Consensus

Volume 40
Issue 2 *Faith and Science*

Article 4

11-25-2019

Historical and Contemporary Explorations in Neurotheology

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Neurotheology is a new field that integrates neuroscience and theology. More specifically, it is a discipline that focuses on understanding the neurological processes that may be the foundation of some uniquely human processes and practices, such as sacredness, the divine, spirituality, faith, mysticism, meditation, religiosity, and beliefs, to name only a few. Another way one could look at the field is to see it as one that explores our transcendent reality, an experiential, subjective reality that allows human beings to make meaning in their lives.

This past fall, Martin Luther University College (Luther) in Waterloo, Ontario, introduced four new minors for undergraduate students who attend both Luther and Wilfrid Laurier University. The minors in Christian Studies and Global Citizenship, Human Relationships, Judaism, and Spirituality and Global Music require that students registered in any one of the minors take one foundational course. The course is entitled *Why Am I here? Worldview, Meaning-Making, and Authenticity* and, fundamentally, it asks second-year students, from various academic programs, to think about who they are, what they value, and what their purpose is. Their reflections on these questions emerge from the contexts of their individual, local, and global realities. This course is genuinely interdisciplinary, and every week different faculty members from Luther introduce ideas from their area of expertise. My background is neurosciences and the history of neuroscience. I have been teaching a course on neuroscience and psychotherapy for several years now at Luther. Although my thoughts on neurotheology have been brewing for quite some time, it was providing a guest lecture on neuroscience and meaning-making that finally allowed me to put pen to paper and truly dive into neurotheology.

Andrew Newberg (1966-) is a pioneer in the field, and it is often thought that he created the term in and around the 1990s. The use of the term, however, goes further back than Newberg. Cook and Elcoro (2013) note that Aldous Huxley coined the term Neurotheology in his 1962 book, *The Island,* and they also suggest that Lawrence McKinney's (1994) book, *Neurotheology: Virtual Religion in the 21st Century*, put the field on the map. I would argue, however, that James Ashbrook set the table for contemporary discussions on Neurotheology back in the 1980s. Ashbrook's article, "Neurotheology: The Working Brain and the Work of Theology," was published in 1984 in the journal *Zygon* and, since that time, he made Neuroethology his life's work (1984, 1989a, 1989b, 1992, 1993a, 1993b, 1996a, 1996b, 1996c, 1997, 1999). But what is Neurotheology, and where did it come from?

A Long and Winding Road to Neurotheology

Of course, mind-body-brain discussions began much earlier than Ashbrook and the contemporary neurotheologists. Aristotle (384-322 BC), Descartes (1596-1650), Locke (1632-1704), and Leibniz (1646-1716), in particular, theorized about associationism,

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rationalism, empiricism, and mondadology, respectively. These discussions remained purely philosophical until the late 18th century when German physician Franz Joseph Gall (1758-1828) theorized that shape and skull size (and ultimately the brain beneath) correlated to specific localized functions which could then be extrapolated to personality traits. Gall labelled the attribute of Reverence/Veneration as bump #18 on the skull and described this trait as one that allows people to revere God and saints (Fowler, 1857). Fowler (1857) theorized that, if this part of the skull/brain was large, the person "experiences an awe of God and things sacred; loves to adore the Supreme Being, especially in his works; feels true devotion, fervent piety, and love of divine things; takes great delight in religious exercises; has much respect for superiority; regards God as the centre of hopes, fears, and aspirations" (p. 94). However, if this part of the brain was small, or indented, the person "experiences little devotion or respect, and is deficient in fervor; cares little for religious observances, and is not easily impressed with the worshiping sentiment…Is almost destitute in feeling and practice of this sentiment" (p. 94). See Figure 1.

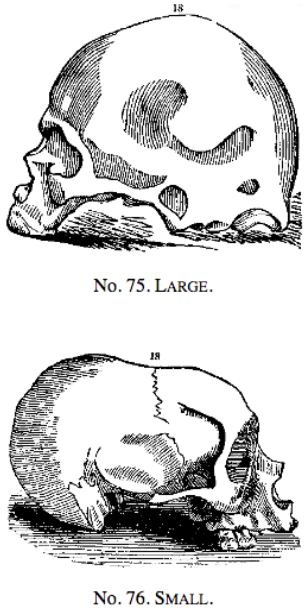

Figure 1. From: Fowler, L. N. (1855). The illustrated self-instructor in phrenology and physiology: with one hundred engravings, and a chart of the character. New York: Fowlers and Wells Publishers (p. 92).

Lorenzo Fowler (1811-1896), a follower of Gall, and the person who popularized phrenology in the United States, labeled trait #17 on the head as Spirituality. Fowler (1857) stated that, if you had a large bump on this part of the skull, the person

> perceives and knows things independent of the senses or intellect, or as it were by spiritual intuition; experiences an internal consciousness of what is best, and that spiritual communion with God which constitutes the essence of true piety; loves to meditate; bestows a species of waking clairvoyance, and is as it were "forewarned of God;" combined with large Veneration, holds intimate communion with the Deity. (p. 92)

If, however, you had an indentation in this part of your skull, or just a small bump, Fowler (1857) suggested, one had "no spiritual guidings or superstitions…Perceives spiritual truths so indistinctly as rarely to admit them; is not guided by faith, because so weak; like disbelieving Thomas, must see the fullest PROOF before it believes; has very little credulity, and doubts things of a superhuman origin or nature; has no premonitions, and disbelieves in them" (p. 92). Gall's and Fowler's Phrenology flourished in the early 19th century but fell out of favour when advances in physiological and anatomical understandings of brain functioning did not support phrenological theories.

During the last quarter of the 19th century, advances in knowledge about the gross anatomy of the brain opened the door for discussions on spirituality. Improved microscopes and microscopic techniques also played a significant role in these developments. Benton (2000) suggests that the period from 1861-1875 was one of very rapid progress when clinical neurology, anatomy, physiology and psychology combined to transform the mental sciences. For example, Paul Broca (1824-1880) and Carl Wernicke (1848-1905) established that the brain contained localized speech and recognition centers. Concomitantly with the research on localization, the latter half of the 19th century brought with it a controversy about whether neural matter was continuous or made up of discrete neurons (Harper, 2017).

In 1865, the work of Deiters (1834-1863) and Schultze (1825-1874) established, first, that individual nerve cells (neurons) did exist and, second, that these cells had many "protoplasmic extensions" but only one "axis cylinder" (Finger, 2000, p. 202). This was the first step in the development of the *neuron doctrine*, which confirmed that the nervous system was not one long hollow tube nor was it made up of entities that were fused to each other. Gerlach's (1820-1896) 1872 gold chloride method and Golgi's (1843-1926) 1873 silver nitrate discovery allowed the morphology of nerve cells to be visualized much more clearly. In 1888, these technological advances allowed Santiago Ramón y Cajal (1852-1934) and Wilhelm von Waldeyer (1836-1921) to confirm that the branches of the nerve cells did not fuse to each other (anastomosis). In 1897, Sir Charles Scott Sherrington's (1857-1952) experiments also confirmed the neuron doctrine; that a "synapse" or gap did occur between neuron branches (Finger, 1994, 2000). These advances in neuroanatomy and neurochemistry provided us with structural explanations of brain processes. But neuroanatomists and neurophysiologists had not made the leap from brain to mind or from brain to soul; it was the mental philosophers who took that leap.

In Scotland, Alexander Bain (1818-1903) was the first mental philosopher to create a theoretical neural network model (1872) that attempted to explain memory, emotion, learning, and conscious and unconscious processes from a neurophysiological perspective; Sigmund Freud (1856-1939) created a similar, but more advanced, neural network model in 1895, in his *Project for a Scientific Psychology* (Harper, 2017, 2019). In explaining his neurophysiological model of the mind, Freud did not touch on the spiritual; however, Bain (1872) suggested the following: "There might be certain mental functions of a *lower* kind, partially dependent upon the material organization, while the highest functions might be of a purely spiritual nature, in no way governed by physical conditions" (p. 2). Bain then went on to focus on neurophysiology in the book. William James (1842-1910), in his *Principles of Psychology* (1890), illustrated his "stream of consciousness" theory as an associative neural network (Harper, 2017). James (1890) argued that we had three distinctive selves: A bodily self, a social self, and a spiritual self. 'These exist within us in a hierarchical fashion with the

bodily self at the bottom, the social self in the middle, and the spiritual self at the top of the scale' (p. 313). In relation to the spiritual self, James (1890) stated, "Our considering the spiritual self at all is a reflective process, is the result of our abandoning the outward-looking point of view, and of our having become able to think of subjectivity as such, to think *ourselves as thinkers*" (p. 296, emphasis in original). James' Soul Theory suggested, "The soul would be thus a medium upon which…the manifold brain-processes *combine their effects…*I confess, therefore, that to posit a soul influenced in some mysterious way by the brain-states and responding to them by conscious affections of its own, seems to me the line of least logical resistance, so far as we yet have attained" (1890, p. 181, emphasis in original). Finally, James (1890) stated:

> The spiritualistic reader may nevertheless believe in the soul if he will; whilst the positivistic one who wishes to give a tinge of mystery to the expression of his positivism can continue to say that nature in her unfathomable designs has mixed us of clay and flame, of brain and mind, that the two things hand indubitably together and determine each other's being, but how or why, no mortal may ever know (p. 182).

Consequently, the relationship between the brain and spirituality was a cause for contemplation during the last quarter of the 19th century. Bain, Freud, and James' theories, however, remained in the realms of the theoretical and hypothetical.

Empirical research on mind-body connections began in 1879, marked by Wilhelm Wundt's (1832-1920) creation of the first experimental psychology laboratory at the University of Leibniz, thus providing a home for philosophical theories to be tested. Wundt's focus was on understanding conscious processes, and his work provided the foundations for the creation of a new discipline, psychology (Danziger, 1979). Although Wundt's laboratory offered empirical support for human sensation and perception, as it related to brain function, questions such as '*how do neurons and synapses contribute to consciousness? And what role do axons and dendrites play in allowing us to feel the emotions of love, compassion, and empathy?* had to wait until the 20th century.

Before the 1950s, discussions about brain chemistry were nonexistent (Shepherd, 2009, p. 39), chiefly because it was assumed that neuronal communication in the brain and CNS was primarily electrical; chemical theories were directed toward the peripheral nervous system (Carlsson, 2001). From the 1920s to the 1950s, many endocrine "chemicals" were discovered. Still, alongside these breakthroughs, the idea that similar molecules existed in the brain had not widely entered academic, medical, or cultural conversations. Consequently, biologists, anatomists, and neuroscientists made critical advances in brain chemistry research during the first half of the 20th century, but it was the 1950s, when the electron microscope was created, that confirmed the existence of "brain chemicals," now known as neurotransmitters (Harper, 2017). The 1980s gave us the discovery of the neurotransmitter and the creation of selective serotonin reuptake inhibitors. GABA, the primary inhibitory neurotransmitter in the brain, along with excitatory transmitters such as serotonin, dopamine, glutamate, and acetylcholine, were found to play key roles in psychological processes. The ability to regulate emotion and mood with drugs resulted in the closing asylums (Schutt, 2016). Today the increasing cases of mood, anxiety, stress, addiction, and spectrum disorders, particularly in children and adolescents, is contributing to affective

neuroscience and psychopharmacology becoming an increasingly dominant field (Booker and Dunsmore, 2016).

As a researcher, I have seen neurological explanations permeate every area of psychology, and the fixation with the brain appears to have no end. There is, of course, a natural connection between psychology and neuroscience that, as noted, began more than one hundred years ago. Still, a renewed emphasis on brain function and neural networks emerged when cognitive psychology became the most prominent area within psychology from the 1970s through the 1980s, causing scholars to question whether a Kuhnian paradigm shift had occurred in reaction to the behaviorism of the previous decade (Benjafield, 2005). In conjunction with the emerging cognitive revolution, there came an emphasis on interdisciplinary research. Cognitive psychology "…appealed to academic psychologists who regarded themselves as tough-minded scientists first and foremost" (Benjafield, 2005, p. 289). Furthermore, information theory, computer science, and Chomsky's linguistic theories provided an appealing scientific framework for cognitive psychologists (Benjafield, 2005). This renewed emphasis on the brain and cognition brought new interdisciplinary research areas, such as neuropsychology, neuropsychiatry, neurolinguistics, and neuropsychoanalysis (Kitcher, 1995; Pribram, 1998; Solms, 1999).

For the past thirty years, academia and the public at large have become increasingly fascinated with neurological explanations of, well, everything. The preoccupation with neurological explanations permeated not only psychology and the social sciences but also economics and the humanities, resulting in a number of new areas of research: neuromusicology, neuroaesthetics, neuroethics, neuroeconomics, and neuroarthistory, to name only a few. More directly related to this paper, and to be discussed later in more detail, is the field of Neurotheology. But why are we "neurologizing" so many fields and emphasizing interdisciplinarity?

Interdisciplinarity

Today Neurotheology, and all the other neuro-disciplines, emphasize interdisciplinarity, an academic trend that began during the late 20th century when there was a rise in publications emphasizing the importance of interdisciplinary research as a way to advance knowledge (Klein, 1990, 1996). I would argue that this trend continues today in academic and professional realms due to an increased call for interdisciplinary projects by government funding agencies in both the United States and Canada. For example, the National Science and Engineering Research Council (NSERC), in their recommendations for funding applications, promote interdisciplinarity and define it on their application website, which states:

> Research that involves the interaction among two or more different disciplines and occurs at the interface between disciplines. This may range from the sharing of ideas to the full integration of concepts, methodology, procedures, theory, terminology, data, organization of research and training. (NSERC, 2019, para 12)

In 2004, Whitfield and Reid noted the Canadian Institute of Health Research (CIHR) encourages applicants to submit projects that are interdisciplinary in nature. There has been an explicit appeal for disciplines to work together so that knowledge can be transferred from academia to praxis; *Knowledge Translation,* which involves the movement of research from

"research producers to research users," is on the rise (Mitton et al., 2007, p. 729). Today, the CIHR is still promoting funding for interdisciplinary projects that promote knowledge translation (CIHR, 2019).

Although interdisciplinarity appears to be a vibrant new topic in the natural and social sciences today, working with others within and between various fields, and learning within an interdisciplinary educational system, is not a new practice to advance knowledge. Many philosophers, such as Aristotle, Kant, and Plato, to name only a few, have been described as interdisciplinary thinkers (Klein, 1990). These examples demonstrate that the sharing and integration of knowledge, and the "conceptual spillage" that occurs within and between areas of knowledge, was more serendipitous and natural in the past (Klein, 1990, p. 86). Knowledge synthesis from this perspective was not a formalized process, at least before the emergence of the modern university.

More recently, there was another push for interdisciplinarity, particularly in the area of neuroscience. This increased interest in neuroscience has been due, partly, to technology and research initiatives supported by funding. The Library of Congress, along with the National Institute of Mental Health, encouraged a public discussion of brain research topics during the last decade of the 20th century (Guttmann & Scholz-Strasser, 1998). Also, the use of imaging studies has been on the rise since the 1990s when George Bush announced the "Decade of the Brain" and, more recently, in 2013, when Barak Obama created "The White House Brain Initiative: Brain Research Through Advancing Innovative Neurotechnologies." These initiatives provided government funding to researchers and required them to work from an interdisciplinary framework.

Moreover, with the discovery of the genome, private funding was also encouraged for research that incorporated neuroscience and technology (Harper, 2017). Consequently, it was in the 1990s when Neurotheology began to take off as a discipline and this interest in neuroscience and theology continues to be on the rise today. The interest in neuroscience and the brain, however, is not limited to academia. It has moved into pop culture as evidenced by a recent *National Geographic Series* entitled "The Story of God," which includes discussions and interviews with Neurotheologist, Andrew Newberg, and the host, Morgan Freeman, gets his brain scanned as he meditates (NatGeo, 2019).

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Some of the earliest research in the area of psychopathology has some direct links to Neurotheology. In 1981, Roger Sperry (1913-1994), along with David Hubel (1926-2013) and Torsten Wiesel (1924-), won the Nobel Prize in Physiology and Medicine for their split-brain research. Split-brain research refers to the studies done with patients who have had the connection (corpus callosum) between their left and right hemispheres severed. In many cases, these patients had such severe and life-threatening epilepsy that it was deemed necessary to cut the corpus callosum to prevent focal/localized seizure activity in one hemisphere from traversing to the other. These above noted Nobel Laureates, along with Sperry's student, Paul Gazzaniga (1939-), confirmed there were qualitative differences between the left and right hemispheres and that the hemispheres can function independently.

Hemispheric Asymmetry

In general, it has been documented that clients with left or right hemisphere damage have different emotional responses (Friston, 2013; Gallese, 2013; Pally & Olds, 1998; Solms, 1997, 2013, 2014; Solms & Panksepp, 2012). These findings suggest that the hemispheres work together to process sensory information that leads to emotional comprehension and reactions. However, hemispheric asymmetry does exist. Commonly the right hemisphere is dominant for negative emotional reactions and, when this hemisphere is damaged, responses may be less negative and more manic or indifferent (Schore, 2000). Clients with this type of damage may minimize their disability or deny motor paralyses because of their inability to have negative emotions. Also, when the right hemisphere is damaged, it is difficult for these clients to understand emotional verbal or facial expressions and non-verbal communication. Alongside the decrease in emotion or negative affect, these clients have corresponding weakened autonomic nervous system activation after the presentation of emotional stimuli (Meares and Schore, 2011; Schore, 1999, 2000; 2001, 2003, 2005; Schore and Schore, 2008). The right hemisphere is correlated with unconscious processing, automatic fight or flight responses, and "emotionally relevant stimuli can be detected, processed, and learned without conscious awareness by a right-hemisphere subcortical pathway, mediating unconscious emotional learning" (Gainotti, 2005, p. 78).

On the other hand, the left hemisphere is dominant for conscious control and analysis of emotional processes and conscious learning. Damage to this side of the brain results in an inability to feel pleasure (Gainotti, 2005) and may also be responsible for higher levels of emotional negativity than control groups (Tondowski, Kovacs, Morin, & Turnbull (2007). Neuropsychologist and psychoanalyst, Allen Schore (2009), is even more specific stating, "I suggest that the ongoing paradigm shift across all sciences is from conscious, explicit, analytical, verbal, and rational left brain to unconscious, integrative, nonverbal, bodily-based emotional processes of the right brain" (p. 21). Gazzaniga (1998) argues that the left hemisphere has many more mental functions than the right hemisphere and that the left hemisphere,

> contains the interpreter, whose job is to interpret our behavior and our responses, whether cognitive or emotional, to environmental challenges. The interpreter constantly stablishes a running narrative of our actions, emotions, thoughts, and dreams. It is the glue that unifies our story and creates our sense of being a whole, rational agent. It brings to our bag of individual instincts the illusion that we are something other than what we are. It builds our theories about our own life, and these narratives of our past behavior pervade our awareness. (p. 174)

Ramachandran, Blakeslee and Shah (1998) argue that the left hemisphere allows us to make sense of the world as it attempts to incorporate new information into our present sense of things. Also, these researchers suggest that the right hemisphere, particularly the parietal lobe, acts as a reality checker that keeps the left hemisphere from diverging too far into a world of fantasy. It is these hemispheric differences that become important when researchers try to understand the neurological foundation of spiritual experiences.

The God Spot in the Brain

In addition to the split-brain research, patients with schizophrenia, and those with temporal lobe epilepsy, have also contributed to our knowledge of hemispheric asymmetry and religiosity. Gilleen and David (2005) note that 30% of clients with schizophrenia have delusions that contain religious or spiritual content.[2] Another study (Murray, Cunningham, & Price, 2012) found that 63.3% of patients with schizophrenia "have religious grandiose delusions consisting of believing they are a saint, God, the devil, a prophet, Jesus, or some other important person" (p. 410). Moreover, they found gender differences in the type of religious thought; women often though they were saints, while men more often thought they were God. Ramachandran and Blakslee and Shah (1998) work with clients who have epilepsy and noted that about 25% of patients with this disorder have profoundly moving religious experiences during their seizures. Furthermore, in all of these studies, it is the left temporal lobe that appears to be generating these religious and/or spiritual thoughts. While I note some more recent findings here, Wilder Penfield documented similar results back in the 1950s.

In the 1920s and 1930s, Penfield's epileptic seizure localization surgeries changed the face of neurosurgery. In the 1950s, his focus moved to mapping the sensory and motor cortices and this mapping allowed Penfield to prove that the sensory-motor cortices were not as distinct as previously thought; he found that 25% of the sensory responses occurred in the motor cortex and the motor cortex could elicit 20% of the sensations (Guenther, 2015). Important in Penfield's methodology was the patient's ability to report the motor and sensory responses as the brain was stimulated. He found that motor movement accounts were more reliable if someone watching the patient observed the movement; conversely, the patient more accurately reported sensations.

One caveat, however, was that the patient had to have the ability to be introspective enough to report the sensations accurately. Penfield noted that his relationship and rapport with the client before the surgery allowed them to be more open and able to communicate in-depth descriptions of the felt sensations. During these surgeries, Penfield noted that the subjects often reported sensations, as expected, but they also reported memories (Guenther, 2015).

After reading Penfield's research, Lawrence Kubie, a psychoanalyst from New York, travelled to Montreal to observe the neurosurgeon at work. Although Penfield was a brain surgeon, the concept of unconscious memory acted as a bridge that brought psychoanalysis and neuroscience together for a short time. Upon his arrival at the Montreal Neurological Institute, Kubie first observed Penfield's surgeries but, later, he was allowed directly into the operating room. With Dictaphone in hand, Kubie recorded the memories of the patients on the table and Penfield also allowed him to do association experiments, recording the flow of patient thoughts as Penfield stimulated specific brain regions. Kubie's 1953 paper, "Some Implications for Psychoanalysis of Modern Concepts of the Organization of the Brain," was

[2] I note one caveat when using the term "delusions" as they relate to religion/spirituality. In 1974, the anti-psychiatrist supporter, Thomas Szasz, "mischievously remarked that 'when you speak to God it is prayer, when God speaks to you it is schizophrenia' (cited in Dien and Littlewood, 2007, p. Notes, #2). Accordingly, being spiritual or religious and "talking to God" is not necessarily delusional or part of a DSM diagnosis. Although hearing God speak to you may seem "abnormal" in one culture, it is entirely 'normal' in others. Thus, one must keep in mind that the DSM is culturally constructed and privileges a very North American and limited view of what is normal (Frances, 2013).

based on the research he did at Penfield's Montreal lab. This research prompted Kubie and Penfield to write "Memory Mechanisms" (1952), which was published in the *American Medical Association's Archives of Neurological Psychiatry.*

In this paper, Penfield explained his findings and Kubie contributed a discussion. Penfield (1952) found that evoked memories, due to surgical stimulation, differed from memories recalled under nonsurgical circumstances. Evoked memories were more vivid and detailed and felt more real to the patient as if it were really happening. Penfield (1952) stated, "It would appear that the memory record continues intact even after the subject's ability to recall it disappears…when it is thus forced into the patient's consciousness, it seems to him to be a present experience" (p. 184). "… It is tempting to believe that synaptic facilitation is established by the original experience which guides the succession of impulses, later employed to activate the pattern through one connection after another, thus producing recollection" (pp. 186). In the discussion section of the paper, Kubie (cited in Penfield, 1952) agreed with Penfield's findings, stating: "From all of this work we learn that at least in certain epileptic subjects the electrical stimulation of the temporal cortex can produce the equivalent of hypnotically induced regressions into the past, with a reliving of the past as though it were in the present…or as Freud put it, in the unconscious there is no such thing as time and space" (p. 192). Kubie (cited in Penfield, 1952) saw the potential of the research to play a role in psychotherapy; he stated, "Finally what is evoked is a specific reliving of a specific experience, and not a diffuse 'memory' of nonspecific generalizations from many past experiences. In short, the electrical stimulation of these areas of temporal cortex can evoke in a few moments precisely that type of re-experiencing of the past which the analyst has to struggle for days and weeks and months and years to achieve" (p. 193).

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Similar to some of the findings today, when Penfield stimulated the left temporal lobe in some of his patients, they had very real spiritual and/or religious experiences. During stimulation, one patient stated, "God said I'm going to die" (Penfield & Perot, 1963, p. 636). Another patient herd music during surgery and stated, "Yes, it is the war march of the priests" (Penfield, 1955, p. 68). In the years following Penfield's work, neuroscientists began to posit that there was a "God Spot" in the brain, particularly in the left hemisphere. V.S. Ramachandran et al. (1998), at one point, noted that there might be a "God Module" in the brain. However, Ramachandran and Newberg now both dispel this idea because it is not only the temporal lobe that appears to be correlated with spiritual experiences. Beauregard (2007) states, "there is no single God spot, localized uniquely in the temporal lobe of the human brain. These states are mediated by a neural network that is well distributed throughout the brain" (cited in Biello, 2007, p. 47).

For example, Beauregard and Paquette (2006), from the University of Montreal, used fMRI technology to study the brains of fifteen Carmelite nuns. Their goal was to find the neural correlates of mystical experience, and they defined mysticism as a "sense of union with God. It can also include a number of other elements, such as the 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" (p. 187). Beauregard and Paquette (2006) found increased activation in the caudate nucleus, an area correlated to learning and memory, but also with

unconditional love. The insula and the medial orbital prefrontal cortex are areas associated with feelings of pleasure, and these were both activated.

A more recent study by Ferguson et al. (2018) used fMRI technology to understand the spiritual processes in devout Mormons. They found "that a recognizable feeling central to their devotional practice was reproducibly associated with activation in nucleus accumbens, ventromedial prefrontal cortex, and frontal attentional regions" (p. 104). These areas indicate that the frontal lobes are activated during mental concentration, while the other regions noted are linked to reward systems in the brain. Andrew Newberg has had similar results (2018). Newberg is considered to be a key researcher in the field of Neurotheology, and he has been since the 1990s. He was was highly influenced by the work of Eugene D'Ayuili and Charles Laughlin Jr (1975). Newberg argues that God is part of our conscious processing and, the more we think of God, the more changes we see in our brains, as demonstrated by fMRI research (Newberg and Waldman, 2007, 2009, 2017). Newberg (2010) states:

> When considering the primary reasons for developing neurotheology as a field, we can consider four foundational goals for scholarship in this area. These are 1. To improve our understanding of the human mind and brain. 2. To improve our understanding of religion and theology. 3. To improve the human condition, particularly in the context of health and well-being. [and] 4. To improve the human condition, particularly in the context of religion and spirituality. (p. 20)

Newberg and Waldman (2009) state, "the human brain is uniquely constructed to perceive and generate spiritual realities. Yet it has no way to ascertain the accuracy of such perceptions. Instead, our brain uses logic, reason, intuition, imagination, and emotion to integrate God and the universe into a complex system of personal values, behaviors, and beliefs" (p. 4). Newberg has scanned the brains of Buddhist Monks as they meditate, Nuns as they pray, and Sikhs engaged in meditative chants. He has also studied elderly populations to see if eight weeks of medication can improve their memory; he found that it did (Newberg, 2018).

Further, Newberg (2016) has explored spiritual experiences and found they are correlated to decreases in anxiety and depression. He has also found that a de-activation in the parietal lobe occurs when subjects feel a connection to something bigger than themselves; transcendence, or a feeling of being with God, or when meditating on nature (Newberg, 2018). The parietal lobe is a part of the brain that is key for perception, making sense of the world. It activates with sensation (touch, taste, temperature), with language, and as we try to orient ourselves spatially. Decreases in activation in this area may make us lose our sense of ourselves; we move from feeling "I" to feeling "we" (Miller et al., 2019; Newberg, 2018).

Do fMRI Machines have all the Answers?

This brief and broad history has outlined only a few of the key factors that played a role in the development of mind-body research and interdisciplinarity as it relates to the foundations of Neurotheology. Accordingly, one can make connections between some of these factors and the creation of the psy-disciplines (see Danziger, 1997; Richards, 2010) and some of the other new neuro-disciplines, including Neurotheology. Moreover, while this

paper has only touched on some brief examples of the research emerging from the field of Neurotheology, it is research that raises several hermeneutical questions. Can brain function and neurological processes fully explain who we are, what we feel, what we believe, what we value, and what we think? Is there a direct link between brain anatomy and function and the conscious or unconscious processes that emerge from them?

These questions come to the forefront because, today, it seems "neuro" can do no wrong. If we can see something on an fMRI machine, it must be true. Vidal (2009) referred to the emphasis on imaging results as "hype" (p. 5), and Quart (2012) states, "The problem isn't solely that self-appointed scientists often jump to faulty conclusions about neuroscience. It's also that they are part of a larger cultural tendency, in which neuroscientific explanations eclipse historical, political, economic, literary and journalistic interpretations of experience" (para. 3). Thus, the word "neuro" has not only permeated academia, but also popular culture and Quart refers to it as "pop neuroscience…[something] coarsened for mass audiences" (para. 3-10). Others call it neuroculture, a process whereby "neuroscience knowledge partakes in our daily lives, social practices, and intellectual discourses" (Franzetto & Anker, 2009, p. 815). But, as Searle (1993) suggests, do "brain processes cause consciousness" (p. 6)?

Today, writers, particularly the neuro-philosophers interested in the mind-body problem, focus primarily on the mind-brain relationship (Gopnik, 2013, para. 2). Churchland (1989) argues that mind and brain are synonymous and that concepts such as consciousness, emotions, and beliefs should be eliminated and exchanged for neuronal rather than psychological explanations. Churchland asks, "are mental states irreducible to neurobiological states?" and, in considering her detractors, she defines two types of researchers, the "Boggled Skeptics" and the "Principled Skeptics" (p. 316). The boggled skeptics take a Kantian view arguing that "mental phenomena, in contrast to the physical objects investigated by physical scientist, (1) have no spatial dimension, (2) are too transient to pin down for sustained observation, (3) cannot be experimentally manipulated, and (4) perhaps, most important of all, cannot be mathematically described or analyzed" (Fancher & Rutherford, 2012, p. 142). The principled skeptics are similar to the boggled skeptics, but they also consider the idea that the brain may contain a nonphysical soul (Churchland, 1989).

Gopnick (2013), however, has a more light-hearted take on the matter and divides neuro writers into "the Spocks and Kirks, either embracing the idea that consciousness can be located in a web of brain tissue or debunking it" (2013, para 2). The Spocks are the rational and analytical sect that believes that the mind is a machine that can be studied via contemporary neuroscience, while the Kirks are the more emotional group that believes that soul and the human spirit cannot be measured in a scanner (Gopnik, 2013, para. 2). A full examination of the philosophical debate regarding neuroimaging is outside the scope of this paper. However, along these same lines, there are some who are concerned over the use of imaging technology and believe that integrating neuroscience with the subjective sciences is not clinically relevant (in the case of psychoanalysis and clinical psychology), but also damaging to these more subjective fields (Blass & Carmeli, 2007; Kitcher, 1995; Pulver, 2001).

Neurotheology: Is there a Political Side to the Discipline?

Another question is, is the neurologizing of theology a political movement? I say this because many academics accused psychoanalysts of neurologizing Freud to make his work

more acceptable to the world of quantitative psychology. In 1895, Freud created a neurological model of the mind entitled, *Project for a Scientific Psychology*, and Freud's goal was to make psychoanalysis a natural science. However, Freud's *Project* was put in a drawer, and it was not published until 1950. It was only upon its publication, fifty years later, that the psy-disciplines realized how neurological Freud's theories actually were. His theories of dreams, conscious and unconscious processes, the pleasure principle, defence mechanisms, and cognition, all had neurological foundations as outlined in the *Project* (Harper, 2017). In the 1980s and 1990s, with the decade of the brain, Freud's *Project* came to the forefront of the psychoanalytic scholarship, and there was some controversy. For example, in 1984, Knight argued that some of the scholarship surrounding the importance of Freud's *Project* was written by "the new neurologizers who see in the *Project* both the flaws of psychoanalysis and its potential redemption through updating its neurological base" (p. 340). Further, Knight argued that accentuating Freud's neurological background, one hundred years later, might induce renewed interest or redemption for the discipline of psychoanalysis, a discipline that had been struggling for survival during the 1980s (the decade of the neurotransmitter) and the decade of the brain (1990s).

In 1979, Sulloway had suggested that there was a "…quasi-political cast to the debate over the *Project*" (p. 121), with a division between the "soft-science" believers and the "hard-science" supporters. Much of the debate within the scholarship focused on many different interpretations of the text; it could be used to support or refute psychoanalysis as a science (Sulloway, 1979). Knight (1984) concurred, stating: "Positions taken on these questions [about the *Project*] tend to reflect the kind of investment the disputant has in the intellectual viability of psychoanalysis as an autonomous, scientifically credible, and or humanistically fruitful field" (p. 340).

Accordingly, does aligning theology with other disciplines, such as neuroscience, give the field any advantages? Does theology become more credible or more scientific by 'neurologizing' itself? Does emphasizing the neurological origins of theological concepts allow theology to be grounded in science, thereby making it more credible, and more palatable to some? Is this a bit of "if you can't beat them, then join them" sort of philosophy? Moreover, does grounding theological studies in neuroscience make them more likely to be granted funding by agencies? Kuhn (1962/1969) suggested this might be possible. He stated, "scientists are people, scientists form groups…they compete for resources, in science that is funding, and for personal power."

Furthermore, there could be practical reasons for theology to align with neuroscience. Kitcher's (1995) view, using cognitive science as an example, suggests that because the cognitive sciences include "…neural, developmental, computational, linguistic, psychological, and social factors…" (p. 3) There is a belief that these disciplines need to learn from each other and co-evolve. Consequently, interdisciplinary approaches are viewed as highly positive and are increasingly being supported in academic settings (Kitcher, 1995).

Conclusion

This paper has likely provided more questions than answers. It briefly explored the field of Neurotheology today, examined some historical precursors to the field, and considered interdisciplinarity, the rise of technology, and increased funding for the neuro-disciplines as key factors that may have played a role in its development. In explaining the field of Neurotheology, Newberg (2018) argues that the discipline "is not a scientific attempt

to explain away religion…it is a two-way street in which science and religion can mutually inform each other" (p. 15). I hope the field continues to follow this philosophy, and I would encourage researchers, while continuing to use objective fMRI technology, to find a way to keep the subjective qualitative experiences of participants at the forefront of their studies.

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