

PART II

CHAPTER 2

SCIENCE ON THE SOUL AND THEOLOGY

The eyes have been called the ‘windows to the soul,’ the idea being that systemic diseases have signs identifiable on ophthalmic examination.¹ Similarly, the eyes are a window to the brain, where a neuroimaging contrast agent, using an ophthalmic method, was delivered and distributed to the brain of live mice *via* the lymphatic system.² This is scientific use of an old expression from an era that believed more strongly in the soul.

The face too is a significant pathway to the soul.³ It is also related to cultures, as in the question, “are the windows to the soul the same in the East and West?”⁴ It was found that different cultures tend to weigh facial cues differently when interpreting emotional expressions. Even the skin may be regarded as a “mirror of the soul”⁵ where light from the outside world passes through the layers of epidermal cells, the first line of immune defences, and interacting with the neuroendocrine system.

The soul can be framed as a neuroethical issue.⁶ The deeply-held belief that there is something more to persons than their physical substance is found in human consciousness and nearly all world religions. Neuroscience, however, challenges this view, demonstrating that perception, motor control, even “character, consciousness

¹ Paul Foster Kay-Tee Khaw, “The eye: window to the soul or a mirror of systemic health?,” *Heart* Vol.65 No.5 (March 2009), pp.348-349. See also Mark F.Whitters, “‘The Eye is the Lamp of the Body’: Its Meaning in the Sermon on the Mount,” *Irish Theological Quarterly* Vol.71 Nos.1-2 (February 2006), pp.77-88; Ahmad M.Mansour et al., “Jesus and the eye: New Testament miracles of vision,” *Acta Ophthalmologica Scandinavica* Vol.83 No.6 (December 2005), pp.739-745

² Christina H.Liu et al., “Noninvasive delivery of gene targeting probes to live brains for transcription MRI,” *The FASEB Journal* Vol.22 No.4 (April 2008), pp.1193-1203.

³ Stephen Porter et al., “Is the Face a Window to the Soul?: Investigation of the Accuracy of Intuitive Judgments of the Trustworthiness of Human Faces,” *Canadian Journal of Behavioural Science* Vol.40 No.3 (July 2008), pp.171-177.

⁴ Masaki Yuki, William W.Maddux and Takahiko Masuda, “Are the windows to the soul the same in the East and West? Cultural differences in using the eyes and mouth as cues to recognize emotions in Japan and the United States,” *Journal of Experimental Social Psychology* Vol.43 No.2 (March 2007), pp.303-311

⁵ Klas Nordlind, Efrain C.Azmitia and Andrzej Slominski, “The skin as a mirror of the soul: exploring the possible roles of serotonin,” *Experimental Dermatology* Vol.17 No.4 (April 2008), pp.301-311

⁶ Martha J.Farah, “Neuroethics: the practical and the philosophical,” *Trends in Cognitive Sciences* Vol.9 No.1 (January 2005), pp.34-40

and sense of spirituality may all be features of the machine. If they are, then why think there's a ghost in there at all?"⁷

Broad social consequences are perceived in the apparent incompatibility between the neuroscientific view and the intuitive or religious view of persons. While a literal interpretation of Genesis is held by only a minority of religious thinkers, "the existence of an immaterial soul is a near universal belief."⁸ It is also observed how the transcendent God of the West may be dead [Nietzsche], or at least dying, and prominent scientists regard belief in God as a delusion [Dawkins], but the evolved human brain continues: "the inclination in humans for calling on the heavens to provide assistance in times of trouble can be expected to continue."⁹

This chapter concentrates on investigations into religious, spiritual, or mystical experiences which are said to be like "measuring the immeasurable".¹⁰ Related headings are 'spirituality and health'¹¹ and 'religion and health'.¹² Other interesting developments include neuropsychanalysis.¹³

Our interest is in scientific study of brain, mind and 'soul'. Important areas considered are: religious experiences in relationship to psychoactive substances; religious experiences and the neurosciences, and examples such as prayer and pain. Next, 'neurotheology' is examined along with critiques of that and other neurological studies of religion, and a critique of materialist neuroscience.

⁷ Farah, *Neuroethics: the practical and the philosophical*, p.39

⁸ Farah, *Neuroethics: the practical and the philosophical*, p.39

⁹ John D.Sellman et.al., "Future of God in recovery from drug addiction," *Australian and New Zealand Journal of Psychiatry* Vol.41 No.10 (2007), pp.800-808 (p.805)

¹⁰ David O.Moberg, "Spirituality Research: Measuring the Immeasurable?," *Perspectives on Science and Christian Faith* Vol.62 No.2 (June 2010), pp.99-114

¹¹ Rachel Sing Kiat Ting, "The Worldviews of Healing Traditions in the East and West: Implications for Psychology of Religion," *Pastoral Psychology* Vol.61 Nos.5-6 (December 2012), pp.759-782

¹² Neal Krause, "Religion and Health: Making Sense of a Disheveled Literature," *Journal of Religion and Health* Vol.50 No.1 (March 2011), pp.20-35; Franco Bonaguidi, "Religiosity associated with prolonged survival in liver transplant recipients," *Liver Transplantation* Vol.16 No.10 (October 2010), pp.1158-1163

¹³ In the early 1980s brain and body replaced *psyche* and neuroscience reigned in psychiatry, influencing psychoanalysis. For example, Allan N.Schore, "Relational Trauma and the Developing Right Brain: An Interface of Psychoanalytic Self Psychology and Neuroscience," *Annals of the New York Academy of Sciences* Vol.1159 (April 2009), pp.189-203; Mark Solms and Oliver Turnbull, *The brain and the inner world. An introduction to the neuroscience of subjective experience* (New York: Other Press, 2002), pp.42-43

Neurochemistry and Psychopharmacology

If the soul is understood as the essence of a person emanating from states of mind which physiologically correlates with states of the brain, then soul is a brain process.¹⁴ Religious experiences have been identified with the dopamine-rich ventral brain systems.¹⁵ This involves neuroanatomy, neurochemistry, and ventromedial dopaminergic systems in clinical disorders linked with hyperreligiosity: mania, obsessive-compulsive disorder, schizophrenia, and temporal-lobe epilepsy.¹⁶

Altered states of consciousness are associated with pathological and religious experiences.¹⁷ Drugs are also associated with mystical experiences, e.g. Mescaline is derived from the peyote cactus (*Lophophora williamsii* or *Anhalonium lewinni*) and used in religious ceremonies in native American and Mexican settings. Psilocybin and mescaline both work in similar ways to the well known D-lysergic acid diethylamide or LSD.¹⁸ Mescaline and psilocybin are hallucinogens, drugs that produce intoxication or a 'trip'.¹⁹ Hallucinations are generally experienced clearly rather than being confused. These may be *psychotomimetic* where the experience superficially mimics a condition of psychosis, and *psychedelic*, a subjective experience where the mind is expanded or is in unison with humanity or the universe.²⁰

Psilocin-based 'magic' mushrooms [PBBM] became part Western culture in the late 1950s.²¹ The spiritual associations reported prompt arguments that the category

¹⁴ James B. Ashbrook, "Making Sense of Soul and Sabbath: Brain Processes and the Making of Meaning." *Zygon* Vol.27 No.1 (March 1992), pp.31-49. For Ashbrook, soul is "what we call our own and what distinguishes us from all others." (p.45)

¹⁵ Fred H. Previc, "The role of the extrapersonal brain systems in religious activity," *Consciousness and Cognition* Vol.15 No.3 (September 2006), pp.500-539

¹⁶ Previc, *The role of the extrapersonal brain systems*, p.518

¹⁷ John H. Court, "Altered States in the Church and Clinic," *Pastoral Psychology* Vol.59 No.4 (August 2010), pp.411-422; Frederick R. Dannaway, "Strange Fires, Weird Smokes and Psychoactive Combustibles: Entheogens and Incense in Ancient Traditions," *Journal of Psychoactive Drugs* Vol.42 No.4 (December 2010), pp.485-497

¹⁸ See Eric Nestler, Steven E. Hyman, and Robert C. Malenka, *Molecular Neuropharmacology: A Foundation for Clinical Neuroscience* (New York: McGraw-Hill, 2001), p.201 and pp.394-395

¹⁹ For instance hallucination and visual illusions, raised awareness of internal stimulus and thoughts, and raised awareness of external stimuli. Stephen M. Stahl, *Essential Psychopharmacology: Neuroscientific Basis and Practical Applications*, Second Edition (New York: Cambridge University Press, 2000), pp.510-515

²⁰ Stahl, *Essential Psychopharmacology*, p. 510

²¹ In other words in the psychedelic philosophy and 'hippy' counter culture. Sarah Riley, James Thompson and Christine Griffin, "Turn on, tune in, but don't drop out: The impact of neo-liberalism on magic mushroom users' (in)ability to imagine collectivist social worlds," *International Journal of*

‘entheogen’ (‘manifesting the divine within’) better defines PBMM than ‘psychedelic’ or ‘hallucinogen’.²² Magic or sacred plants have been used by shamans in rituals for prophecy, divination and ecstasy.²³

Clinicians, scientists and humanists are interested in psychedelic drugs.²⁴ Besides *Hallucinogens*,²⁵ other types are:

Trance-inducers - substances and ritual plants with lesser effects than hallucinogens, e.g. *Ololiuhqui* (Seeds of the Virgin Mary); The effects are a state of apathy and lethargy where subjects experience greater sensitivity to external stimuli which becomes irritating, and a stimulation of the imagination in divination and other ritual settings.²⁶

Cognodysleptics: marijuana-type substances which produce their own effects, and not alkaloids. They rarely result in hallucinations; Although they affect the imagination, recent memory mechanisms, or raise taste or auditory sensations.²⁷

Deliriogens e.g. Toloache or Tlápatl of the Mexicans (*Datura stramonium*). These plants have powerful mental and behavioural effects.²⁸

In one study volunteers taking psilocybin found experiences akin to spontaneous mystical experiences, having considerable and sustained personal meaning.²⁹

Drug Policy Vol.21 No.6 (November 2010), pp. 445-451. The term ‘Psilocin’ is *verbatim* from their paper, though Psilocybin is the term generally used in the literature.

²² Riley, Thompson & Griffin, *Turn on, tune in, but don’t drop out*, p.445

²³ José Luis Díaz, “Sacred plants and visionary consciousness,” *Phenomenology and the Cognitive Sciences* Vol.9 No.2 (June 2010), pp.159-170. On shamanic rituals see for instance, Vince Polito, Robyn Langdon and Jac Brown, “The experience of altered states of consciousness in shamanic ritual: The role of pre-existing beliefs and affective factors,” *Consciousness and Cognition* Vol.19 No.4 (December 2010), pp.918-925

²⁴ For example, Franz X. Vollenweider and Michael Kometer, “The neurobiology of psychedelic drugs: implications for the treatment of mood disorders,” *Nature Reviews Neuroscience* Vol.11 No.9 (September 2010), pp.642-651; Paulo Cesar Ribeiro Barbosa et.al., “A Six-Month Prospective Evaluation of Personality Traits, Psychiatric Symptoms and Quality of Life in Ayahuasca-Naïve Subjects,” *Journal of Psychoactive Drugs* Vol.41 No.3 (September 2009), pp.205-212

²⁵ Specifically, “perceptual experiences without an identifiable consensual object, within a clear and even lucid or amplified consciousness.” Díaz, *Sacred plants*, p.164.

²⁶ Díaz, *Sacred plants*, p.165

²⁷ Díaz, *Sacred plants*, p.166

²⁸ Díaz, *Sacred plants*, p.166

²⁹ R.R. Griffiths et.al., “Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance,” *Psychopharmacology* Vol.187 No.3 (August 2006), pp.268-283

Fourteenth months later,³⁰ psilocybin occasioned experiences comparable to spontaneously occurring mystical experiences. Over a year later, volunteers found these the most spiritually significant experiences of their lives which positively changed their attitudes, altruism, and behaviour. It was reported that psilocybin occasioned continuing positive changes in mood, attitudes, life satisfaction, and altruism/social effects. At the 14-month follow-up, ratings for wellbeing or life satisfaction remained high. The most reported behaviour changes were increased spiritual practice, better social relationships with family and others, and increased psychological and physical self-care.³¹

The potential religious significance of conscious states facilitated by entheogens or psychedelic drugs include:³² nonmystical states of consciousness, with mystical consciousness defined as “a state of human experience that, when retrospectively expressed, typically can be found to entail expressions of ineffability, unity, intuitive knowledge, transcendence of time and space, sacredness and profoundly positive mood.”³³ Attention is given to the potentially life-enhancing effects of particular states of consciousness caused by psilocybin and remain accessible in memory afterwards.³⁴

Another meaning is “the biochemistry of revelation and the origins of world religions.”³⁵ It has been thought that the ancient seers who wrote the Rig Veda, and early Christian cult members, knew about the effects of mushrooms. But some of these theories have been questioned, particularly when the claims could imply that most religions are mushroom-generated, rather than that use of mushrooms may be one method for evoking revelatory experiences which are likened to those produced through spontaneous changes in brain chemistry.³⁶

³⁰ R.R.Griffiths et.al., “Mystical-type experiences occasioned by psilocybin mediate the attribution of personal meaning and spiritual significance 14 months later,” *Journal of Psychopharmacology* Vol.22 No.6 (August 2008), pp.621-632

³¹ Roland R.Griffiths et.al., “Psilocybin occasioned mystical-type experiences: immediate and persisting dose-related effects,” *Psychopharmacology* Vol.218 No.4 (December 2011), pp.649-665 (pp.662-663)

³² William A.Richards, “The Phenomenology and Potential Religious Import of States of Consciousness Facilitated by Psilocybin,” *Archive for the Psychology of Religion* Vol.30 No.1 (2008), pp.189-199

³³ Richards, *States of Consciousness Facilitated by Psilocybin*, p.195

³⁴ Richards, *States of Consciousness Facilitated by Psilocybin*, p.190

³⁵ Richards, *States of Consciousness Facilitated by Psilocybin*, p.197

³⁶ Richards, *States of Consciousness Facilitated by Psilocybin*, p.197

Paolo Nencini and Kathleen A. Grant³⁷ identify three reasons for the psychopharmacological approach to investigate religious experiences:³⁸ one, the ethnographic data describing religious use of hallucinogenic drugs. Two, the religious experiences are reproducible in experiments. Three, there are possible insights offered into the neurophysiological substrates of religious experience.³⁹

Critical Comment

The idea of psychotic events and religious events having common neural mechanisms may be untenable, as is using the neurobiology of schizophrenia to ‘map’ epileptic or drug-induced religious experiences.⁴⁰ Religious experience is not an archetypal brain function like pain or reward: there may not be a common pathway generating similar subjective phenomena for everyone.⁴¹

However, it has been claimed that Christians taking drugs like Prozac, which medically treat depression and dysphoria,⁴² experienced God anew; the drugs dispelled anger and depression, together with feelings of inner transformation just like their conversion. It is wondered, "can it be that a pill can do what the Holy Spirit or human will could not?... why is it that a drug influencing the levels of a certain neurotransmitter can have such dramatic results in people when prayer and good intentions seem to have been inadequate."⁴³

³⁷ Paolo Nencini and Kathleen A. Grant, "Psychobiology of Drug-Induced Religious Experience: From the Brain 'Locus of Religion' to Cognitive Unbinding," *Substance Use & Misuse* Vol.45 No.13 (November 2010), pp.2130-2151

³⁸ Nencini & Grant, *Psychobiology of Drug-Induced Religious Experience*, pp.2131-2132

³⁹ In fact their study aimed to investigate the limits of psychopharmacological studies for understanding the neurobiological bases of religious experience

⁴⁰ Nencini & Grant, *Psychobiology of Drug-Induced Religious Experience*, pp.2140-2141. Nencini and Grant refer to the Carmelite nuns study [see later] which revealed a broad activation of brain activity, not a particular 'locus of religion'. They find that this and other nonpharmacological studies do not uphold the hypothesis of a common neurobiological substrate of religious experience, nor does pharmacological information demonstrate a common molecular mechanism to express religious experience, nor a specific 'locus of religion' or 'extrapersonal brain system' (pp.2141-2142).

⁴¹ Nencini & Grant, *Psychobiology of Drug-Induced Religious Experience*, p.2142

⁴² Michael J. Boivin, "Finding God in Prozac or finding Prozac in God: Preserving a Christian view of the person amidst a biopsychological revolution," *Christian Scholar's Review* Vol.32 No.2 (Winter 2003), pp.159-176. Boivin explains that this new class drugs "potentiate the activity of a brain chemical called serotonin within the emotional centers of the brain by allowing the chemical molecules to circulate longer near the nerve cell receptors. Simply put, they have revolutionized psychiatric interventions for mood disorders... Prozac is being supplanted by newer members of this class of drugs, such as Zoloft, in the first-line treatment of depression and anxiety disorder." (p.160)

⁴³ Boivin, *Finding God in Prozac*, p.159, quoting from C.E. Barshinger, L.E. LaRowe, and A. Tapia, "The Gospel According to Prozac: Can a Pill do What the Holy Spirit Could Not?" *Christianity Today* (14 August 1995), p.35

Christian scholars know that Prozac alters the brain, resulting in more stability, hope, and patience. These hint at the ecological restoration that awaits redeemed humanity in the resurrection (Isaiah 11:4-10; Isaiah 65:17-25). It may be “not too unreasonable to suggest that it is possible to find Prozac in God.”⁴⁴ But Prozac has limitations in effecting full and lasting return to emotional lives free of shame, anger, fear and despair. On the other hand, “such medications do not entirely miss a core aspect of the hope that awaits those destined to be fully restored emotional and psychobiological beings in God's Kingdom.”⁴⁵

While drug users have reported personal experiences deemed spiritual even religious, and the mind effects of psychedelic drugs are pharmacologically documented, this demonstrates that ‘religious’ experiences can be voluntarily induced using psychoactive substances. It cannot then be claimed that authentic religious experiences are artificial, although they may neurologically use similar brain areas implicated in psychopharmacology studies.

The Neurosciences and Religious Experiences

Religious experiences are examinable by neuroscience as the brain is involved in all experiences.⁴⁶ For example, spiritual experiences and the serotonin system have been studied by positron emission tomography and personality assessments.⁴⁷ The serotonin system and spiritual experiences link is supported by observations that drugs like psilocybin, LSD, etc. can cause disturbances of the serotonin system in some brain regions.⁴⁸ However, here religion/spirituality was reduced to mystical experiences.⁴⁹

⁴⁴ Boivin, *Finding God in Prozac*, p.176

⁴⁵ Boivin, *Finding God in Prozac*, p.176 Boivin proposes that to “whatever extent that such medications alleviate despair and provide a glimpse into happiness is the extent to which we can anticipate what awaits us as fully restored emotional beings in and with Christ at the resurrection (Revelation 21:4).” (p.176)

⁴⁶ Fraser Watts, “Brain Science and Religious Experience,” in Russell Stannard (ed.), *God for the 21st Century* (Philadelphia: Templeton Foundation Press, 2000), pp.121-123; for other directions see the report by Robert K.C. Forman, “A Watershed Event: Neuroscience, Consciousness and Spirituality Conference, July 2008,” *Journal of Consciousness Studies* Vol.15 No.8 (August 2008), pp.110–115

⁴⁷ Jacqueline Borg et.al., “The Serotonin System and Spiritual Experiences,” *The American Journal of Psychiatry* Vol.160 No.11 (November 2003), pp.1965-1969

⁴⁸ Borg et.al., *The Serotonin System and Spiritual Experiences*, p.1968

⁴⁹ Daniel E.Hall et.al., “Religion, Spirituality, and Mysticism,” *The American Journal of Psychiatry* Vol.161 No.9 (September 2004), pp.1720-1721

But sceptics imply that the (religious) experience produced by neurons is invalid. One rejoinder is that religious experience could result from the brain but it is not necessarily so. The rational lure to believe in God is that “it makes plausible sense of a broad range of different things. It offers a single unifying explanation for, say, the astonishing fruitfulness of the universe, the claims of religious leaders like Jesus, and for powerful religious experiences.”⁵⁰

It is remarkable, for some, that brain regions are frequently linked with religious experiences, revealing something of the nature of religion: “whatever else it is, religion is an integral part of human nature and thus religion is not mere delusion.”⁵¹ In neuroimaging data and clinical cases, the amygdala, large portions of the prefrontal lobes and the anterior temporal cortex are always implicated in religious experiences.⁵²

A way to identify potential functional benefits of religion is to consider how religious experiences are mediated by the brain. By observing which brain areas are involved in religious behaviours or experiences, clues can be gleaned as to the kinds of information being processed or not. But such reverse-engineering techniques to examine subjective experiences are limited.⁵³ And measuring subjective experiences is challenging.⁵⁴

Religious experience can, of course, be viewed theologically. The relationship between God and the individual can be expressed through things, words, rites, places and people. The pre-conceptual experience of God can be distinguished from ‘religious experience’, ‘experience of grace’, ‘Christian experience’ and ‘mystical experience’. Theology of the experience of God is clearly valuable.⁵⁵

⁵⁰ Watts, *Brain Science and Religious Experience*, p.121

⁵¹ Patrick McNamara, *The Neuroscience of Religious Experience* (New York: Cambridge University Press, 2009), p.xi. See also Ryan McKay, “Hallucinating God? The Cognitive Neuropsychiatry of Religious Belief and Experience,” *Evolution & Cognition* Vol.10 No.1 (2004), pp.114-125

⁵² McNamara, *The Neuroscience of Religious Experience*, p.xi.

⁵³ *The Neuroscience of Religious Experience*, p.10

⁵⁴ For instance, depending on reports about the experiences instead of the experiences themselves.

⁵⁵ Denis Edwards, *Human Experience of God* (New York/Ramsey: Paulist Press, 1983), pp.13-15. Only this “can do justice to the Old and New Testament understanding that God breaks in on our individual lives, that the Spirit moves within us, that God’s Word is communicated to us, and that we live in God’s presence.” (p.5)

However, God's actions in relation to human beings can cause conceptual difficulties.⁵⁶ More expansive terms accommodating non-theistic religions are 'experiences of ultimacy,'⁵⁷ and 'religious and spiritual experiences (RSEs).'⁵⁸ The term 'spiritual neuroscience' is proposed for scientific investigations of psychology, religion, spirituality, and neuroscience,⁵⁹ neural underpinnings of religious/spiritual/mystical experiences (RSMEs). Elucidating the neural substrates of these experiences does "not diminish or depreciate their meaning and value, and that the external reality of 'God' can neither be confirmed nor disconfirmed by delineating the neural correlates of RSMEs."⁶⁰ Here are several illustrative cases.

M.Beauregard and V.Paquette used fMRI to study the neural correlates of a Christian mystical experience of contemplative Carmelite nuns. Such mystical experience is characterized by a sense of union with God, plus a number of other dimensions: "a sense of having touched the ultimate ground of reality, the experience of timelessness and spacelessness, the sense of union with humankind and the universe, as well as feelings of positive affect, peace, joy and unconditional love."⁶¹ The findings suggest that various brain systems and regions mediate differing aspects of mystical experiences. This conclusion is expected because these experiences are multidimensional, "they implicate changes in perception (e.g., visual mental imagery), cognition (e.g., representations about the self), and emotion (e.g., peace, joy, unconditional love)."⁶²

⁵⁶ Fraser Watts, "Cognitive Neuroscience and Religious Consciousness," in Russell et.al. (eds.), *Neuroscience and the Person*, pp.327-346. Religious experience is also a subject of philosophical debate in the areas of theories of perception and the epistemology, reliability and justification of religious experiences. For e.g. Nathaniel F.Barrett and Wesley J.Wildman, "Seeing is Believing? How Reinterpreting the Direct Realism of Perception as Dynamic Engagement Alters the Justificatory Force of Religious Experience," *International Journal for Philosophy of Religion* Vol.66 No.2 (October 2009), pp.71-86

⁵⁷ Wesley J.Wildman and Leslie A.Brothers, "A Neuropsychological-Semiotic Model of Religious Experiences," in Russell et.al. (eds.), *Neuroscience and the Person*, pp.347-413

⁵⁸ Wesley J.Wildman, *Religious and Spiritual Experiences* (Cambridge and New York: Cambridge University Press, 2011), p.4

⁵⁹ Mario Beauregard and Vincent Paquette, "Neural correlates of a mystical experience in Carmelite nuns," *Neuroscience Letters* Vol.405 No.3 (25 September 2006), pp.186-190

⁶⁰ Beauregard & Paquette, *Neural correlates of a mystical experience*, p.186

⁶¹ Beauregard & Paquette, *Neural correlates of a mystical experience*, p.187. In the study, the Mystical condition was when subjects were "asked to remember and relive (eyes closed) the most intense mystical experience ever felt in their lives as a member of the Carmelite Order. This strategy was adopted given that the nuns told us before the onset of the study that 'God can't be summoned at will'." (p.187)

⁶² Beauregard & Paquette, *Neural correlates of a mystical experience*, p.188

In a follow-up study using the same group of nuns,⁶³ electroencephalography (EEG) was used to identify the neuroelectrical correlates of a Christian mystical experience.⁶⁴ Changes in the subject during the mystical experience were mediated by marked changes in EEG power and coherence, implicating several cortical areas of the brain in both hemispheres.⁶⁵

Epilepsy patients have also been observed having religious experiences during (ictal), after (postictal), and in between (interictal) seizures.⁶⁶ Some suggested links between religious phenomena and cortical function include the Limbic system; even neocortical areas for ideations occurring with religious experiences.⁶⁷

It has been suggested that personalities like Saint Birgitta could have had epilepsy.⁶⁸ Neurological processes also probably are underneath interictal religiosity, though social and psychological elements may be involved. The literature and personal cases suggest that ictal religious experiences, like other ictal experienced phenomena, are more linked with a seizure focus in the right hemisphere. Postictal religiosity, like postictal psychosis and delusions, is common with bilateral temporal lobe seizure foci or dysfunction. The right hemisphere may have a unique role in experiential and personality features associated with the emotional, corporeal, and spiritual self. The right frontal lobe may be principally responsible for the aspects of personality, e.g. social, political, and religious values. The question has been raised: God may speak via the temporal lobes; or does the brain have an evolved function giving religious persons a survival advantage?⁶⁹

⁶³ Mario Beauregard and Vincent Paquette, "EEG activity in Carmelite nuns during a mystical experience," *Neuroscience Letters* Vol.444 No.1 (17 October 2008), pp.1-4. Beauregard and Paquette call this "a sequel" to their 2006 functional magnetic resonance imaging (fMRI) study.

⁶⁴ There have been EEG studies of very deep meditation, but these researchers stress the Christian perspective. Beauregard & Paquette, *EEG activity in Carmelite nuns*, p.1.

⁶⁵ Beauregard & Paquette, *EEG activity in Carmelite nuns*, p.4.

⁶⁶ For example, Orrin Devinsky and George Lai, "Spirituality and Religion in Epilepsy," *Epilepsy & Behavior* Vol.12 No.4 (May 2008), pp.636-643; Rima Dolgoff-Kaspar et.al., "Numinous-like auras and spirituality in persons with partial seizures," *Epilepsia* Vol.52 No.3 (March 2011), pp.640-644 and Katia Lin et.al., "Sign of the Cross (*Signum Crucis*): Observation of an uncommon ictal manifestation of mesial temporal lobe epilepsy," *Epilepsy & Behavior* Vol.14 No.2 (February 2009), pp.400-403

⁶⁷ Devinsky & Lai, *Spirituality and Religion in Epilepsy*, p.641

⁶⁸ Joseph I.Sirven, Joseph F.Drazkowski and Katherine H.Noë, "Seizures Among Public Figures: Lessons Learned From the Epilepsy of Pope Pius IX," *Mayo Clinic Proceedings* Vol.82 No.12 (December 2007), pp.1535-1540

⁶⁹ Anne-Marie Landtblom, "Did St Birgitta suffer from epilepsy? A Neuropathography," *Seizure* Vol.13 No.3 (April 2004), pp.161-167 (p.167). Similarly some wonder if epilepsy could have influenced any Catholic doctrine created during Pius IX's papacy, Pope Pius IX (1792-1878, beatified

Others have investigated spiritual states independent of meditation, e.g. changes ranging from detachment from present body perceptions/actions to states of consciousness marked by weak self-other boundaries and feelings of strong connections of the self with the universe.⁷⁰ These are reflected in a stable personality dimension called self-transcendence (ST).⁷¹ In one study subjects were undergoing removal of brain glioma or neural brain tissue cancer. The idea was that ST is modulated by changes of neural activity in particular cortical areas. The findings were that removal of high-grade glioma and low-grade glioma affecting the posterior areas of the brain induced “a specific, significant, and reliable increase of ST. These changes were observed soon after cortical ablation, thus hinting at a specific role of the involved structures rather than at a slow adaptation process.”⁷² A stable personality trait like ST may change quickly due to brain lesions, indicating that at least some personality aspects may be altered by neural activity in certain areas.

Another area of study is the devil,⁷³ though ideas vary about demonic supernatural powers. With globalisation, African Christianity conducts worship services amidst post-Enlightenment, white Christian churches in Britain. Supernatural causes may explain mental illness for some religious-cultural communities but its use is debatable in secular medicine.⁷⁴ Historically, ‘madness’ in the form of schizophrenia and epilepsy were viewed as a result of possession by evil spirits.⁷⁵ A study found four adult patients in Haiti whose epileptic seizures were ascribed to Voodoo spirit

2000), particularly the approval process of 2 central doctrines of the Catholic Church: the immaculate conception of the Virgin Mary and papal infallibility. According to some biographers, “approval of dogma on the immaculate conception of the Virgin Mary was inherently Pius IX’s thanks to the Virgin Mary for having cured him of his epilepsy.” Sirven, Draskowski & Noe, *Epilepsy of Pope Pius IX*, p.1539

⁷⁰ Cosimo Urgesi et.al., “The Spiritual Brain: Selective Cortical Lesions Modulate Human Self-Transcendence,” *Neuron* Vol.65 No.3 (11 February 2010), pp.309-319 (p.309)

Urgesi et.al., *The Spiritual Brain*, p.310

⁷² Urgesi et.al., *The Spiritual Brain*, p.314

⁷³ For instance, Stafford Betty, “The Growing Evidence for ‘Demonic Possession’: What Should Psychiatry’s Response be?,” *Journal of Religion and Health* Vol.44 No.1 (Spring 2005), pp.13-30

⁷⁴ Gerard Leavey, “The Appreciation of the Spiritual in Mental Illness: A Qualitative Study of Beliefs Among Clergy in the UK,” *Transcultural Psychiatry* Vol.47 No.4 (September 2010), pp.571-590.

Compare to Susan Smith, “Spirit and Spirits: The Shape of a Catholic Pneumatology of Healing,” in Elaine M.Wainwright (ed.), *Spirit Possession, Theology, and Identity: A Pacific Exploration* (Hindmarsh, S.A.: ATF Press, 2010), pp.241-269

⁷⁵ See Thomas P.Bleck, “Historical Aspects of Critical Care and the Nervous System,” *Critical Care Clinics* Vol.25 No.1 (January 2009), pp.153-164

possession, improved after medical treatment.⁷⁶ Several brain diseases can cause abnormal behaviours describable as demonic possession.⁷⁷ So, are ‘spirits’ the hallucinations of a sick brain, or do they exist?⁷⁸ If an *alien* spiritual being could “interact with a living brain, that would suggest *a fortiori* that an *inborn* spiritual being - what we call a soul - could interact with it.”⁷⁹

Interestingly there are also studies of experiences of a presence, ‘another consciousness’. Personal proximity of a Sentient Being is attributed to spirits and the Muses.⁸⁰ If all experiences are generated by the brain, it is claimed that “experiences of all Sentient Beings, including God, should be generated by brain activity.”⁸¹ In one study, weak complex magnetic fields were applied that produced experiences of sensed presence or experiences of another consciousness in close proximity,⁸² e.g. sensing a known deceased person.⁸³ This ‘God helmet’ was even tried by non-believer Richard Dawkins, without great effect.⁸⁴

Prayer, Pain, Dark Night

Now to consider some cases of religious practices. Prayer experiments assess claims about healing power,⁸⁵ something not respected in the academic medical

⁷⁶ A.E.Cavanna, S.Cavanna and A.Cavanna, “Epileptic seizures and spirit possession in Haitian culture: Report of four cases and review of the literature,” *Epilepsy & Behavior* Vol.19 No.1 (September 2010), pp.89-91

⁷⁷ Guillaume Sébire, “In search of lost time from ‘Demonic Possession’ to anti-N-methyl-D-aspartate receptor encephalitis,” *Annals of Neurology* Vol.67 No.1 (January 2010), pp.141–142

⁷⁸ Betty, *The Growing Evidence for ‘Demonic Possession’*, pp.18-19

⁷⁹ Betty, *The Growing Evidence for ‘Demonic Possession’*, p.26

⁸⁰ L.S.St.-Pierre and M.A.Persinger, “Experimental facilitation of the sensed presence is predicted by the specific patterns of the applied magnetic fields, not by suggestibility: re-analyses of 19 experiments,” *International Journal of Neuroscience* Vol.116 No.9 (September 2006), pp.1079-1096

⁸¹ God is understood very broadly here. St.-Pierre & Persinger, *Experimental facilitation of the sensed presence*, p.1080

⁸² John Nicholas Booth and Michael A.Persinger, “Discrete Shifts Within the Theta Band Between the Frontal and Parietal Regions of the Right Hemisphere and the Experiences of a Sensed Presence,” *The Journal of Neuropsychiatry and Clinical Neurosciences* Vol.21 No.3 (Summer 2009), pp.279-283

⁸³ The results have consistencies with other studies of patients with temporal lobe epilepsy and reporting sudden religious conversions and the feeling of powerful presences of God. Booth & Persinger, *Discrete Shifts Within the Theta Band*, p.282

⁸⁴ John Cornwell, “Science fiction on the BBC,” *The Tablet* Vol.257 No.8481 (12 April 2003), p.20

⁸⁵ Jeff Levin, “And Let Us Make Us a Name”: Reflections on the Future of the Religion and Health Field.” *Journal of Religion and Health* Vol.48 No.2 (June 2009), pp.125-145 (p.135). See also the information study by Wendy Cadge, “Saying Your Prayers, Constructing Your Religions: Medical Studies of Intercessory Prayer,” *The Journal of Religion* Vol. 89 No.3 (July 2009), pp.299-327 and remarks in Patricia Fosarelli, “Outcomes of Intercessory Prayer for Those Who Are Ill: Scientific and Pastoral Perspectives,” *The Linacre Quarterly* Vol.78 No.2 (May 2011), pp.125-137

community.⁸⁶ Neuroscientific studies concentrate on the brain, rather than prayers' efficacy. A study of Danish Christians used fMRI to explore how improvised and formal praying changed their evoked BOLD [blood oxygen level-dependent] response.⁸⁷ It was expected that praying differs in cognitive content and their neural correlates. Two forms of praying were used corresponding to a highly formal institutional mode of religion: with rehearsed and rigidly performed actions and speech acts; and a non-institutional mode: with improvised actions and speech acts. The Lord's Prayer was a highly formalized 'Speech act' used; and Personal Praying was an improvised 'Speech act'.⁸⁸

The results support the general assumption that "different forms of religious praying are defined by diverse cognitive features and subserved by different networks of activation."⁸⁹ Personal Praying also activated the temporopolar region associated both with processing of social narratives and autobiographical memory.⁹⁰ Compared to formal praying, improvised forms of praying were better able to activate 'theory of mind' processing.⁹¹ The Lord's Prayer and Personal praying activate dissimilar neural regions. Brain areas of social cognition recruited during personal prayer suggests that praying to God is an intersubjective experience.⁹²

Religious states can also affect pain. One investigation used fMRI to explore the perception and neural processing of pain in 12 practicing Catholics and 12 non-religious subjects. They were given noxious electrical stimulation while presented with an image of the Virgin Mary ('religious condition') or a matched image without a religious connotation ('non-religious condition'). Individuals were instructed to look at the presented image for 30 seconds before electrical stimulation and during

⁸⁶ Jane Teas, "Medicine Can Give Me a Diagnosis, and Faith Can Give Me a Different Prognosis: Faith and Healing in the American South," *Explore: The Journal of Science and Healing* Vol.6 No.1 (January-February 2010), pp.17-21

⁸⁷ Uffe Schjoedt et.al.. "Highly religious participants recruit areas of social cognition in personal prayer," *Social Cognitive and Affective Neuroscience* Vol.4 No.2 (June 2009), pp.199-207. See also Uffe Schjødt et.al., "Rewarding prayers," *Neuroscience Letters* Vol.443 No.3 (10 October 2008), pp.165-168

⁸⁸ Schjoedt et.al.. *Highly religious participants*, p.200

⁸⁹ Schjoedt et.al.. *Highly religious participants*, p.202

⁹⁰ Schjoedt et.al.. *Highly religious participants*, p.205

⁹¹ Whereas highly formalised prayers generally comprise regularly rehearsed, non-personal and abstracted content. Schjoedt et.al.. *Highly religious participants*, p.205

⁹² It also offers "important insights to the study of theology, in which Christian doctrine on God's nature includes abstract concepts like God's omnipresence, omniscience, omnipotence, the Trinity and the Holy Spirit." Schjoedt et.al.. *Highly religious participants*, p.205

that. After each stimulation period individuals rated the intensity of the stimulation they perceived.

The researchers analysed whether religious belief could be shown experimentally to modulate pain and whether modulation of pain by religious belief is mediated by the right the ventrolateral prefrontal cortex (VLPFC), the vital brain area implicated in high-level pain-modulatory effect.⁹³ Religious believers were able to down-regulate the perceived intensity of a noxious stimulation when presented with a religious image. Presentation of a non-religious image had no effect on pain perception. Non-religious control participants showed no modulation of pain when presented with either of the pictures.⁹⁴ One explanation is that Catholics could have reappraised the negative experience of pain by using the religious image, by reinterpreting the meaning of a stimulus, thereby altering emotional responses.⁹⁵ The research is interdisciplinary.⁹⁶

‘Religious’ experience also features in saints and the mentally ill, whose brains may recruit similar regions and manifest themselves physiologically in parallel ways. The term ‘Dark Night of the Soul’ originates from the Carmelite mystic Saint John of the Cross (1542-1591), describing phases in the spiritual life.⁹⁷ It is a metaphor for loneliness and desolation during crises of faith or in relationship with God. Therefore, “in spite of the emotional distress experienced in this period of darkness, the Dark Night is perceived to be a divine gift in disguise, whereby the individual can be transformed and purified, their faith deepened and reinforced and the union with God brought closer.”⁹⁸

⁹³ Katja Wiech et al., “An fMRI study measuring analgesia enhanced by religion as a belief system,” *Pain* Vol.139 No.2 (15 October 2008), pp.467-476

⁹⁴ Wiech et al., *An fMRI study measuring analgesia*, p.473.

⁹⁵ The results could have “wider implications regarding how major cultural influences such as religious belief might change the developing brain and its subsequent capacity for dealing with life’s challenges.” Wiech et al., *An fMRI study measuring analgesia*, p.475

⁹⁶ Jeanne D. Talbot, “Something about Mary,” *Pain* Vol.139 No.2 (15 October 2008), pp.241-242. Talbot comments on Wiech et al.’s study. It managed “the rare feat of contributing to distant and disparate areas of research. It is a collaborative endeavor, involving the faculties of clinical neurology, divinity, theology and philosophy.” (p.241)

⁹⁷ G. Durà-Vila and S. Dein, “The Dark Night of the Soul: spiritual distress and its psychiatric implications,” *Mental Health, Religion & Culture* Vol.12 No.6 (September 2009), pp.43-559; Kevin Culligan OCD, “The Dark Night and Depression,” *Presence: The Journal of Spiritual Directors International* Vol.10 No.1 (February 2004), pp.9-19; Nancy Pfaff, “Spiritual Direction and the Dark Night of the Soul,” *Presence* Vol.4 No.2 (May 1998), pp.32-43

⁹⁸ Durà-Vila & Dein, *The Dark Night of the Soul*, p.544

Advanced mystical spirituality parallels the continuum of schizophrenic and schizoaffective conditions.⁹⁹ The felt *deletions* of presence could be the phenomenological demarcation points for anhedonia (without pleasure) of psychoticism and also for spiritual suffering in mysticism as metapathological loss of meaning which intensifies as the ‘dark night of the soul’.¹⁰⁰

In schizoaffective anhedonia the tendency towards loss of felt presence finally completes itself, whereas with ‘mystical poverty’, “a deepening of meditative witnessing reveals a nonsubstantiality within previous enhancements of presence - only to be transformed into more subtle levels of unitive mysticism with a more complete letting go of the ordinary boundaries of self.”¹⁰¹ The schizophrenic anhedonia distills the despair of the spiritual dark night, but lacks its previous tacit assurance of a steadily expanded presence. Some pain of the ‘dark night’ is caused by the memory of this contrast and “the awareness of a seemingly complete loss of meaning in the very midst of its ostensibly more authentic realization. This broader context ‘contains’ spiritual despair as a ‘meta’ version of the more total life context of suffering in the patient.”¹⁰²

The above cases highlight the serious scientific interest in religious phenomena, which prompts theological attention. It is an interdisciplinary subject involving scientists and theologians with varying and at times contentious interpretations.

Critique of Neurotheology

Now established in the science and religion interface,¹⁰³ neurotheology is “the field of study linking the neurosciences with religion and theology,”¹⁰⁴ evaluating

⁹⁹ Harry T.Hunt, “‘Dark Nights of the Soul’: Phenomenology and Neurocognition of Spiritual Suffering in Mysticism and Psychosis,” *Review of General Psychology* Vol.11 No.3 (September 2007), pp.209–234

¹⁰⁰ Metapathologies arise from intense spiritual or mystical experiences, which William James called ‘theopathies’. Hunt, *Dark Nights of the Soul*, p.213

¹⁰¹ Hunt, *Dark Nights of the Soul*, p.220

¹⁰² Hunt, *Dark Nights of the Soul*, p.220. See also Phyllis Zagano and C.Kevin Gillespie, “Embracing Darkness: A Theological and Psychological Case Study of Mother Teresa,” *Spiritus* Vol.10 No.1 (Spring 2010), pp.52-75. Zagano and Gillespie conclude that “we can be certain Mother Teresa suffered much sadness in her life, but there is no real evidence of her being clinically depressed. We can be certain that she was invited to Dark Night of the Senses, and the signs of Dark Night of the Spirit are never clear.” (p.71)

¹⁰³ Michael Trimble, *The Soul in the Brain: The Cerebral Basis of Language, Art, and Belief* (Baltimore: The Johns Hopkins University Press, 2007); William A.Rottschaefer, “The Image of God of Neurotheology: Reflections of Culturally Based Religious Commitments or Evolutionarily Based

theological principles,¹⁰⁵ and relevant to the human soul.¹⁰⁶ Science too might need evaluation from religious or theological perspectives.¹⁰⁷

The method does not “specifically presume, *a priori*, that either the material universe or God should have priority. Rather, neurotheology strives to determine the nature of that relationship priority *a posteriori*.”¹⁰⁸

Generally, two enterprises are distinguished:¹⁰⁹ *neurotheology* as a form of neuroscience, the neuroscientific study of religious phenomena such as beliefs, practices and behaviour. This neuroscientific study of religion is divided into reductionist and religionist schools. Reductive neuroscience of religion aims to “disprove the reality or importance of religion and to replace it with non-mysterious neurological functions (or malfunctions),”¹¹⁰ as seen in the work of researcher Michael Persinger. Religionist neuroscience of religion is about manifesting the neural foundations of religious phenomena and ‘genuine’ neural events that accompany the phenomena, e.g. d’Aquili and Newberg, who like Persinger seek to replace theology with the new neuroscientific understanding of religion.¹¹¹

Then, *neurotheology* as a form of theology is the neurologically-informed theological reflection on the data.¹¹² For example, taking evidence from neuroscience to justify or confirm claims in theology, such as the work of J.B.Ashbrook and C.R.Albright

Neuroscientific Theories?,” *Zygon* Vol.34 No.1 (March 1999), pp.57–65; James B.Ashbrook and Carol Rausch Albright, “The Humanizing Brain: An Introduction,” *Zygon* Vol.34 No.1 (March 1999), pp.7-43

¹⁰⁴ Andrew B.Newberg, *Principles of Neurotheology* (Farnham, Surrey & Burlington, Vermont: Ashgate, 2010), p.45. Newberg concedes he has “never been comfortable with the term, ‘neurotheology’...my greatest concern has always been the lack of clarity about what neurotheology is and what it should try to do as a field. Try as I might to avoid using neurotheology in my articles and books, it seems to be something that simply will not go away – at least any more than God.” (p.ix)

¹⁰⁵ Newberg defines and distinguishes soul, religion, religiousness, spirituality, belief, faith, theology, God, and science. See Newberg, *Principles of Neurotheology*, pp.48-49

¹⁰⁶ Alison J.Gray, “Whatever happened to the soul? Some theological implications of neuroscience,” *Mental Health, Religion & Culture* Vol.13 No.6 (September 2010), pp.637–648

¹⁰⁷ Newberg, *Principles of Neurotheology*, p.46

¹⁰⁸ Newberg, *Principles of Neurotheology*, p.46

¹⁰⁹ Pierre-Yves Brandt, Fabrice Clément and Russell Re Manning, “Neurotheology: challenges and opportunities,” *Schweizer Archiv für Neurologie und Psychiatrie* Vol.161 No.8 (2010), pp.305-309. The authors note how one of the early popularises the term, James Ashbrook seemed uncomfortable with the term, “his first use of the word is immediately followed by the disclaimer ‘for want of a simpler label’.” (p.305)

¹¹⁰ Brandt, Clément & Manning, *Neurotheology*, p.306

¹¹¹ Brandt, Clément & Manning, *Neurotheology*, p.306

¹¹² Brandt, Clément & Manning, *Neurotheology*, p.305

(*The Humanizing Brain*, 1997) is read as an apologetic “natural theology of the brain.”¹¹³

Mysticism raises philosophical questions,¹¹⁴ and so does neurotheology. The perception of an absolute reality would have an expectation that God is more than a knowable being, and personifications of God would use symbolic language to grasp the ungraspable.¹¹⁵ Human minds are drawn to this deeper reality of oneness or no-suffering. Therefore, spirituality will continue to shape human experiences. God, however defined, will not go away.¹¹⁶

Some have welcomed such research.¹¹⁷ But while Newberg sees human *experience* as a biological construction, he could be suggesting that God may be due to neurological conditioning and religious experience results from the limbic system.¹¹⁸ This notion of God, limited to a three-and-a-half-pound brain, appears too small for a 15-billion-year-old-universe.¹¹⁹ An evolving universe features matter moving toward spirit and human consciousness. This emergence of human life relies on evolution plus an inner drive towards spiritual transcendence.¹²⁰

But there are other problems, e.g. the goal of the neurological study of religious beliefs, behaviour and experience (RBBE) is to investigate the hypothesis that there are reliable brain-RBBE correlations of activity. If these correlations are identified, how does it matter and what will it tell us?¹²¹ Cognitive neuroscientists are not dedicated to formulating a comprehensive model, but are interested in the neural

¹¹³ Brandt, Clément & Manning, *Neurotheology*, p.306

¹¹⁴ Matthew C.Bagger, “Anti-Representationalism and Mystical Empiricism,” *Method & Theory in the Study of Religion* Vol.20 No.4 (2008), pp.297-307

¹¹⁵ Andrew Newberg, Eugene D'Aquili and Vince Rause, *Why God Won't Go Away: Brain Science and the Biology of Belief* (New York: Ballantine Books, 2001), p.161. That is, various incarnations of God are metaphorical interpretations of the same spiritual reality – the reality experienced as Absolute Unitary Being.” (p.162)

¹¹⁶ Newberg, d'Aquili & Rause, *Why God Won't Go Away*, p.172

¹¹⁷ Ilia Delio, OSF, “Brain Science and the Biology of Belief: A Theological Response,” *Zygon* Vol.38 No.3 (September 2003), pp. 573–585; Len Sperry, “Spirituality, Liturgy and Biology,” *Human Development* Vol.21 No.2 (Winter 2001), pp.27-33

¹¹⁸ Delio, *Brain Science and the Biology of Belief*, p.577

¹¹⁹ Delio, *Brain Science and the Biology of Belief*, p.578..

¹²⁰ Ilia Delio OSF, *Christ in Evolution* (Maryknoll, New York: Orbis Books, 2008), p.21

¹²¹ Wesley J.Wildman and Patrick McNamara, “Challenges Facing the Neurological Study of Religious Belief, Behavior and Experience,” *Method and Theory in the Study of Religion* Vol.20 No.3 (2008), pp.212-242. (p.213)

basis of highly specific cognitive functions.¹²² Others argue that surprisingly little is known about the neural foundations of religiosity.¹²³ Results can be interpreted that particular aspects of religious belief are mediated by recognised brain networks, and support current psychological theories that locate religious belief within evolutionary adaptive cognitive functions.¹²⁴

There are also difficulties with introspection as a method, involving privileged access, self-reports of subjective experiences, and the use of ‘mature contemplatives’.¹²⁵ Assumptions are questioned, e.g. that religious experience is mystical experience.¹²⁶ There is an appeal to keep religious agendas away from research, like phenomenologists who bracketed out their spiritual preferences. Otherwise the results might indicate nothing other than teleological confirmation of religious claims.¹²⁷

Nonetheless, the research as a whole seems reductionist and materialistic, which can dismiss conscious relationship with the mystery of God and religious experiences as the products of electrochemical brain activities.¹²⁸ There can be meaningful, faith-based, lives of the mystics which are not just experiences of their religious ‘states’¹²⁹

A.Coles remarks how neurotheology has been “an embarrassment” when “privatized discussions, over-interpreted accounts of poor experiments are recycled to construct

¹²² Wesley J.Wildman and Patrick McNamara, “Evaluating Reliance on Narratives in the Psychological Study of Religious Experiences,” *International Journal for the Psychology of Religion* Vol.20 No.4 (October-December 2010), pp.223-254. Cf.also Fraser Watts, *Theology and Psychology*, Ashgate Science and Religion Series (Aldershot, Hants and Burlington, Vermont: Ashgate, 2002), p.83

¹²³ Dimitrios Kapogiannis et.al, “Cognitive and neural foundations of religious belief,” *Proceedings of the National Academy of Sciences of the United States of America* Vol.106 No.12 (24 March 2009), pp.4876-488

¹²⁴ Kapogiannis et.al, *Cognitive and neural foundations*, p.4876

¹²⁵ Armin W.Geertz, “When cognitive scientists become religious, science is in trouble: On neurotheology from a philosophy of science perspective,” *Religion* Vol.39 No.4 (December 2009), pp.319-324 (p.320). He sees “power struggles between religious interest groups and scientists. Results are often a blend of attempts to debunk scientific evidence, perform pseudoscientific experiments and/or use little understood scientific results to legitimate religious techniques and claims.” (p.319)

¹²⁶ Geertz, *When cognitive scientists become religious*, p.321

¹²⁷ Geertz, *When cognitive scientists become religious*, p.324

¹²⁸ Pat Collins CM, *Mind and Spirit: Spirituality and Psychology in Dialogue* (Dublin: The Columba Press, 2006), p.159. Similarly with explanations of mysticism.

¹²⁹ Peter Hampson, “Beyond Unity, Integration and Experience: Cultural Psychology and the Theology of Mediaeval Mysticism,” *New Blackfriars* Vol.86 No.1006 (November 2005), pp.622–641 (p.631)

grand schemes to explain religious experience.”¹³⁰ For example, on SPECT scanning of eight Tibetan meditators and some Franciscan nuns, he observes, “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.”¹³¹

Apropos of this, recent scanning research has been almost entirely American,¹³² is generally restricted to small sample sizes, some specialised activities such as meditation, and firm generalisations are not possible. Religious life is so multifaceted that it appears probable that most brain areas are involved somehow. Thus the proper question is “not where religion is located in the brain, but rather how different aspects of religious life and experience can be mapped on to different areas of the brain.”¹³³ The cognitive systems involved in religion are a possible place to start before searching for their neural bases. To try to go straight “from religion to the brain, without mediation through cognitive psychology, has only a slim chance of paying off.”¹³⁴

Two conditions are proposed to explain religion via neuroimaging studies of religious experience. 1. The noncircularity constraint where the neuroscientific data has to be independent of an existing religious tradition. If a religious tradition has to be invoked so as to claim the existence of data, or to or characterise their relevance to explaining religion, then such data obviously cannot be used to account for the emergence of that very religious traditions.”¹³⁵

2. The sufficiency constraint, where the data must, *ceteris paribus*, indicate sufficient conditions for the emergence of a tradition. The *ceteris paribus* clause is important since brain properties alone may be strictly insufficient for the emergence of religion because of all types of further conditions required for religion to emerge.¹³⁶ Certain ‘hard-wired experiences’ may or may not be necessary to explain religion, yet they can never be sufficient because the neuroscientific data requires additional

¹³⁰ Alasdair Coles, “God, theologian and humble neurologist,” *Brain* Vol.131 No.7 (July 2008), pp.1953-1959 (p.1954)

¹³¹ Coles, *God, theologian and humble neurologist*, p.1956

¹³² Fraser Watts, “Psychology, Religion & Theology - A Response to Malcolm Jeeves,” *Science and Christian Belief* Vol.21 No.1 (April 2009), pp.55-60

¹³³ Watts, *Psychology, Religion & Theology*, p.59

¹³⁴ Watts, *Psychology, Religion & Theology*, p.59

¹³⁵ Azari & Slors, *From Brain Imaging Religious Experience*, p.74

¹³⁶ Azari & Slors, *From Brain Imaging Religious Experience*, p.74

sociological, psychological and epistemological considerations. The outcome is that “there cannot be a naturalistic explanation of religion primarily in terms of neuroscientific data. Hence the sufficiency condition is violated.”¹³⁷

How about a ‘God spot’ in the brain? Activation of one brain area is unlikely to solely correspond with a particular experience. A better way is to “think of a God-receptive (or God-activated?) brain state as opposed to a God spot. . .it is also not unreasonable to assume that partial activation through other means (direct electrical stimulation, drugs, some types of meditation, etc.) might mimic or promote experiences of the divine.”¹³⁸ Not all religious experiences are ontologically equivalent, but discovering authentic experiences, assuming God exists, and those that imitate such states, is a formidable undertaking.¹³⁹

Reproducibility of phenomena is an issue for faith’s unpredictable events,¹⁴⁰ e.g non-reproducibility of most mystical experiences. The very nature of these experiences suggests that they are not under the subject’s control. Many reports indicate that the experiences are under conditions where the subject had no prior expectations. Hence it is exceptionally difficult to extrapolate from the experimental data to a general model of neural substrates of religious experience.¹⁴¹ Yet, humans have a choice in relating to God.¹⁴²

Consider a review by Alexander A.Fingelkurts and Andrew A.Fingelkurts who ask, “Is our brain hardwired to believe in and produce God, or is our brain hardwired to perceive God?”¹⁴³

¹³⁷ Azari & Slors, *From Brain Imaging Religious Experience*, p.78

¹³⁸ Keith Crutcher, “Is There a God Spot in the Brain?,” in *Advances in Neuroscience: Social Moral Philosophical Theological Implications*, Proceedings of the ITEST Workshop September 2002 (St.Louis, Missouri: ITEST Faith/Science Press, 2003), pp.1-20 (p.12).

¹³⁹ Crutcher, *Is There a God Spot in the Brain?*, p.12

¹⁴⁰ Crutcher, *Is There a God Spot in the Brain?*, pp.7-8

¹⁴¹ Crutcher, *Is There a God Spot in the Brain?*, p.10

¹⁴² Carlos Fayard, Melissa J.Pereau and Antonia Ciovica, “‘Love the Lord With All Your Mind’: Explorations on a Possible Neurobiology of the Experience of God and Some Implications for the Practice of Psychotherapy,” *Journal of Psychology and Christianity* Vol.28 No.2 (Summer 2009), pp.167-181 (p.167)

¹⁴³ Alexander A.Fingelkurts and Andrew A.Fingelkurts, “Is our brain hardwired to produce God, or is our brain hardwired to perceive God? A systematic review on the role of the brain in mediating religious experience,” *Cognitive Processing* Vol.10 No.4 (November 2009), pp.293–326

Arguments for the ‘producing’ or a neuroscientific and/or cognitive view, are reductionistic where the brain is structured to provide experiences that make humans believe there is a God, yet this belief may be due to brain activity and their interpretations,¹⁴⁴ Arguments for a ‘perceiving’ or a theological view, are summarised as: “our brains have the capacity to perceive God, and since our brain is designed to attune us to reality, this points to the likelihood that there is a God.”¹⁴⁵

The brain evolved as an organ, capable of self-reflection but also of experiencing something higher than itself. This stems from a form of causation unlike physics: mental/conscious agency which not identical with or reducible to brain processes and exerts downward causation on brain plasticity. Their review does not prove a ‘perceiving’ point of view but does not disprove it either.¹⁴⁶

The review found neuroscience neither proved a ‘producing’ view nor disproved a ‘perceiving’ view. The conclusion is that religious experience is manifested in brain activity and that the brain somehow mediates some features of religiosity.¹⁴⁷ The question “Is our brain hardwired to believe in and produce God, or is our brain hardwired to perceive God?” remains unanswered. Both sides are unified in subjective experience and upheld by brain processes.

The problem appears to be unsuitable levels of description and explanation. The reviewers see a problem of conceptualisation reducing religious experience to brain activity only and implicitly or explicitly presuming that religious experience is a by-product cognitive or brain process. Yet the authors also look to theologians who often reject the relevance of biology for explaining religious experience.¹⁴⁸ The results suggest that the potential for religious experience is an innate biological characteristic. Development of this characteristic is “a biosocial issue, and the realisation of religious experience is a psychobiological issue. Thus, all this makes it suitable for ‘bridging’ biology and theology to describe and later to explain religious experience.”¹⁴⁹

¹⁴⁴ Fingelkurts & Fingelkurts, *Is our brain hardwired?*, p.300

¹⁴⁵ Fingelkurts & Fingelkurts, *Is our brain hardwired?*, p.312

¹⁴⁶ Fingelkurts & Fingelkurts, *Is our brain hardwired?*, p.313

¹⁴⁷ Fingelkurts & Fingelkurts, *Is our brain hardwired?*, p.312

¹⁴⁸ Fingelkurts & Fingelkurts, *Is our brain hardwired?*, p.314

¹⁴⁹ Fingelkurts & Fingelkurts, *Is our brain hardwired?*, p.314

But religious experience is a subjective psycho-neurophysiological phenomenon. To understand and *explain* it fully, Fingelkurts and Fingelkurts find it needs *description* of its physical, biological, psychological, sociological and spiritual dimensions. Neuroscience cannot offer a reliable *explanation* for religious experience.¹⁵⁰ A methodological shift is proposed from ‘explanation’ to ‘description.’ The effects they foresee are a reduction of (a) misinterpretation of results, (b) desired logical speculations and (c) explanations which have limited phenomenological adequacy.¹⁵¹

Within a Catholic theological framework, Wilfried Apfalter proposes neurotheology as part of theology.¹⁵²

1. Catholic neurotheology would look to the neurosciences and the cognitive sciences theologically.¹⁵³
2. Catholic neurotheology would try to “flesh out cognitive and neuroscientific details of magisterial infallibility,”¹⁵⁴
3. The theology of creation and Trinitarian theology are centrally relevant
4. Catholic neurotheology would explore the neuroscientific relevance of the Eucharistic liturgy’s proclamation of the ‘mystery of faith,’¹⁵⁵
5. The question of souls during and after death is very challenging for Catholic neurotheology,¹⁵⁶

¹⁵⁰ Cognitive neuroscience can contribute to an overall description of religious experience on biological and psychological levels. This needs to occur prior to reliable explanations for religious experience can be constructed. Fingelkurts & Fingelkurts, *Is our brain hardwired?*, p.316

¹⁵¹ Fingelkurts & Fingelkurts, *Is our brain hardwired?*, p.316.

¹⁵² It would be part of Catholic theology with reference to the magisterium and canonical regulations. Wilfried Apfalter, “Neurotheology: What Can We Expect from a (Future) Catholic Version?,” *Theology and Science* Vol.7 No.2 (2009), pp.163-174. The biographical note reads, “Wilfried Apfalter is a doctoral student at the Department of Philosophy and at the Department of Neurobiology and Cognition Research at the University of Vienna in Austria.” (p.174)

¹⁵³ It would make “Catholic beliefs, doctrines and teachings more amenable to an up-to-date neuroscientific point of view wherever possible, and at the same time almost certainly would try to carry on always acting theologically accountable and fruitful.” Apfalter, *Neurotheology*, p.170

¹⁵⁴ Apfalter, *Neurotheology*, p.166. For example, Vatican I’s *Dei Filius* which forbids faithful Christians to defend conclusions of science known to be contrary to the faith especially those condemned by the church. If so Apfalter realises that “on this basis Catholic neurotheology is not very likely to become a fully accepted peer-partner of established neurosciences soon.” (p.166)

¹⁵⁵ Apfalter, *Neurotheology*, p.168. It would “try to show in detail how and to what extent the annunciation of Christ’s death and the professing/praising of his resurrection are actually involved in representing the ‘mystery of faith.’” (p.168)

¹⁵⁶ Apfalter, *Neurotheology*, p.169. He recognises that the notion of immortal souls “currently lacks support from neuroscientific evidence and without much doubt, also contradicts with the professional opinion of most contemporary neuroscientists worldwide. Likewise, the ontological status and the functional roles, etc. of souls before death are controversial, too.” (p.169)

Apfalter considers inter- and transdisciplinarity work on the boundaries.¹⁵⁷ There could be practice with the goal of “becoming a peer-partner of the neurosciences.”¹⁵⁸ This is possible only if neurotheological statements are rigorously testable, exclude competing alternatives and rely on independently justified auxiliary propositions. It requires very clear and detailed doctrinal statements and Apfalter also foresees challenges to the magisterium.

Additionally, it would need some change toward a more ‘realistic’ position; i.e. really accepting ‘reality’ as the fundamental criterion of knowledge. Maybe then Catholic theology would gain a new understanding of ‘theological experience’.¹⁵⁹ Or Catholic neurotheology could be a strictly theological project. So that subjects in neurotheology may go beyond traditional theological ones and its methodology and the general pattern of arguments could remain unchanged. For instance, arguing that the sciences are incomplete. Catholic neurotheology could simply “define itself a discipline in fundamental theology, thereby restricting itself to asking primarily theological questions that arise from the scientific models. Perhaps this second mode is more likely to occur.”¹⁶⁰

Faith, neuroscience and theology can intersect, though not always as ‘neurotheology’,¹⁶¹ e.g. cross-disciplinary integration of neurology, psychology and religion.¹⁶²

Critique of Materialist Interpretations

Materialist neuroscience can be portrayed as having a common cultural assumption that sees religious experience as delusional.¹⁶³ This assumption equates religious

¹⁵⁷ Apfalter, *Neurotheology*, p.170. In short, “we can expect some intriguing negotiations stimulated by the realization of a Catholic neurotheology that attempts to maintain a genuine Catholic theological character.” (pp.170-171)

¹⁵⁸ Apfalter, *Neurotheology*, p.169

¹⁵⁹ Apfalter, *Neurotheology*, p.170

¹⁶⁰ Apfalter, *Neurotheology*, p.170. In any case, a Catholic neurotheology clearly “would still/again be occupied to some degree with making ‘invisible’ things becoming (more) ‘visible’.” (p.170)

¹⁶¹ Philip Clayton, “Neuroscience, the Person, and God: An Emergentist Account,” *Zygon* Vol.35 No.3 (September 2000), pp.613–652; William P.Cheshire, “Till We Have Minds,” *Ethics & Medicine* Vol.25 No.1 (Spring 2009), pp.11-16

¹⁶² Warren S.Brown, “The Brain, Religion, and Baseball: Comments on the Potential for a Neurology of Religion and Religious Experience,” Patrick McNamara (ed.), *Where God and Science Meet, Volume 2. The Neurology of Religious Experience* (Westport, Connecticut and London: Praeger Perspectives, 2006), pp.229-244

experience with neurophysiology: yet a fallacy, some claim. If consciousness evolved, why has it evolved? There may be no persuasive answer; “the relationship between brain and consciousness is like that between two dancers who always move together, but sometimes with one and sometimes the other taking the lead.”¹⁶⁴

But M.Beaugard and D.O’Leary present a nonmaterialist account of human nature because a materialist explanation is incomplete, monistic and seeks to refute any contrary evidence. It makes a spiritual nature for human beings unattainable because it insists that “even if materialist science does not offer satisfactory explanations now, we must stick with its unsatisfactory insights, in the hope that better ones will arrive someday.”¹⁶⁵ Materialist neuroscience they argue cannot explain mind or free will in the context of brain, mind and determinism.¹⁶⁶ Demonstrating that specific brain states are associated with spiritual/ mystical experiences “neither shows that such experiences are ‘nothing but’ brain states nor proves that God exists. It shows only that it is reasonable to believe that mystics do contact a power outside themselves.”¹⁶⁷

Neuroscientific studies of faith experiences do not in fact undermine faith. The brain’s neurological substrates enable spiritual states to be experienced as gifts of a divine creator. Materialist philosophers insist that such a substrate is meaningless and originated by chance.¹⁶⁸ Unsurprisingly, these views have been criticised by scholars in the academic literature.¹⁶⁹

¹⁶³ John Hick, *The New Frontier of Religion and Science: Religious Experience, Neuroscience and the Transcendent* (Basingstoke, Hampshire and New York: Palgrave Macmillan, 2006), p.204

¹⁶⁴ Hick, *The New Frontier*, p.205; cf also Matthew Ratcliffe, “Scientific naturalism and the neurology of religious experience,” *Religious Studies* Vol.39 No.3 (September 2003), pp.323-345

¹⁶⁵ Mario Beauregard and Denyse O’Leary, *The Spiritual Brain: A Neuroscientist’s Case for the Existence of the Soul* (New York: HarperCollins, 2007), p.24

¹⁶⁶ Beauregard & O’Leary, *The Spiritual Brain*, p.34

¹⁶⁷ Beauregard & O’Leary, *The Spiritual Brain*, p.38.

¹⁶⁸ Beauregard & O’Leary, *The Spiritual Brain*, p.39. This is because “materialism constrains them to think so. Nothing in the available scientific evidence requires that interpretation.” (p.40)

¹⁶⁹ Andy Clark, “There is no non-materialist neuroscience,” *Cortex* Vol.46 No.2 (February 2010), pp.147-149; Martha J.Farah and Nancy Murphy, “Neuroscience and the Soul.” *Science* Vol.323 No.5918 (27 February 2009), p.1168. Clark describes O’Leary as the ‘post-Darwinist’ journalist and multi-blogger; Clark, *There is no non-materialist neuroscience*, p.147

Similarly, if science can account for the experiences of spiritual growth and prayer, what remains of grace and intention in one's prayer life?¹⁷⁰ In fact, science can only explain the physicalist grounds for experience in prayer.¹⁷¹

Others argue that neuroimaging experiments cannot explain self-consciousness, true language and abstraction.¹⁷² To imply that observable neurological processes could ever "be the cause of a person's capacity for these immaterial capacities is to conflate an inferior cause (the human brain) with a superior effect (conceptual thought). But simple logic dictates that the perfection of effects can never exceed that of their cause."¹⁷³ In this view, the mind or spiritual intellect substantially united to a material body defines the human animal as an intelligent, free person. Human capacities for conceptual thought, as seen in mathematics and science, are able to transcend time and space and may be evidence of immaterial aspects of human beings. This exceeds the materialist nature of the perceptual processes of the brain which rely on present, material objects of thought.¹⁷⁴

In light of reductionist interpretations of neuroscience, the recommendation is that reading brain scans for human intentions is best done with an immaterialist anthropology and ethical mindset. Endowed with immaterial powers of intellect and will, humans are moral persons who are rooted in the natural world through their bodies yet transcend materiality. In this anthropology, each human being is essentially equal to all others, given accidental differences of gender, race, religion, developmental stages and acquired abilities. A meta-ethical grasp of brain scan experiments is adopted, upholding the metaphysical principles which grounds freedom, human rights, dignity and spirituality.¹⁷⁵

¹⁷⁰ Eugene Stockton, "Mysticism in the Australian Environment: Calls to a New Consciousness," *Compass* Vol.36 No.4 (Summer 2002), pp.12-16

¹⁷¹ Stockton elaborates, "the experience is not grace, that the experience of God is not God (but perhaps a pointer to God)...What is important is the loving intention towards God, rather than meditation for its own sake...however explained, spiritual growth is seen as the accompaniment or consequence of prayer, not the goal." Stockton, *Mysticism in the Australian Environment*, p.16

¹⁷² Renée Mirkes OSF, "Reading Brain Scans for Intention Identification: A Tale of Two Anthropologies," *Ethics & Medicine* Vol.24 No.2 (Summer 2008), pp.69-76.

¹⁷³ Mirkes, *Reading Brain Scans*, p.72.

¹⁷⁴ Mirkes, *Reading Brain Scans*, p.72

¹⁷⁵ Mirkes, *Reading Brain Scans*, p.74. She concludes that one cannot overestimate the importance of giving centre stage to such analysis in current public debates about neural research. While she does not call it so, it is obviously a high priority for what others have named 'neuroethics'.

Another interpretation is that the human spirit “with its operations of knowing and choosing, plus the psychic energy that becomes conscious in these operations, is what we can identify as ‘soul’.”¹⁷⁶ The operations of experiencing, questioning, concluding and choosing are the points of entry for divine influence.¹⁷⁷

Moreover, a further view is that some 30–40 000 years ago in Europe, humans suddenly gained the gifts of self-awareness, symbol, language and creativity, including spirituality ¹⁷⁸ *Homo sapiens* became *homo divinis*, slightly lower than God, an embodied likeness of God, 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.”¹⁷⁹

Critical Analysis

The neuroscientific research into religion, like other scientific experiments, is only possible because human beings have physical bodies, brains, and embodied minds. Christians would add that it is also possible because of a transcendent God whose existence, if believed in, provides a more complete context; and traditional Catholic teaching would include too the spiritual principle in human beings. Science aims to investigate hypotheses, generate results and attempts to explain the findings, even about human religious experiences, yet be open to revision as a science and to transcendent explanation by way of dialogue with Christianity.

Neuroscience generally has no subject-specific interest in the soul, but there is relevance in neuroscientific study of religion and religious experience insofar as it investigates a person’s brain and body which are united to the soul. Created in the

¹⁷⁶ Carla Mae Streeter OP, “Organism, Psyche, Spirit - Some Clarifications: Toward an Anthropological Framework For Working with the Neuro-Psycho-Sciences,” in *Advances in Neuroscience*, pp.52-71 (pp.64-65)

¹⁷⁷ Streeter says the soul is *deified* in the “very substance of its operations as it comes more and more under the influence of the divine...Human relationship with the divine describes *holiness*, and the unfolding of how grace, virtue and the gifts of the Spirit bring that holiness about.” Streeter, *Organism, Psyche, Spirit*, p.66

¹⁷⁸ Coles, *God, theologian and humble neurologist*, p.1958

¹⁷⁹ Coles, *God, theologian and humble neurologist*, p.1958

image of God, the traditional Catholic view of the human person is of a being, corporeal and spiritual, where "soul" signifies the spiritual principle.¹⁸⁰

The investigations detailed in this chapter have significance because they represent newer methods of approaching the mystical, spiritual and transcendent, attempting to measure the immeasurable.¹⁸¹ Scientific methods have included psychoanalysis¹⁸² and psychology of religion.¹⁸³ If the soul is accepted as a reality, then neuroimaging of brain activity would have links with the soul because of the soul/body unity. Something from a person's spiritual principle could be expressed bodily and thus be manifested in the brain, somewhere. The methodology naturally does not and indeed cannot apprehend a spirit, as it is a physicalist method. The methods also bracket out questions about the existence and influence of God, someone presumed to exist in a Christian understanding of body/soul.

Yet spiritual/religious experiences are proper areas for philosophy and theology. Criticism can be made of the understanding of religion in neuroscience where interpretations of results then make philosophical claims. For instance a robust causally-closed materialism: "but we have, in all the history of human thought and endeavour [sic.], not one single documented case in which something truly non-material (something, that is, that has no physical existence at all) has made the slightest difference to anything at all."¹⁸⁴ This view implies that mind is matter and rules out resurrection of the body and miracles.

What meanings the correlations between religious phenomena and brain activity have are open to debate. Objective study unsurprisingly empties the subjective

¹⁸⁰ *Catechism of the Catholic Church*, nos.362-3634; p.92-93

¹⁸¹ Moberg, *Spirituality Research: Measuring the Immeasurable?*, pp.99-114

¹⁸² Bruce Stevens, 'The Invasion of Memory: A Psychological Perspective on Trauma in the Experience of God', in James Haire, Christine Ledger and Stephen Pickard (eds.) *From Resurrection to Return: Perspectives from Theology and Science on Christian Eschatology*, Public and Contextual Theology Series (Adelaide: ATF Press, 2007), pp.172-184

¹⁸³ Niko Kohls, Anna Hack and Harald Walach, "Measuring the Unmeasurable by Ticking Boxes and Opening Pandora's Box? Mixed Methods Research as a Useful Tool for Investigating Exceptional and Spiritual Experiences," *Archive for the Psychology of Religion* Vol.30 No.1 (2008), pp.155-187; James Benjamin Schuurmans-Stekhoven, "Is it God or Just the Data that Moves in Mysterious Ways? How Well-Being Research may be Mistaking Faith for Virtue," *Social Indicators Research* Vol.100 No.2 (January 2011), pp.313-330

¹⁸⁴ Clark, *There is no non-materialist neuroscience*, p.148

dimensions. While others are sceptical, the research can offer support that the data is consonant with the traditional body/soul.

The experimental findings, whether under the neurotheology heading or otherwise, invite professional interest from Christian researchers. If anything, the science and soul literature should modify any causal dominance of the soul to always now include brain explanations. These can almost substitute for the soul, e.g. neurons firing, drug-induced states. The studies are welcome but cautions need to be applied when using knowledge which affects something so central as the spiritual core of psychophysical human beings. This may have relevance to traditional ideas on the soul.

However, scientific studies, like those outlined above, show that there are problems in Tommaso's medieval thinking that the powers of the soul "so transcend the material world that it has an activity and a permanent power to act which material forces contribute nothing. This is the power we call understanding."¹⁸⁵ Undoubtedly religious experience would classically be in the realms of the soul but now it can be recorded in the brain; at least as correlations but empirical ones nonetheless.

On the other hand, Tommaso's argument that the human soul's perfection is to know the truth with the mind, remains valid.¹⁸⁶ Through their proper operations and right directions, humans seek to reach the contemplation of truth, and this means to reach God. "It is for this purpose, then, that the soul is united to the body, and in this union does man's being consist."¹⁸⁷ For believers the spiritual/religious neuroscience worldview attests to the unity of body and soul together engaged in religious experiences of the divine, as captured in brain mapping. For atheists, there is no God and no soul; and while neural activity is evident, its interpretation diverges from faith-sensitive explanations.

¹⁸⁵ Aquinas, *Sum.Theol. Vol 11*, I.Q.76 Art.1, pp.46-47, cf also Aquinas, *S.T. Vol One*, I. Q.76 Art.1, p.372

¹⁸⁶ "ultima perfectio animae humanae consistit in cognitione veritatis, quae est per intellectum", Aquinas, *Quaestio Disputata de Anima* 1, Aquinas (McDermott), Passage 18, Art.1 "But against that" [2]

¹⁸⁷ Aquinas, *SCG*, Book 2, Ch.83 [28], pp.280-281.

For example, the question “Is our brain hardwired to believe in and produce God, or is our brain hardwired to perceive God?”,¹⁸⁸ and the cultural observation “why god won’t go away”¹⁸⁹: are answered in terms of human adaptation and brain evolution. Some scientists think, “if God does indeed exist, the only place he can manifest his existence would be in the tangled neural pathways and physiological structures of the brain.”¹⁹⁰ Such observations need not threaten the notion of the soul, however they do give a higher causal role to the brain, as has been demonstrated in the neurological discoveries centuries after Tommaso. They mute the influence of the soul, but do not totally silence it or cause it to vanish.

The soul, says Tommaso, also senses some things with the body such as when it feels a wound. “while it does sense some things without the body, that is, not happening in the body but solely in the mind, as when it feels saddened or gladdened by something it hears.”¹⁹¹ This suggests that a different schema from hylomorphism can be used e.g. to understand the dark night of the soul. For Tommaso, his position implies the body feels a wound, whereas sadness or gladness is only in the mind or soul. In modern terms, this would imply that spiritual darkness need not be depression.

Consider a well-known example: scholars suggest it can be certain Mother Teresa suffered much sadness in her life, but also that there is no real evidence she was clinically depressed. “We can be certain that she was invited to Dark Night of the Senses, and the signs of Dark Night of the Spirit are never clear.”¹⁹² Inner chaos that is emotional, spiritual and cognitive can precede the beginnings of the Dark Night. Physical and emotional suffering can be connected experiences of the Divine.¹⁹³

Thus even if it is the dark night of the *soul*, the experience can be felt in the body and emotions. Interestingly, John Paul II identifies bodily and spiritual elements as the

¹⁸⁸ Fingelkurts & Fingelkurts, *Is our brain hardwired?*, p.293

¹⁸⁹ Newberg, d'Aquili & Rause, *Why God Won't Go Away*, passim

¹⁹⁰ Newberg, d'Aquili & Rause, *Why God Won't Go Away*, p.53

¹⁹¹ Aquinas, *Sum.Theol. Vol 11*, I. Q.77 Art.5 ad.3, pp.106-107

¹⁹² Phyllis Zagano and C. Kevin Gillespie, “Embracing Darkness: A Theological and Psychological Case Study of Mother Teresa,” *Spiritus* Vol.10 No.1 (Spring 2010), pp.52-75 (p.71)

¹⁹³ Glòria Durà-Vilà et.al., “The Dark Night of the Soul: Causes and Resolution of Emotional Distress Among Contemplative Nuns,” *Transcultural Psychiatry* Vol.47 No.4 (September 2010), pp.548-570

direct subject of suffering.¹⁹⁴ Inasmuch as ‘suffering’ and ‘pain’ can be used synonymously; *physical suffering* occurs when “the body is hurting” while *moral suffering* is “pain of the soul”. He says, “it is a question of pain of a spiritual nature, and not only of the ‘psychological’ dimension of pain which accompanies both moral and physical suffering.”¹⁹⁵ A wholistic anthropology is best placed to understand this spiritual phenomenon.

Conclusions

There are competing readings of scientific studies of the soul. One kind of explanation to be avoided is what we might call a “soul of the gaps” as it were, akin to the concept of a “god-of-the-gaps,”¹⁹⁶ where the soul is invoked to plug gaps in the state of knowledge. Some neuroscientists like Greene contend that there are no more gaps, but others like Beaugard conclude that when spiritual experiences are transformative, “the most reasonable explanation and the one that best accounts for all the evidence, is that the people who have such experiences have actually contacted a reality outside themselves, a reality that has brought them closer to the real nature of the universe.”¹⁹⁷

Clearly the account of the soul in the Catholic tradition and in Tommaso is not framed in neuroscientific language. But while they can be faulted on those grounds, they do highlight a spiritual dimension not reachable by sceptical thinkers. Others note that all studies of spirituality are incomplete, even with progress since the late 1980s.¹⁹⁸ Research methods used to describe and evaluate findings about spirituality can cover only a part of the whole of spirituality. Moreover, there are real language difficulties for inner experiences of God, which illustrates the impossible but indispensable situation of all discourse about the unknowable God, as mystics of various traditions have taught.¹⁹⁹

¹⁹⁴ John Paul II, *Salvifici Doloris, Apostolic Letter of the Supreme Pontiff John Paul II on the Christian Meaning of Human Suffering* (Homebush, New South Wales: St.Paul Publications, 1984), para.5; p.12

¹⁹⁵ John Paul II, *Salvifici Doloris*, para.5; 12

¹⁹⁶ Jack Collins, “Miracles, Intelligent Design and God-of-the-Gaps,” *Perspectives on Science and Christian Faith* Vol.55 No.1 (March 2003), pp.22-29

¹⁹⁷ Beaugard & O’Leary, *The Spiritual Brain*, p.xiv

¹⁹⁸ Moberg, *Spirituality Research*, p.111

¹⁹⁹ Bernard McGinn, “The Language of Inner Experience in Christian Mysticism,” in Elizabeth Dreyer and Mark S.Burrows (eds.), *Minding the Spirit: The Study of Christian Spirituality* (Baltimore and London: The Johns Hopkins University Press, 2005), pp.135-151

If there was brain scanning in the seventeenth century it is thought they may have experimentally researched “the neural basis of godly behaviour and prayer.”²⁰⁰ Such hypothetical neuroscientists would give the impression that the mysteries of the brain had been uncovered. Thus the brain produced what they expected: godly behaviour, without knowing that the community had created such categories.

Thus, the study of the soul and in the light of science is a daunting project but it has occurred throughout history. Regarding the attempts to reconcile science and religion on the question of human identity, it may be that “the secularists may come to the weary conclusion that the same battles have constantly to be re-fought.”²⁰¹ But it need not be if scholars adopted Barbour’s type III pointers to dialogue. To this stage, however, many of the voices in the literature consider that the relationship is in terms of type I and type II. Pursuing the questions of neurotheology might steer future research in more constructive directions

One issue that the thesis has not considered so far concerns the effects of the deterioration of the body. While neuroscience and its methods reveal the brain-body contributions to religious experience, the brain cannot be relied on when either it and/or the other part of the body are undergoing degeneration. This affects the soul too, and will be explored in the next chapter.

²⁰⁰ Leslie Brothers, *Friday's Footprint: How Society Shapes the Human Mind* (New York & Oxford: Oxford University Press, 1997), p.145.

²⁰¹ Ann Thomson, *Bodies of Thought: Science, Religion, and the Soul in the Early Enlightenment* (Oxford and New York: Oxford University Press, 2008), p.248