

What God does to your brain

The controversial science of neurotheology aims to find the answer to an age-old question: why do we believe?



The 'God helmet' (left) is said to use electrical impulses to recreate religious experiences

By Julia Llewellyn Smith

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When neuroscientist Andrew Newberg scanned the brain of “Kevin”, a staunch atheist, while he was meditating, he made a fascinating discovery. “Compared with the Buddhist monks and Franciscan nuns, whose brains I’d also scanned, Kevin’s brain operated in a significantly different way,” he says.

“He had far more activity in the prefrontal cortex, the area that controls emotional feelings and mediates attention. Kevin’s brain appeared to be functioning in a highly analytical way, even when he was in a resting state.”

Would Newberg find something similar if he scanned my brain? I, too, am an atheist. This is largely the result of my upbringing (my father is a theoretical physicist, who, as a former director general of Cern, set up the Large Hadron Collider that is searching for the Higgs boson, or so-called “God” particle – though many physicists loathe that phrase), but also of prolonged investigations into other religions to see if I was “missing” something central to billions of people worldwide.

In this spirit, several years ago, I attended an “Alpha” course, a 10-week introduction to evangelical Christianity. It utterly failed to convince me but, during a service, another “recruit”, Mark, fell to his knees, babbling “in tongues”. When he came round, he was convinced he had been possessed by the Holy Spirit. I watched, bemused. Why had he entered this transcendental state, while I was completely unmoved? Was he deluded, or was he genuinely a conduit of God? Or were our brains simply wired differently?

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“When people speak in tongues, they’re gone, they’re in a completely altered state. But most of the time they’re normal people like us, with jobs and children – they don’t show any sign of being delusional,” says Newberg. “Scans of their brains – when they’re ‘possessed’ – show very different results to scans of Buddhist monks or Carmelite nuns in prayer or meditation. There you see increased frontal lobe activity in the areas concerned with concentration, but the speakers in tongues had decreased activity in the same area, which would give them the sensation that someone else was ‘running the show’.”

And what about me? “I wouldn’t be surprised if you have a harder time letting go of frontal lobe activity, so you tend to observe and take a more critical eye of events, while other people’s brains allow them to simply surrender to events around them.”

Newberg is director of research at the Jefferson Myrna Brind Centre of Integrative Medicine, in Philadelphia, and co-author of, among other books, *The Metaphysical Mind: Probing the Biology of Philosophical Thought*. He is a leading neurotheologist, pioneering a new and highly controversial science that investigates whether – as many sceptics have long suspected – God didn’t create us, but we created God.

During brain scans of those involved in various types of meditation and prayer, Newberg noticed increased activity in the limbic system, which regulates emotion. He also noted decreased activity in the parietal lobe, the part of the brain responsible for orienting oneself in space and time.

“When this happens, you lose your sense of self,” he says. “You have a notion of a great interconnectedness of things. It could be a sense where the self dissolves into nothingness, or dissolves into God or the universe.”

Such “mystical”, self-blurring experiences are central to almost all religions – from the **unio mystica** experienced by Carmelite nuns during prayer, when they claim their soul has mingled with the godhead, to Buddhists striving for unity with the universe through focusing on sacred objects. But if Newberg and his colleagues are correct, such experiences are not proof of being touched by a supreme being, but mere blips in brain chemistry.

“It seems that the brain is built in such a way that allows us as human beings to have transcendent experiences extremely easily, furthering our belief in a greater power,” Newberg says. This would explain why some type of religion exists in every culture, arguably making spirituality one of the defining characteristics of our species.

Depending on your religious views, such discoveries are either deeply fascinating or profoundly disturbing. Throughout history, spirituality has been viewed as something outside science, just as the soul is separate from the body; both ineffable essences, transcending the materialist universe.

No wonder, then, that neurotheology (or biotheology), with its implications that the brain is merely a “computer of meat”, is hugely contentious in the US, where only 1.6 per cent and 2.4 per cent of the population declare themselves “atheist” or “agnostic”, respectively.

Some theologians, however, welcome the research, seeing it as proof that God equipped our bodies with the ability to believe.

“I get attacked by everyone,” says Patrick McNamara, associate professor of neurology at Boston University and author of *The Neuroscience of Religious Experience*. “Atheists hate me because I’m saying religion has some basis in the brain and fundamentalist Christians hate me because I’m saying religion is nothing but brain impulses.”

Graham Ward, Regius Professor of Divinity at Oxford University and author of the forthcoming *Unbelievable: Why We Believe and Why We Don’t*, is sceptical about many neuroscientific attempts to explain God, pointing out that recent advances have weakened the theory that only one area of the brain is responsible for certain functions. “In any case,” he says, “the temporal lobes light up for any kind of excitement, not just religious experience.”

However, he agrees that it is imperative to examine religion scientifically. “Religion is at the root both of so many great civilisations and of so many wars, it has so much mythological power, we have to understand how it works and be alert to how dangerous it can be.”

If religion is merely a product of the mind, then perhaps its effects can be simulated artificially – with potentially powerful results. In the Nineties, Canadian cognitive neuroscientist Michael Persinger invented a “God helmet”, which, he claimed, simulated religious experiences by directing complex magnetic fields to the parts of the brain that include the parietal lobe.

Evangelical Christians demonstrated outside the lab where Persinger tested the helmet, outraged at his suggestion that God could be replicated via a machine. But more than 80 per cent of those who wore the helmet reported sensing a presence in the room that many took to be their deity. They also became deeply emotional and, after the experiment, were filled with a sense of loss.

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This led Persinger to conclude that divine visions – not to mention every other type of out-of-body experience, from the Virgin Mary being visited by the Holy Spirit to UFO sightings – were probably nothing more than people being subjected to energy fields connected to shifts in the Earth’s plates or environmental disturbances.

In 2001, Persinger tried the helmet on possibly the world’s most vocal atheist, **Prof Richard Dawkins**, who reported that his breathing and sensation in his limbs were affected, but insisted he had not seen God. Still upbeat, Persinger argued that earlier tests had shown Dawkins had far less sensitivity than others in the temporal lobes.

Persinger vs Dawkins: The God Helmet from Tommy Decentralized on Vimeo.

Or, perhaps Dawkins is simply lacking the “**God gene**” or VMAT2, to be precise, that controls the flow of mood-regulating chemicals, called monoamines, in the brain. According to US molecular geneticist Dr Dean Hamer, subjects with this gene were more susceptible to self-transcendent, spiritual experiences. Many neuroscientists now think spiritual tendencies involve genes relating to the brain’s dopamine and serotonin neurotransmitters.

Another, more recent, study by researchers at Auburn University in Alabama showed that subjects who perceived supernatural agents at work in their daily lives tended to use brain pathways associated with fear when asked to contemplate their religious beliefs. Those with beliefs based on doctrine tended to use pathways associated with language. On the other hand, atheists tended to use pathways connected with visual imagery.

Perhaps, the team suggested, non-believers try visually to imagine a supernatural agent as a test of its existence and subsequently reject the idea as unlikely when that image does not fit with any known image in their memory.

The researchers also found individuals with a stronger ability to attribute mental states – such as beliefs, desires and intents – to themselves and to understand that others may have different mental states from their own. This ability, known as the “theory of mind”, is thought to have evolved in humans over thousands of years – suggesting religion is a by-product of human evolution.

Spirituality, after all, serves a vital human purpose. Numerous studies show that religious belief is medically and psychologically (not to mention socially) beneficial. Reports have shown that churchgoers live an average seven years longer than heathens. They report lower blood pressure, recover quicker from

breast cancer, have better outcomes from coronary disease and rheumatoid arthritis, have greater success with IVF and are less likely to have children with meningitis.

Patients with a strong “intrinsic faith” (a deep personal belief, not just a social inclination to go to a place of worship) recover 70 per cent faster from depression than those who are not deeply religious.

Changes in brain chemistry can also make people lose their religion. McNamara has used MRI scans on people with Parkinson’s disease.

“We discovered a subgroup who were quite religious but, as the disease progressed, lost some aspects of their religiosity,” he says. Sufferers’ brains lack the neurotransmitter dopamine, making McNamara suspect that religiosity is linked to dopamine activity in the prefrontal lobes. “These areas of the brain handle complexity best, so it may be that people with Parkinson’s find it harder to access complex religious experiences.”



“When religion is operating the way it ought – when we’re not talking about fanatics blowing up non-believers – it strengthens the prefrontal lobes, which helps inhibit impulses better,” McNamara says. “Religious activities such as prayer, ritual, abstaining from alcohol, strengthen the ability of frontal lobes to control primitive impulses.”

Such advantages aside, religions give their followers the benefits of a supportive social network – since research has shown lack of social contact can be more harmful to health than obesity, alcoholism and smoking 15 cigarettes a day. “Being part of a group is very important psychologically. In times of prosperity, people tend to question large movements, but during periods of economic stress, fundamentalist movements flourish,” says McNamara.

Interestingly, those who describe themselves as born-again do not show any evidence of this particular benefit in experiments. On the contrary, recent research by the Centre for the Study of Ageing at Duke University, North Carolina, revealed that there was significantly greater hippocampal atrophy (brain damage associated with depression, Alzheimer’s and dementia) in people who reported a life-changing religious experience, compared to religious people who did not describe themselves as born again.

The human psyche hates any form of cognitive dissonance – or challenge to ingrained beliefs – and so scientists think the struggles through which born-again Christians go in order to overcome their old modes of thinking cause severe stress to their brains.

In general, though, it seems that, if I want to be psychologically healthy, I need to ape the faithful. And it turns out I'm already working along the right lines. A few years ago, conscious of lacking regular social ties (before I worked from home, an office provided that), I made an effort to join community groups. I've also, recently, like many other people become interested in subjects such as yoga and mindfulness, a secular type of meditation.

Sceptics such as me used to consider such fields flaky, but now their health benefits are proven – not least in the way they strengthen prefrontal lobes – it would be foolish to dismiss them.

“We've granted quasi-religious status to well-being pursuits such as mindfulness; it's like soft Buddhism, and it's no bad thing,” says Ward. “We are so busy, so wound up, so the recognition that we are not machines and need to find therapeutic ways to deal with our stress is very welcome, however it comes about.”

Amen to that.

How God Changes Your Brain by Andrew Newberg is available [here](#)

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How we moderate

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