

## The Sixth Dimension and God's Helmet

I have to be honest: my feelings about religion are ambivalent. The famous author Julian Barnes expresses similar feelings at the start of his book *Nothing to be Frightened Of*: "I don't believe in God, but I miss him."<sup>1</sup> I guess that calling oneself an agnostic may be considered a wishy-washy position by many but that seems to fit his position (and mine).

Agnosticism: the view that the truth value of certain claims—especially claims about the existence or nonexistence of any deity, but also other religious and metaphysical claims—is unknown or unknowable.<sup>2</sup> A more decisive individual may call him or herself an atheist. Mr. Barnes tells us that category 1 atheists are those who have no God and no fear of death. Despite this, most still enjoy life and show wonder at our lives and world.

Atheism: (opposite of theism) in a broad sense, is the rejection of belief in the existence of deities. Atheism is simply the absence of belief that any deities exist.<sup>3</sup>

Is the human predisposition to religion cultural or biologic? Studies suggest that activation of certain cerebral networks spanning the frontal, parietal, and temporal lobes are associated with spiritual states. Thus, damage to these areas should alter some of these feelings, including self-transcendence. Transcendence refers to the ability to detach one's consciousness from the physical body, a type of spiritual experience. Transcendence is common to all faiths and is part of the so-called "religious state." Spiritual experiences are as common today as in the past. Catholic nuns and Buddhist monks undergoing functional MR imaging (fMRI) during introspection showed changes in the prefrontal, cingulate cortex, temporal and parietal lobes, and in some subcortical areas.<sup>4-8</sup> These brain changes varied with the individual's ability to meditate. The activity of the serotonin brain system is probably genetically determined and is linked to varying degrees of self-transcendence and religious or spiritual experiences.<sup>9</sup>

In an interesting study, Urgesi et al<sup>10</sup> obtained self-transcendence scores before and after brain tumor resections. They postulated that selective surgical damage to the frontal lobes would decrease self-transcendence, whereas temporo-parietal damage would increase it. They tested nearly 90 patients with different tumors (high- and low-grade gliomas, meningiomas) and found that when posterior areas of the brain were removed, a significant and reliable increase in self-transcendence occurred. This change happened very soon after surgery and therefore was not considered an adaptive process. Furthermore, patients in whom meningiomas were removed from similar locations did not experience these changes (the underlying brain was presumably not damaged as consequence of an extra-axial mass resection). Patients who were already highly religious before surgery reported increased self-transcendence and mystic experiences postoperatively. It is not clear from this study whether damage to posterior brain tissues lead to higher recruitment of activity in other regions of the brain that contribute to the feeling of transcendence. In a different study, 12 patients (6 religious)

were evaluated with positron-emission tomography imaging while praying.<sup>10</sup> From memory, they recited Psalm 23 while undergoing cerebral blood flow studies. For reasons that escape me, Psalm 23 is usually a favorite of religious converts. In this study, all religious subjects reported having attained a "religious state" during recitation and showed significantly increased blood flow to the right dorsolateral prefrontal cortex. This contradicts the common belief that it is mainly the limbic system that is associated with faith beliefs. Religious beliefs may be a cognitive process mediated by pre-established neural circuits.

Could it be that God is located in one part of the brain? Beauregard and Paquette<sup>5</sup> performed fMRI in a series of Carmelite nuns while they reported being in a state of union with God. The Carmelite Sisters are the counterpart of the Carmelite Brothers, and both groups follow very strict dietary (could this influence brain function?) and religious beliefs and activities. The 15 Carmelites evaluated showed positive fMRI results but instead of activating only one region, 12 different regions were activated. Franciscan nuns seem to activate slightly different regions of their brains when praying.<sup>11</sup> In both groups, the pre- and inferior-frontal regions were active during the tasks performed. Because spiritual and mystical experiences are relatively common in patients with temporal lobe seizures, microseizures are long thought to be responsible for some of these experiences.

The fact that epileptics have numinous experiences more often than nonepileptics may explain why they have been revered in some cultures and persecuted in others. Sigmund Freud dismissed spiritual experiences as pathology, but not surprisingly Carl Jung did not. The "Sacred Disease" of antiquity was refuted by Hippocrates who argued against the association of seizures and prophetic and mystical powers (for him seizures were just purely a brain dysfunction). In the New Testament, Matthew (17:14–20) witnessed Jesus curing a boy who presumably had epilepsy and this may be one source from which the association between epilepsy and religion comes. In an article reviewed for this essay, I found a fascinating table listing religious figures who allegedly had epilepsy, including the Buddha, Mohammed, Ezekiel, St. Paul, and Joseph Smith among others.<sup>12</sup> Before and after seizures, up to 4% of patients report having religious experiences.<sup>12</sup> Patients with postictal psychosis may experience feelings of hyper-religiosity (Joan of Arc may have been one such patient). Religion has been present throughout the history of humankind and some argue that humans should be called *Homo religious* rather than *Homo sapiens*.<sup>13</sup> More than one-half of American adults report a "spiritual" and life-changing experience. That includes people with many different personalities and backgrounds. Personality researchers propose 5 main dimensions of personality: extraversion, agreeableness, conscientiousness, neuroticism, and openness. These 5 traits probably define personality but need not all be present in one person. Religiosity is probably the sixth major dimension of personality.<sup>13</sup>

If religious experiences are based on neurophysiologic events, can we provoke them? In 2001, Michael Persinger reported using an apparatus to stimulate spiritual experiences.<sup>14</sup> Dr. Persinger is a well-recognized personality in the world of paranormal studies. His research extends to the perception of

unidentified flying objects (UFOs). He states that UFOs and other paranormal experiences can be caused by changes in the magnetic environments in which we live (though I have never heard a patient say anything about paranormal experiences during or after an MR imaging at 1.5T or 3T). Based on his observations, he outfitted a snowmobile helmet (and if you Google it, that is exactly what it is) with solenoids that presumably altered the local magnetic fields (as in transcranial magnetic stimulation). Compared with those we use in neuroradiology, his magnetic fields were miniscule and on the order of 3–7 microtesla. He reported that at least 80% of participants felt a presence in the room when wearing the activated apparatus.\* Some even categorized this presence as being God. Dr. Persinger also seems to think that spiritual activity is located in the right temporal lobe, contradicting the evidence presented previously in this *Perspectives*. In 2004, a group of Swedish researchers tried to reproduce his results without any luck.<sup>15</sup> A significant number of subjects in the control group also experienced a presence, sometimes a significant one. As expected, prolonged and not so amicable arguments erupted between them and Dr. Persinger. Back-and-forth arguments included inadequate exposure to magnetic waves due to a short time wearing the helmet and the different and varying degrees of suggestibility in the subjects.

To prove his point, he chose to try this thing on Dr. Richard Dawkins. Because Dr. Dawkins—Professor of Public Understanding of Science at Oxford—is a world-class category 1 atheist, this experiment can be interpreted as very brave or very foolish on Dr. Persinger’s part. Not unexpectedly, Dr. Dawkins did not feel a presence or any effects while wearing the contraption. Just for the record, popular publications by Dr. Dawkins include *The Blind Watchmaker* (arguing against creationism and intelligent design), *The God Delusion* (faith is a delusion), and *The Selfish Gene* (gene-centered view of evolution), among others; thus, clearly, he is not a suggestible person. This experiment has not dissuaded others who continue to claim validity to the God helmet experiment. There are controversial data suggesting that alterations in the VMAT<sub>2</sub> gene (also involved in serotonin regulation) may affect an individual’s degree of spirituality.<sup>16</sup> Will the helmet work better on these individuals? Neurotheology is a new discipline that attempts to answer many of these questions with the use of functional neuroimaging.

If the brain’s serotonin system is implicated in religious experiences, can certain chemicals be used to duplicate these experiences? Some drugs, mainly LSD, mescaline, ayahuasca, and peyote, are known to have chemical features similar to serotonin and share its receptors. In the 1950s and 1960s, LSD was given to terminal lung cancer patients, and most reported having an increased acceptance of death, because while on their drug “trip” they had mystical experiences that lead to the firm belief that life continues after death. There are several fairly credible studies, some performed at Harvard on Harvard students, using serotonin-like drugs to incite mystical experiences, all with positive results.<sup>17</sup> Certain mushrooms and cacti (such as peyote) also contain psychogenic compounds that induce joyful,

mystical, and religious experiences (mushrooms and cacti have been used for this purpose since ancient times in the Americas). Psilocybin is one such drug, and Johns Hopkins recruits cancer patients to take this drug and evaluate the spiritual changes it may bring.<sup>18</sup> These “spirit-facilitating” drugs may offer some solace to terminal cancer patients. Ingesting psilocybin-containing mushrooms was the topic of a series of books in the 1970s by Carlos Castañeda. Many of us who were teenagers during the 1970s avidly read this anthropologist’s series of books dealing with shamanism, attempting to gain some knowledge of spirituality. A wonderful and highly recommended book on the LSD experience is *The Electric Kool-Aid Acid Test* by Tom Wolfe.<sup>19</sup>

Writing about religion-related issues is always treacherous and bound to upset some. Rest assured that I am respectful of all faiths and beliefs. As we get older, our thoughts relating to death and some faith implications arise often, and so I thought to give a short overview about how these relate to neuroimaging. It is important to keep in mind that many American academics have strong spiritual beliefs. Approximately 40% of scientists and 7% of members of the National Academy of Sciences believe in a God and nearly 40% believe in human immortality.<sup>20</sup>

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\* Maybe just covering one’s head is enough to experience some type of spiritual experience. Is that why most religious persons, regardless of faith, wear headgear?