, that something extraordinary happened. For the first time in hominid history, sophisticated creativity appeared, for instance the cave art of Lascaux, the rock sculptures of the Dordogne and the recently discovered human–lion figurine (Conard, 2003). Traditionally, these had been thought to be naturalistic pictures, but van Huyssteen supports Terence Deacon [*The symbolic species* (1997)] and others who argue that they are symbolic. For instance, he discusses a picture in the cave of Lascaux, which had been thought to depict a hunting accident. A figure lies in front of a wounded bull. It has a human body and legs, with erect phallus, but four-fingered bird hands and a bird head. Nearby lies a staff with a bird handle. Such half-human, half-animal figures are relatively common in Upper Paleolithic art and are reminiscent of shamanism, and in particular the fusion of shaman with the spirit of the animal at death. The speculation that *homo sapiens* practised shamanism, first made by David Lewis-Williams (*The mind in the cave; consciousness and the origins of art*, 2002) is a bold move, which brings new associations. For this animalistic religion, regarded by some as a religious archetype, is still extant amongst hunter–gatherer peoples. It essentially systematizes different levels of consciousness: dreams, sleep, hallucinations and altered states of awareness induced by repetitive movement (the 'whirling dervish')

and music. Shamans describe ecstasy, autoscopy, orthoscopy, the sensation of flight to a spirit world above and descent to a place below. Jobbing neurologists will of course have come across most of that list in the clinic and no doubt, largely, subsumed them within a secular narrative. van Huyssteen also draws attention to the hand prints found deep in the caves of Lascaux, which are either painted by placing dyed hands on the wall or by blowing paint around a hand to leave a reverse image. These lie alongside stunning representations of horses, whose forms are integrated into the crevasses of the rock walls. The suggestion is that the humans descended to the site, in a pilgrimage perhaps to a netherworld and then sacramentally touched the handprints around the horses. van Huyssteen speculates that the rock becomes a shamanistic veil separating humans from the spiritual world.

van Huyssteen and Deacon's key argument is that religion emerged as humans used supernatural narrative to explain their experience of their new-found consciousness. Apart from anything else, this speaks to the 'naturalness' of religion:

Religious belief is one of the earliest special propensities or dispositions that we are able to detect in the archaeological record of modern humans. In this sense, then, there is a naturalness to the religious imagination that challenges any viewpoint that would want to see religion or religious imagination as esoteric, or as an isolated faculty of the human mind that developed later (p. 193).

The Upper Paleolithic Revolution consisted of more than just cave paintings. Visual creativity emerged in many other ways. Burial rites become more complex. And, it is speculated, the first music was made and the first words spoken. van Huyssteen argues that the key distinction between Upper Paleolithic man and *homo sapiens* elsewhere and earlier hominids, was the power to construct and understand symbol, of which language of course is a part. This ability to 'code the invisible' allowed for storage of information outside of the gene and the start of the cultural non-genetic inheritance. The 'mental toolkit' required to manage symbolic representation is the 'ability to be conscious of being conscious' and to search for meaning. The new humans wake up, discover they are naked and meet God.

What event within the brain of *homo sapiens* allowed this new capacity for symbolic thought? van Huyssteen could have turned to comparative neuroanatomy but instead, fatally, he falls for the self-advertisements of 'neurotheology'.

'Neurotheology': bad neurology and bad theology

The term 'neurotheology' was first used by James Ashbrook and subsequently taken up by Andrew Newberg and Eugene

D'Aquili, from the University of Pennsylvania, in *The mystical mind* (1999) and *Why God won't go away* (2001). Supposedly, these are neuroscientists who study religious experience. By inventing a new name for this quasi-field, they give the misimpression that there has been no relevant work before or outside their writings. Anne Runehov, a theologian from Copenhagen, accepts this uncritically in *Sacred or neural? Neuroscientific explanations of religious experience: a philosophical evaluation*, which is a rather laborious critique of Newberg and D'Aquili, and the other key figure of neurotheology, Michael Persinger of the Laurentian University, Canada.

What characterizes these researchers are their deafferentation both from important neuroscience and mainstream theology. They are more amateur philosophers than scientists. Especially in Persinger's case, hypotheses sail majestically from introduction to conclusion in his papers, untrammelled by methodology or data and spiced by not a little paranoia ['the process that precipitates God experience may also contain some fundamental flaw that could eradicate us from the face of this earth' (Persinger, 1997)]. Once put down, his work is hard to pick up again. His main thesis is that God-experiences are nothing but temporal lobe mini seizures. Much of Persinger's evidence comes from his own private scale, the Personal Philosophy Inventory, which he validated using people with temporal lobe epilepsy. Unsurprisingly, when applied to religious people, some questions are answered positively. Persinger concludes that they have 'epilepsy-like' symptoms; therefore, religion is epilepsy. Another source of data comes from experiments with his own form of temporal lobe transcranial magnetic stimulation, to which Richard Dawkins was famously subjected on television. Apparently, some people are induced to sense the divine, and this, therefore, proves that God does not exist. Sadly for all concerned, Dawkins felt nothing.

In contrast, Newberg and d'Aquili have no doubt that God exists, although they prefer to describe him as an 'Absolute Unitary Being'. They too have a privatized sale of spirituality: the Aesthetic Religious Continuum. Their famous experiment involved SPECT scanning eight Tibetan meditators and some Franciscan nuns, controlled by nine healthy persons. The meditators sat in a room, with whatever aids they needed (candles, jasmine incense), and pulled a cotton twine to indicate that their meditation was at its most intense. They were then injected with HMPAO for the SPECT scan, which showed increased regional cerebral blood flow in the inferior and orbital frontal cortices, midbrain, cingulate gyri and thalamus. Without careful interpretation, this contributes as much to the study of religious experience as a Chicago city plan does to an analysis of American culture. Sadly Newberg and d'Aquili cannot contain themselves. From their experiments, they conclude there is a 'causal operator' hard wired into the brain, which seeks to explain all that the brain experiences, and this may lead to the formation of myth and religion. They propose other brain modules: 'holistic operator',

‘reductionist operator’, binary operator and so on. From this, they deduce a meta-theology and even a mega-theology, in which they declare that general structures of the world religions and of theology itself can all be derived from neurotheology.

Anne Runehov’s conscientious study of neurotheology fails in the end to deliver the killer blow. Unfortunately, she gets mired in the tortuosity of the work of Persinger, Newberg and d’Aquili, and comes up with some lame criticisms such as poor sample size and lack of control for gender. van Huyssteen, on the other hand, is succinctly dismissive. Persinger’s work is not mentioned at all. No neurotheology is deemed sufficiently credible to appear in this summing up and, of the work of Newberg and d’Aquili, he writes:

Clearly if this [meta- and mega-theology] is only meant *neurologically*, it would be highly reductionist and a rather naïve scientist violation of the disciplinary boundaries between neuroscience and theology. If it is seriously claimed to be a *philosophical* position, it would be naively modernist, if not foundationalist, in its disregard for the specificity and integrity of the world’s very diverse religions . . . their speculations on the kind of meta- and megatheologies that might be derived from this is bad science as well as bad theology. (p. 259)

There is restrained scholarly neuroscience that would merit van Huyssteen’s attention, which does not advertise itself as ‘neurotheology’. As an example, consider the recent study from UCLA on the activation patterns of belief, disbelief and uncertainty, which provocatively demonstrate no distinction between verifiable and unverifiable beliefs, and pathways activated for belief to be similar to those associated with ‘reward’ and those for disbelief akin to ‘disgust’ (Harris, 2008).

The sacred disease

If neurology is to reclaim some credibility in the interdisciplinary dialogue on humanity’s God experience, it could do a lot worse than revisit the ecstatic seizures of temporal lobe epilepsy. Consider the questions raised by the case of Karen Armstrong (see *Brain* 2006; 129: 278–81). An acclaimed theologian now (author amongst others of the impressive studies *History of God* and *The great transformation: the beginning of our religious traditions* and autobiographies, *The spiral staircase* and *Through the narrow gate*), she entered a Catholic convent at the age of 17. She developed curious ‘fainting episodes’, and experienced both heaven and hell. Later she was diagnosed with epilepsy, was treated and lost her faith. Fascinatingly, she retains a curious longing for her ecstatic seizures.

Certainly just before I have a grand mal fit I have a ‘vision’ of such peace, joy and significance that I can only call it God. What does this say about the whole nature of religious vision? Certain episodes in the lives of the saints have acquired a new meaning for me. When Theresa of Avila had her three-day

vision of hell, was she simply having a temporal lobe attack? The horrors she saw are similar to those I have experienced, but in her case informed by the religious imagery of her time. Like other saints who have ‘seen’ hell she describes an appalling stench, which is part of an epileptic aura. Is it possible that the feeling I have had all my life that something – God, perhaps? – is just over the horizon, something unimaginable but almost tangibly present, is simply the result of an electrical irregularity in my brain? It is a question that can’t yet be answered, unless it be that God, if He exists, could have created us with that capacity for Him, glimpsed at only when the brain is convulsed. What I can say, however, is that if my ‘visions’ have sometimes let me into ‘Hell’ they have also given me possible intimations of a Heaven, which I would not have been without. (Armstrong, *Beginning the world*, 1983).

Michael Trimble is well placed to pursue the significance of such seizures, after a career in neuropsychiatry based at the Institute of Neurology in London. He has written several papers on the subject over the last 20 years and some new material appears in *The soul in the brain, the cerebral basis of language, art and belief*. In 1982, Trimble and colleagues reported six patients with temporal lobe epilepsy and hypergraphia, often on religious themes, in the *Journal of Neurology Neurosurgery and Psychiatry*. In 2006, with Anthony Freeman, he studied people with temporal lobe epilepsy who did or did not attend religious services, alongside 30 regular church goers without epilepsy. Their results confirmed the Geschwind hypothesis: temporal lobe epilepsy patients who were devout worshippers scored highly on emotionality and hypergraphia. They more often had the experience of the ineffable and they were also more likely to have psychoses. And in 2004, Trimble published a small case series in *Journal of Neurology Neurosurgery and Psychiatry* suggesting that right hippocampal atrophy in TLE patients is particularly associated with hyperreligiosity.

Trimble’s work is a modest contribution to the small and provisional literature on ecstatic temporal lobe seizures. Definitive studies are now needed to answer some core questions: Just how common is this form of epilepsy? How often does it lead to religious behaviour? How socially conditioned is such manifestation of religion? From which anatomical structures do these seizures originate? What is the effect of treating the seizures? Is there any distinction from the religiosity of those without epilepsy?

Trimble’s goal in *The Soul in the brain, the cerebral basis of language, art and belief* is to give a unitary explanation for the neurophysiology of poetry, music and, above all, religion. Where van Huyssteen is cautious and scholarly, Trimble is a jackdaw, eager for any glistening bauble to decorate his synthesis: that formal religion is a tyranny of the left hemisphere over the religious, poetic and musical muses of the right hemisphere; an evil that could be exorcised if only people understood neuroscience.

Among our feelings, generated and modulated by subcortical and limbic structures and the right hemisphere, resides the

ability to experience the numinous. This has arisen as part of our evolutionary heritage, as part of the biosocial development of humankind, and is variously expressed in music, poetry and religious sentiment. The latter have been encapsulated by the formalities of structured (left-hemisphere driven) constraints such that even in our secular times, many espouse a belief that only practising religious people are capable of religious feeling. The arrogance of this stance is a remarkable tribute to a continuing ignorance of, in particular, epistemology and neurobiology. (p. 201)

Trimble's hypothesis resonates with Bruce Miller's observation that unusual creativity can emerge as the frontal lobes disintegrate in fronto-temporal dementia. Although religion was not explicitly studied by his team, the case histories of some of his patients (Miller, 2000, 2003; Mell, 2003) suggest that religious convictions and behaviours may also flower, suggesting that the 'religion module' (as Howard Gardner might put it) was suppressed in life. A systematic longitudinal study of the religious beliefs of patients with fronto-temporal dementia would be very instructive.

My neurons made me believe in God

Donald Mackay, a fine neurophysiologist of faith, always warned against 'nothing-buttery': for instance, that the God-experience is 'nothing but' activity within the temporal or frontal lobes. For only a hard reductionist would really want to argue that all behaviour can be explained by the prime mover of neuronal activity. Most often, at least amongst the neurotheologists, *methodological* reductionism ('to experiment on religious experience, I chose to image brain activity') is confused with *ontological* reductionism ('religious feeling is nothing but a particular pattern of brain activity').

The corrective to hard neurological reductionism is *Did my neurons make me do it? Philosophical and neurobiological perspectives on moral responsibility and free will* by Nancy Murphy and Warren Brown, both of Fuller Seminary. It took 10 years to write and was inspired by Brown's experience of watching Donald MacKay prepare to deliver the Gifford lectures. Their central thesis speaks to that core doctrine of *imago Dei*: that humans have free will. Or are we hard wired neural machines who only imagine that we can choose for ourselves? Murphy and Brown's arguments are complex, sophisticated and witty, drawing from theology, moral philosophy, neurobiology and computational theory. They conclude with a model of the mind as a restless interrogator of the environment, so introducing 'top-down processing' as experience and society adapt the models of the developing and plastic brain. The key to learning is 'backward error propagation'.

We agree that humans are never entirely responsible for their own characters. We come into the world with some degree of initial biological (genetic) predetermination. As with other

organisms, we are always already active due to this innate biological machinery. We try out various actions and modify our behavioural tendencies based on feedback. The maturation process is that if slowly developing higher-order evaluative systems that nest and modulate the systems that control our biological processes, and having built into our nervous system maps of how the world works. (p. 286)

As with van Huyssteen, Terence Deacon's book *The symbolic species* (1997) is key to Murphy and Brown. Deacon speculates that the anatomical substrate for these adaptable and plastic maps of how the world works is the prefrontal cortex. This area subserves nested hierarchical associative processing and slowly develops into early adulthood.

A conclusion: homo divinis and the humble neurologist

So it seems that, some 30–40 000 years ago in Europe, humans suddenly acquired the gifts of self-awareness, symbol, language and creativity. Which of these was the foundational event is hard to know, and perhaps need not be known. But, importantly, spirituality was part of the package.

It would be "normal, natural and rational" to be religious, and although it will never succeed as an argument for the existence of God, on this view the human condition and the character of religion naturally fit, cohere, complement and reinforce each other. (van Huyssteen)

Homo sapiens became *homo divinis*: an embodied likeness of God, a little lower than God, crucially moral yet weak. Adam and Eve awoke as the human brain evolved the toolkit to seek and understand symbol, to become aware of itself, the community around it and the new genetics of knowledge, so reordering its maps of how the world works. And part of this machinery, it seems, was the circuitry to experience the unutterable. Now, is that God? At the end of his book, Trimble quotes Sebastian Faulks' *Human traces*, previously reviewed in *Brain* (2007; 130: 3342–8):

And that is why religion is about absence. Because once the gods were there. And that is why all poetry and music strikes us with this awful longing for what once was ours – because it begins in regions of the brain where once the gods made themselves heard.

No amount of fMRI scans, micropipettes, EEGs or neural network computing can ever prove whether God exists or not. We are left uniquely alone, catching glimpses and shards of what the truth might be: 'For now we see in a mirror, dimly, but then we will see face to face. Now I know only in part; then I will know fully, even as I have been fully known' (1 Cor 13: 12). But van

Huyssteen, Murphy and Brown have shown how much our understanding of the God experience can be nuanced by careful dialogue between theology, philosophy, paleoanthropology, ethnography and neuroscience. There is a part in this conversation for the humble neurologist, faithfully reporting back from the clinic on the experiences of people with focal lesions, epilepsy and dementia.

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