Religion and Psychiatry in the Age of Neuroscience

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Abstract: In recent decades, an evolving conversation among religion, psychiatry, and neuroscience has been taking place, transforming, among other things, how we conceptualize religion and how that conceptualization affects its relation to psychiatry. In this article, we review several dimensions of the dialogue, beginning with its history and the phenomenology of religious experience. We then turn to neuroscientific studies to see how they explain religious experience, and we follow that with two related areas: the benefits of religious beliefs and practices, and the evolutionary foundation of those beneficial effects. A final section addresses neuroscientific and evolutionary accounts of the transcendent, that is, what those fields make of the claim that religious experience connects to a transcendent reality. We conclude with a brief summary, along with the unresolved questions we have encountered.

Key Words: Neuroscience, religion, psychiatry, phenomenology of religion, neuroscience of religion

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As we write, an evolving conversation among religion, psychiatry, and neuroscience is taking place. Nearly 200 years into the third millennium CE, the age of neuroscience has dawned, transforming, among other things, how we conceptualize religion and how that conceptualization affects its relation to psychiatry. In the article that follows, we unpack several key features of this dialogue—touching on subjects ranging from phenomenology to evolutionary biology, from philosophy of mind to neuroanatomy. After offering a brief historical introduction, we proceed with a nuanced description of the phenomenology of religious experience. We then proceed to the neuroscientific studies themselves to see how they explain religious experience, and we follow that with two related areas: the benefits of religious beliefs and practices, and the evolutionary foundation of those benefits. Next, we address neuroscientific and evolutionary accounts of the transcendent, namely, what those fields make of the claim that religious experience connects to a transcendent reality. Finally, we offer a brief summary and conclude with remarks on the many unresolved questions these fields are bound to encounter.

SCIENCE AND RELIGION: A BRIEF HISTORICAL BACKGROUND

The rise of modern science in the 17th century is attributed primarily to the work of Copernicus, Kepler, Galileo, Newton, and Descartes. Copernican sun-centered astronomy ushered in the beginning of conflict with religion because Earth had lost its special status as the center of the universe. In the 19th century, Darwin's theory of evolution, followed by his book, The Descent of Man, delivered the most significant challenge to religion, countering the story of creation in Genesis and threatening human uniqueness in the order of nature. The 20th and 21st centuries have witnessed the advent of neuroscience, including the ability to quantify, measure, and analyze mental processes such as cognition and emotions in increasingly sophisticated and previously unforeseen ways. Predictably, these methods are now being used to study religious experience, an area that has traditionally remained within the domain of religion and religious studies. At times, data from these experiments have prompted neuroscientists and others to challenge traditional religious notions of various subjects, including mind, soul, will, and morality.

PHENOMENOLOGY OF RELIGIOUS EXPERIENCE

If we are going to study neuroscience, psychiatry, and religion, we must begin with an understanding of what religion is. Given the great variety of religions and religious practices, along with the long cultural history of religion, this question does not allow for a simple answer. Try to compare, for instance, fundamentalist Christianity and Buddhism, or ancient Navaho rituals and contemporary Unitarianism. We can only mention some efforts to answer the question of what religion is.

We begin with two classics: William James' The Varieties of Religious Experience (James, 1987/1902) and Mircea Eliade's The Sacred and the Profane (Eliade, 1959). James distinguishes religious experience and religious institutions, a distinction that serves as a faithful starting point in this discussion. In his groundbreaking Varieties, James declares that he will leave institutional religion—beliefs, theology, hierarchies, church structures—aside and focus entirely on “personal religion.” He defines religion accordingly: “Religion, therefore, as I now ask you arbitrarily to take it, shall mean for us the feelings, acts, and experiences of individual men in their solitude, so far as they apprehend themselves to stand in relation to whatever they may consider the divine” (1987, p. 36). Although admirably trying to capture what is distinct in religious experience, James’ sharp distinction has not gone unchallenged. Charles Taylor (2002), for one, has pointed out that much religious experience—James’ personal religion—takes place in a communal or institutional setting. Would James, for instance, want to say that monks, praying and chanting as a community, are not participating in real religious experience? Although James’ definition of personal religion has faced many critiques, it continues to resonate with contemporary audiences, who might reframe his term as personal spirituality.

Alternatively, in The Sacred and the Profane (Eliade, 1959), one of Eliade’s many works on ancient religion, he describes a world divided into sacred and profane space. The sacred is the space where hierophanies, intense religious experiences, occur. He writes, “For religious man, space is not homogeneous; he experiences interruptions, breaks in it; some parts of space are qualitatively different from others. Hierophanies show something that is no longer stone or tree, but the sacred”—that is something wholly other, ganz andere. As Eliade quotes Exodus, “Draw not nigh hither,” says the Lord to Moses; “put off thy
shoes from off thy feet, for the place whereon thou standest is holy ground” (Exodus 3:5) (1959, p. 20). Eliade recognizes that the modern world has become desacralized, that we now live in a secular world, where a stone is generally never more than a stone. We invoke Eliade to capture a sense, not of religiosity, but of what the religious person would consider real contact with the sacred or transcendent. We recognize, of course, that even in this secular age the sacred persists for many—for instance, in the piece of bread called the Eucharist.

The above quote contains another critical notion from Eliade's book. Along with the ideas of the sacred and hierophanies, there is the idea of the religious man (homo religiosus); man is the creature uniquely able to experiences hierophanies. For primitive man, all value is associated with sacred space. Ordinary, profane life is without value.

In describing the sacred, Eliade invokes Rudolf Otto's notion of the “numinous,” described in The Idea of the Holy, published in 1917 (Otto, 1950/1917). Otto coined the word numinous (from Latin nomen, god) to convey the sense of the wholly other (ganz andere) that defines religious experience. He attempted to describe this experience while recognizing that we are reduced to using ordinary language to express something that cannot be expressed in such language. He explained that one must not rely on verbal description but rather must experience the sacred.

Taking another approach, Robert Bellah, in his monumental text, Religion in Human Evolution, defines religion more broadly than James: “Religion is a system of beliefs and practices relative to the sacred that unite those who adhere to them in a moral community” (Bellah, 2011, p. 1). Bellahs describes these beliefs and practices across the history of human culture. He begins with primitive rites and rituals and moves forward to the axial age, comparing religion in ancient Israel, Greece, China, and India. The breakthrough for Bellah is the emergence of language, which is necessary for religious belief and experience. In this context, he relies heavily on anthropologist Clifford Geertz, whom he paraphrases: “...religion is a system of symbols that, when enacted by human beings, establishes powerful, pervasive, and long-lasting moods and motivations that make sense in terms of an idea of a general order of existence” (2011, p. xiv).

James, Eliade, and Bellah then represent three admirable and enduring attempts to define “religion,” offering similar, but occasionally conflicting, definitions of the phenomenon. These differences have not, however, hindered neuroscientific attempts to define religion and religious experience in their own terms, a subject we turn to next.

**METHODS**

For the following sections of the article, we searched the MEDLINE, PubMed, PsycINFO, and EMBASE databases from January 1, 1990, to August 31, 2019, considering the Decade of the Brain (1990–1999) as a reasonable starting point to review pertinent studies in neuroscience and religion (Library of Congress, n.d.). We also used Google Scholar and the references listed in the individual articles as further search approaches. The searches were limited to English language articles. For the search term neuroscience and psychiatry, MEDLINE yielded 4577 citations, with 121 when qualified with benefits, 574 when qualified with positive psychology, and 596 when qualified with spirituality. For the search term neuroscience and religion, PubMed yielded 443 citations, with 12 when qualified with benefits, 146 when the search term was qualified with practice, 141 when qualified with meditation, and 9 when qualified with spiritualism. PsycINFO yielded 239 citations for neuroscience and religion, 76 citations for neuroscience and positive psychology, and 261 citations for neuroscience and meditation. EMBASE yielded 244 citations for neuroscience and religion, 13 citations for neuroscience and positive psychology, and 178 citations for neuroscience and meditation. All search modalities produced relevant studies, and many of the citations appeared in more than one of the databases.

**Neuroscientific Accounts of Religion and Religious Experience**

Research into the neuroscience of religion stretches back into the early 20th century, when the tools for research were limited to measurements of autonomic activity such as heart rate, blood pressure, body temperature, and electroencephalography. In recent decades, more advanced neuroscientific techniques such as magnetic resonance imaging, computed tomography, functional magnetic resonance imaging (fMRI), single-photon emission computed tomography, and positron-emission tomography (PET) scans have been used to measure the brain's blood flow, dramatically increasing the ability of researchers to study brain functioning (Schoept, 2009). In addition, other techniques have added sophisticated analyses of brain chemistry (Newberg, 2006).

Before describing research studies, some clarification is needed for the terms religion, spirituality, and meditation. Although we have used the term religion in the title of this article, we recognize that researchers often refer to religion and spirituality (R/S) in their work and that in studying meditation, they include meditation in all its forms—spiritual, Christian, and Buddhist or Buddhist-like. Further, many meditators do not identify themselves as religious. In general, some researchers focus exclusively on religion, others on meditation, and still others on both (see Blazer, 2009; Dean et al., 2012; Koenig, 2009; Hill and Pargament, 2003 for thorough reviews of the R/S distinction).

Research into the neuroscience of R/S has taken many forms. Andrew Newberg and colleagues carried out their initial work with a group of meditating Tibetan Buddhist monks (Newberg and Iversen, 2003; Newberg et al., 2001). These studies showed marked blood flow increases in the bilateral frontal cortices, cingulate gyrus, and thalamus, along with decreased blood flow in the superior parietal lobes. Reporting on the activation of the prefrontal cortex and cingulate gyrus, Newberg and Iversen (2003) concluded that “meditation appears to start with activating the prefrontal cortex and possibly the cingulate gyrus associated with the will or intent to clear the mind of thoughts” (p. 284).

In a related study, Azari (2006) compared a practicing Christian group with a nonbelieving group. All were instructed to self-induce a meditative state by focusing on a biblical text, Psalm 23, while being PET scanned. Only the Christian group reported having achieved a religious state (e.g., being in a personal relationship with God as Jesus Christ). As compared with the nonbelievers, the PET imaging of the Christians showed an activation of the right dorsolateral prefrontal cortex. This finding is consistent with the studies by Newburg et al. of Tibetan meditators, which also found increased prefrontal activity.

Noting this similarity across cultural and religious divides, Azari speculates: “Taken together, the neuroimaging results from two very different kinds of religious experience suggest that complex cognitive processes are central to at least some kinds of religious experience” (p. 41). She also concludes that the finding of such cognitively complex networks with activated prefrontal activity vitiates theories of a “God spot”—a unique, religious location mediating religious experience—in the brain. This finding is consistent with McNamara's summarizing statement that the relevant brain circuits associated with religious experience almost always involve key nodes of the amygdala, the right anterior temporal cortex, and the right prefrontal cortex (McNamara, 2009) (see also Benson and Stuss, 1990; Coruh et al., 2005; D'Aquili and Newberg, 1993; Fingelkurts and Fingelkurts, 2009; Gupta et al., 2018; Kapogiannis et al., 2009a; Schoept, 2009).

In their recent book, Goleman and Davidson describe distinct foci of meditation practices as correlating with distinct neurological changes during meditation (Goleman and Davidson, 2017). In particular, they address three distinct aims of contemplative practice—mental equanimity, compassion, and attention—and trace these practices to...
their roots in various meditative traditions. In the studies focusing on mental equanimity, researchers found decreased amygdala reactivity when subjects were practicing this form of meditation while viewing stressful images. In contrast, for those who practiced “compassion meditation,” there was greater activation of the amygdala and insula in response to another’s suffering as compared with a control group doing another form of meditation. Focused attention led to activation of prefrontal circuitry, leading to a relative inhibition of reactivity in the amygdala.

We have so far mentioned meditation and prayer as subjects for research into brain activity during religious experience. To those, we should add recent research on the neurological effects of psilocybin-induced religious experience, reviewed by Schiffman in Scientific American (Schiffman, 2016). (For other reviews of psychedelic substances and religion, see Nichols and Chemel [2006] and Roberts [2006].) This research has been focused primarily on patients with cancer, for whom psilocybin has been shown to relieve their negative and hopeless feelings. They have done preliminary work with normal subjects, who report "mystical" experiences that have enduring positive effects, with two-thirds of healthy volunteers describing the experience as "one of the most important experiences of my life." We are left to wonder how different these substance-induced experiences are from the mystical experiences reported across religious traditions, and what that has to say about the neurological foundations of religious experience.

An obvious limitation of neuroimaging research is that it must limit itself to short-term religious experiences and has little to say regarding long-held religious doctrines and practices, often referred to as extrinsic religiosity, and related to James' notion of institutional religion. An example of an effort to examine the latter is a study by Kagopiammis et al. (2009b), in which they identified four components of religiosity: intimate relationship with God, religious upbringing, nonreligious pragmatism, and fear of God's anger. These were then correlated with findings from the fMRI scanning to determine what areas in the brain were associated with particular aspects of religiosity. For example, reporting an intimate relationship with God and engagement in religious behavior were associated with increased blood flow in the right middle temporal cortex.

In their recent book cited above, Goleman and Davidson attempted to address this limitation as they explore the nature of "trait changes" in individuals whose lives have included an intensive and extensive meditation or contemplative practice—hours per day—as opposed to the "state changes" observed in most of the neuroscience research to date (Goleman and Davidson, 2017). Their hypothesis is that, with intensive practice, these state changes can indeed become trait changes that carry over into quotidian life and exert a sustained effect on experience and behavior. A related fMRI study carried out by Gaw (2019) on religious belief found that stable belief is associated with greater signal in the ventromedial prefrontal cortex.

Other researchers have challenged much of the above research. Ratcliffe (2006) argues that research into the neuroscience of religion requires a clear, agreed-upon, sense of the object of research—religion or religious experience—and that we do not have such an agreement. According to him, terms like divine, numinous, sacred, and even God mean different things to people within and across cultures. Given the current popularity of meditation, including its use by people who define themselves as not religious, as mentioned above, how do we distinguish religious meditation from nonreligious meditation? If, for instance, secular meditation taps the same brain structures as Tibetan or Christian meditation, should we conclude that the secularists are religious even if some declare themselves as atheists? In his book, God Is Not One, Stephen Prothero (2010) argues in the same direction as Ratcliffe.

We end this section with a note of caution expressed by one prominent researcher, Patrick McNamara:

As far as I can see, none of the extant cognitive or neuroscience models of human nature or of the Mind/brain can adequately account for the range of behavioral and cognitive phenomena associated with religion. The empirical facts with which religion scholars have been grappling for decades, or better, centuries, simply cannot yet be adequately handled by the current models of the Mind/brain in the cognitive neurosciences (McNamara 2009).

**Neuroscientific Correlates of the Benefits of Religion and Religious Experiences**

The above section focused on the neuroscientific correlates of religious and spiritual beliefs, behaviors, and experiences, as well as the neuroscience underlying them, without regard to the benefits, particularly psychiatric benefits, of such experiences. In this section, we move on to the issue of benefits and their neurological foundation. In dealing specifically with psychiatric benefits, we must distinguish implicit and explicit evidence for a neurological foundation.

Regarding implicit evidence, there is ample substantiation of a psychiatric benefit, for anxiety and depression, from religious belief and practice (Azhar and Varma, 1995; Baer and Toews, 2009; Braam et al., 1999; Koenig, 1998; Larrivee and Echarte, 2018; Miller, 2003; Newberg and Lee, 2006). Given the evidence cited in the preceding section for a neurologic foundation (at least partial) for religious beliefs and practices, we can reasonably hypothesize that there is a neurological foundation for the psychiatric benefit.

In the direction of explicit evidence for an emotional benefit, Emmons and McNamara (2006) speculate about the benefit of gratitude as a "sacred emotion." They outline four steps of gratitude and invoke Damasio (2005) as providing evidence of limbic/frontal underpinning of the four-step process (p. 22). In another study, Mascaro et al. (2015) argue for the possible effects of kindness-based meditation on brain structure.

Inzlicht et al. (2011) argue that "people are motivated to create and sustain meaning (i.e., a sense of coherency between beliefs, goals, and perceptions of the environment, which provides individuals with the feeling that the world is an orderly place..." [p. 192]) and that religious beliefs create such meaning. Based on neuroimaging research, including their own (Inzlicht and Tullett, 2010; Inzlicht et al., 2009), they attempt to show a diminution of anxiety, with corresponding changes in the anterior cingulate cortex, associated with religious experiences.

The most important studies in this series were carried out by Miller and colleagues. In one prospective, 10-year study (Miller et al., 2012), they showed that individuals at high risk for depression who report a high level of religiosity/spirituality have a 90% decreased risk of developing major depression compared with those with a low level of religiosity/spirituality. They then showed in a later study (Miller et al., 2014) that individuals with high levels of religiosity/spirituality had thicker cortices, at a 5-year follow-up, in the left and right parietal and occipital regions, the mesial frontal lobe of the right hemisphere, and the cuneus and precuneus in the left hemisphere. Because this study was correlational, they could not conclude a causal relation between religiosity and cortical thickness. Nevertheless, these findings together certainly suggest that high religiosity/spirituality has long-term emotional benefits that may be related to neurobiological structures that confer a relative resilience against developing depression.

In this section on the benefits of religious experiences, we point to the related area of what is called positive psychology (LeDoux, 2000; Seligman and Csikszentmihalyi, 2014). The literature on positive psychology includes the development of virtues like gratitude, forgiveness, and humility, as well as assistance in recovery from mental illness (Schrank et al., 2014), and the evidence for a neurobiological foundation includes that indicated above in this section on the benefits of R/S. With regard to specifically religious experiences and emotions, there
is evidence that the amygdala plays a more prominent role in emotions, including religious emotions, than previously recognized (Davidson, 2000; Davidson et al., 2003; Garland et al., 2010; LeDoux 2000; Phelps and LeDoux, 2005; Watts et al., 2006).

Before concluding this section, however, we acknowledge the arguments of others, such as Dawkins and Dennett, discussed below, of the potential harmful effects of religion. Pettee has also noted that religious groups can reinforce stigma toward mental illness and mental health treatment, for a variety of reasons (Pettee 2019). A recent dramatic example of the harmful effects of religion is taking place in Myanmar, where individuals of the Buddhist faith, generally regarded as a belief system of peace and compassion, have led a brutal persecution of a Muslim minority. Although such behaviors may be completely unrelated to personal religiosity/spirituality, the history of human-kind is replete with similar examples of religion-affiliated or religion-precipitated violence. To our awareness, neuroscience has focused on the benefits of religion but has not given equal attention to the neuroscience of religious harm.

Many researchers arguing for a neuroscientific foundation for religious benefits also claim that the benefits and accompanying brain structures rest on an evolutionary foundation. We turn next to that theme.

**Evolutionary Biology and Psychology of Religion**

Evolutionary arguments favoring the development of religious beliefs and practices take the form of sociobiology: religious beliefs and practices have evolved because they confer benefits on humans. This scientific work thus brings together an evolutionary origin of religion, with its survival benefits, and a corresponding basis in brain neurophysiology.

We can take as exemplary a text by well-known psychiatrist and researcher George Vaillant, _Spiritual Evolution: How We Are Wired for Faith, Hope, and Love_ (Vaillant, 2008). Vaillant presents a very positive, not to say Whiggish, account of how evolution has produced a full set of positive emotions, including spirituality. He covers the evolutionary, historical, and neuroscientific evidence for a progressive course of human development. Regarding neuroscience, he follows a familiar course through the limbic system, emphasizing the hippocampus, amygdala, and anterior cingulate gyrus, as well as the prefrontal cortex.

Vaillant’s approach (along with that of others following a similar argument) does not play well with the phenomenon of evil. In discussing, for instance, the survival value of spirituality among Cambodians living through the terror of the Khmer Rouge, Vaillant focuses on the positive role of Buddhism rather than on the evil of Pol Pot and his movement. One could just as easily argue that humans are hardwired for the evil acts of Pol Pot, rather than the spirituality relied upon to survive his atrocities. To address the problem of evil in his account, he writes: “Yes, _The Lord of the Flies_ holds some truth, and child murderers exist, but not in the same numbers as the Cambodian children who valued love and spirituality over a rationally, but heartlessly, planned society” (pp. 55–56). This statement hardly addresses the question of evolution and evil.

Somewhat in the same direction as Vaillant, David Sloan Wilson, a contemporary evolutionary biologist who emphasized group selection in the evolutionary process, argues in _Darwin’s Cathedral: Evolution, Religion, and the Nature of Society_ (Wilson, 2002) that society can be considered as an organism, in which religion and morality are biologically and culturally evolved adaptations that enable humans to function and achieve by collective action what they never could do alone.

Although the above positions use sociobiological arguments for the evolution and persistence of religion and morality, others have put forth sociological arguments for the replacement of religion and ethics by biological knowledge. In his landmark text _Sociobiology_ (Wilson, 1975), the evolutionary biologist Edward O. Wilson, the de facto founder of sociobiology, argues that human behavior is governed by invisible “epigenetic rules,” that religion and ethics will eventually be replaced by biological knowledge, and morality is but an expression of emotions encoded in genes. Wilson avoids a blatant form of reductionism by arguing that it is not genes that determine behavior but that through the mediation of biological processes, they constrain it.

Although effectively agreeing with Wilson’s conclusion, Stephen Jay Gould and Richard Lewontin challenged the entire field of sociobiology. In “The Spanдресes of San Marco” (Gould and Lewontin, 1979), they define a spandrel as a phenotypic characteristic that is a by-product of the evolution of some other characteristic, rather than a direct product of adaptive selection. In this argument, religion is not a product of evolutionary selection; it is a by-product of other selective traits that together might result in what we call religion. On their account, religion is a spandrel.

Steven Pinker adopts this argument, although oddly he does not cite Gould and Lewontin. Pinker disputes the adaptionist arguments for religion and argues that legitimate adaptive traits could lead to religion as a cultural construction (Pinker, 2006).

Finally, to fill out this at times confusing discussion of evolution and religion, we mention the work of Michael Behe (1996), a biochemist who assumes a predetermined divine plan of intelligent design and argues that the irreducible complexity of biochemical systems shows that they cannot be the product of gradual evolution. In addition to strong disagreements about a divine plan by his nonbelieving skeptics, many theological critics have disagreed with Behe for ruling out evolutionary explanations instead of integrating them.

**Neuroscience and the Transcendent**

Certainly, many people believe that in their religious experiences they are in touch with something beyond or transcendent and that they are not just exercising their imagination. As we saw above, Otto’s notion of the wholly other, the _ganz andere_, implies just that, and he offers many examples of individuals reporting such experiences, as does James in the _Varieties_. How does the science of religion deal with this phenomenon?

In addressing this question, we must recognize that the science of religion is, indeed, natural science and that the philosophical underpinning of natural science is naturalism, the major foundations of which are fact and empirical evidence. Scientific research always involves what can be seen, measured, and confirmed. Such research, by definition, excludes phenomena like spirit, soul, and transcendence. This is quite appropriate. The imperative of science is to explain everything it can in a naturalistic manner. Scientists only get into trouble when they stray into metaphysics and declare that natural science is the only way to explain something. That is not a scientific statement but rather a metaphysical statement to the effect that the only allowable metaphysical position is naturalism. Vliegenthart concludes from this that “Even though many scientists in the field will be reluctant to admit it, neuroscience cannot confirm or deny the existence of a transcendent cause for religious experiences” (Vliegenthart, 2011, p. 264).

Research into religion thus inevitably naturalizes religious experience, reducing it to neurological brain changes. It is obviously difficult to reconcile this approach with what we might think of as genuine religious experience. If we take Eliade’s hierarchies to mean real contact with a sacred or transcendent reality, how much sense will it make to say that the sacred shows itself through an individual’s limbic system? But at the same time, given that all conscious experience is reflected in some kind of brain activity (whatever that relationship might be), how much sense would it make to say that true religious experience is not reflected in any brain activity?

How are we to approach this dilemma? A first issue is the challenge of Ratcliffe (2006) and Prothero (2010) described above—that
putative religious experiences (the divine, the sacred, and the numinous) have different meanings in different cultures. In this article we argue that what we are calling the transcendent cuts across traditions and cultures and refer to experiences within the self of a beyond the self (Dupre, 1976).

Regarding the dilemma of scientific naturalism and experience of the transcendent, we cannot rely on many respected scientists to resolve the issue because of their own commitments to naturalism. Examples include such high priests of naturalism as ethologist Steven Dawkins, philosopher Daniel Dennett, and neuroscientist Francis Crick, all overlapping in their attitude with the critical sociobiologists of the previous section.

Dennett (1991) holds that evolution is a mindless, purposeless process and that neuroscience will be able to fully explain intentional actions and all mental events. Dennett is overtly hostile toward religion and states that the scientific method can be equated with rationality, whereas religious faith is irrational even though it sometimes serves socially useful functions. The codiscoverer of DNA, Francis Crick, also highly critical of religion, wrote in his book, The Astonishing Hypothesis: The Scientific Search for the Soul (Crick, 1994) that “your joys and sorrows, your memories and ambitions, your sense of personal identity and freedom are no more than the behavior of a vast assembly of nerve cells and their molecules.” In The God Delusion (1987), Dawkins asserts that belief in God is both irrational and harmful (Dawkins, 1987).

In contrast, there is a group of thinkers arguing for compatibility of science and real belief, which includes such figures as physicist/theologian John Polkinghorne (2010) and Michel Behe (1996) mentioned above.

We suggest a number of possibilities here. One position, eliminative materialism, represented by Patricia Churchland (1989), Daniel Dennett, and others, argues that all “mental” life, religious and otherwise, is nothing but brain process and refers to nothing independent of the brain. This position maintains that the belief in a transcendent reality beyond the brain is a bit of “folk psychology.”

A second position, seemingly opposite of the first, and represented by Newberg et al. (2001), is that certain religious experiences are real and are indeed associated with particular brain areas and processes: “…mystical experience is biologically, observably and scientifically real” rather than “wishful thinking” (p. 7). They argue further that “...neurology makes it clear that spiritual insights are born in startling moments of mystical transcendence” (p. 139) and that “the wisdom of the mystics, it seems, has predicted for centuries what neurology now shows to be true: In Absolute Unitary Being, self blends into other; mind and matter are one and the same” (p. 156). In fact, however, the position of Newberg et al., which we can locate in the philosophical tradition of representational thinking, is in some ways not far from eliminative materialism. The position of representational thinking is that what a person experiences, even in ordinary perception, is not the object out there in the world but rather its representation in the brain. Just as we think of the perceived object as “real,” so can we think of the transcendent absolute unitary being of mystical experience as real. The difference from eliminative materialism is that what Newberg et al. call the real, the eliminative materialists call a product of folk psychology. Ratcliffe (2006) challenges Newberg et al. from a different angle, arguing that their theory depends on a preexisting belief in absolute unitary being and that the authors have not demonstrated that mystical experience demonstrates a contact with the transcendent. Of interest, Preston, Ritter, and Hepler found that belief in the soul diminishes when neuroscience provides strong mechanistic explanations for mind, but increases when there are gaps in neuroscientific explanations (Preston et al., 2013).

Another popular position claiming possible transcendence is what is called nonreductive physicalism. This is an antidualist point of view that strives to treat the mental (and the religious) as somewhat independent of the material brain without sliding into dualism. This position depends on emergence theory, which argues that as brain processes become increasingly complex, they may involve a leap into another level of activity (consciousness, the mental) with different rules of activity that cannot be crudely reduced to the usual procedures of brain process. There are two concerns with this position. The first is that emergence is a speculative theory, with no one having adequately explained how basic neuronal activities “emerge” into consciousness. The second concern is that granting the construct of emergence only gets to consciousness and the mental. It in no way guarantees a path to transcendence (see Gray, 2010 for further discussion on nonreductive physicalism).

Still another position is the work of Griffiths and others, mentioned above, on psiology. The question remains whether the mystical experiences described by subjects represent real transcendence or a manipulation of brain physiology.

A final approach to this perplexing question of the transcendent is that of Steven Jay Gould. In Rocks of Ages: Science and Religion in the Fullness of Life (Gould, 1999) he writes:

I do not see how science and religion could be unified, or even synthesized, under any common scheme of analysis; but I also do not understand why the two enterprises should experience any conflict. Science tries to document the factual character of the natural world. Religion, on the other hand, operates in the equally important, but utterly different, realm of human purposes, meanings, and values — subjects that the factual domain of science might illuminate, but can never resolve. Similarly, while scientists must operate with ethical principles, some specific to their practice, the validity of these principles can never be inferred from the factual discoveries of science (pp. 4–5).

Gould summarizes this position with what he calls the Principle of NOMA or nonoverlapping magisteria. The magisterium of science is the empirical realm, whereas the magisterium of religion involves questions of ultimate meaning and moral value. Gould is, of course, reaffirming the point we made above about naturalism and its limits. He is reminding us that science, in its naturalistic endeavors, will not be able to explain religion and that this only becomes a problem if scientists insist that religion must be explained naturalistically.

We can end this final section where we began the article, with William James. In the Varieties he concludes with his version of Gould’s NOMA, arguing for a world that is both natural and spiritual: “The world interpreted religiously is not the materialistic world over again, with an altered expression; it must have, over and above the altered expression, a natural constitution different at some point from that which a materialistic world would have. It must be such that different events can be expected in it, different conduct must be required” (1987/1902, pp. 462–463). For James, science studies the factual basis of the natural world; it is a world of empirically based causal laws, with minimal attention to individual, subjective experience. Religion, on the other hand, is, primarily, a matter of individual, personal experience, a world that is not visible through the lens of natural science.

CONCLUSIONS

We conclude this review of neuroscience and religion with a few summary comments. With the new, sophisticated tools available to neuroscientists, an enormous amount of research has gone into uncovering the neuroscientific foundations of religious experience. This research is most dramatic and convincing when carried out in an in vivo manner, for example, studying meditating and praying subjects with imaging and neurochemical technologies. Although the results frequently vary from one research protocol to another, they generally converge with a
focus on limbic structures and the prefrontal cortex as the “seats” of religious experience.

However, as interesting as these studies are, questions remain about what to conclude from them. The most important is what counts as religious experience. Another involves the significance that is attributed to the relationship between religiosity/spirituality and activity in a certain part of the brain, for example, the limbic system. There is also an understandable tendency to relate the findings to evolutionary theory and, specifically, to evolutionary psychology—for example, if humans show a positive trait, it must have conveyed a survival advantage. The problem with this approach is that the entire field of evolutionary psychology lives under a shadow of doubt—doubt as to whether the claims of sociobiology and evolutionary biology are anything more than unprovable speculations.

Finally, we end the article with a question regarding religious experience’s putative relationship with a transcendent reality. Scientific studies are by definition constrained to study phenomena naturalistically, that is, with empirical evidence and empirically based generalizations and laws. Such studies are not able to adjudicate the question of transcendence, and that question thus remains open.

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DISCLOSURE

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REFERENCES


