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A NEW CONCEPT TO BE RECKONED WITH:

NEUROTHEOLOGY

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Abstract

The present paper tackles one of the most significant expressions of the old conflict between science and religion, highlighted by the investigation at the crossroads of psychology, religion and spirituality, and neuroscience. Neurotheology is the study of correlations of neural phenomena with subjective experiences of spirituality and hypotheses to explain these phenomena. Partisans of this field claim that there is a neurological and evolutionary basis for subjective experiences traditionally categorized as spiritual or religious. However, writers committed to a materialist ontology and a reductive approach to the mind are arguing not only for neural correlates to spiritual experience but are intending to eliminate spirituality entirely by arguing that these experiences are caused by the brain in some manner. Underlining the “neuroscience of enlightenment”, the author analyzes aspects such as: the brain and enlightenment, prayer on the brain, neuroscience and religious experience, brain functions and theological topics. On functional MRI scans, people who meditate regularly are shown to have developed brains that are wired differently than the brains of people who don’t meditate. They are better able to remain calm and stress-free, live in peace, and practice compassion. What the researchers found is that the subjects who suffered of Alzheimer and Parkinson’s frontal lobes, parietal lobes, and limbic systems all showed similar heightened activity. Though the data has been interpreted by different people in different ways, what is clear is that prayer and meditation seem to have a unique biochemical effect on the brain. Neurotheology seeks to facilitate a dialogue between religion and science with the eventual goal of helping to integrate these perspectives around the nexus of neuropsychology.

Keywords: neurotheology; neuroscience; archetypes; enlightenment; prayer; brain; meditation;

1. INTRODUCTION

The turn of the new millennium has seen the emergence of “spiritual neuroscience”, a field of scientific investigation at the crossroads of psychology, religion and spirituality, and neuroscience. The main objective of this novel domain of research is to explore the neural underpinnings of *religious/spiritual/mystical* experiences (RSMs). These experiences relate to a fundamental dimension of human existence and are frequently reported across all cultures (D. Hay, 1990, p. 127). One of the basic assumptions of spiritual neuroscience is that RSMs are brain mediated, as are all other aspects of

human experience. With respect to this issue, it is of paramount importance to fully appreciate that 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 RSMs (J. Saver, J. Rabin, 1997, p. 499). Living such challenging times, in which supreme efforts have been done to reach at an integrative or holistic approach of reality, the underpinning question is of the type: *How can we achieve a unified understanding of the universe, which comprehends the physical, psychical, and spiritual dimensions of reality?* For that matter one can refer to the already old concept of «archetypes», as described in the psychological theories of C.G. Jung and his followers, one which provide the crucial link between the material and spiritual worlds. On the one hand, they are grounded in evolutionary neuropsychology; on the other, they are the objective constituents of the spiritual world. This might seem to reduce the spiritual realm to the “merely psychological,” or even to neural epiphenomena, but this is a misinterpretation of the theory, and that the gods (or God) are objectively real and crucially important for meaningful human life. (Bruce MacLennan, 2002, p. 1).

The current paper is an investigation into the field of *neurotheology*, a controversial domain which has attracted criticism from both the scientific and religious community and which is often quite divided amongst its own practitioners. Regretfully, but not too unexpectedly, science has got entangled with ideology, with proponents on all sides of the spectrum using findings from the laboratory in support of their own philosophical positions. There is a broader question which sets the frame and provides the context for the investigation into neurotheology and that is the question whether, and to what extent, we are ‘wired for spirituality’. In other words, are we, in any sense, somehow predisposed towards the spiritual? (Jimmy Kyriacou, 2016, p. 1)

2. WHAT IS NEUROTHEOLOGY?

Neurotheology, also known as ‘spiritual neuroscience’, and as the ‘neuroscience of religion’ is the study of correlations of neural phenomena with subjective experiences of spirituality and hypotheses to explain these phenomena. This contrasts with the psychology of religion which studies mental, rather than neural, states. Proponents of neurotheology claim that there is a neurological and evolutionary basis for subjective experiences traditionally categorized as spiritual or religious (David Biello, 2009; Craig Aaen-Stockdale, 2012, p. 521).

A number of distinctions are worth highlighting in this definition: Firstly, the term ‘neurotheology’ is often used interchangeably with the term ‘spiritual neuroscience’. Secondly, neurotheology studies *correlations* between neural phenomena, i.e. brain processes, with subjective experiences of spirituality. Thirdly, we have the claim that there is a neurological and evolutionary basis for these experiences. It is in this third area that most of the controversy arises. While the correlations are a matter of factual evidence, the claims for what the correlations imply are subject to debate. We also note that the term ‘spiritual experience’ remains rather unspecified at this point.

Aldous Huxley used, for the first time, the term “neurotheology”, in the utopian novel *Island* (1962). The discipline studies the cognitive neuroscience of religious experience and spirituality. The term is also sometimes used in a less scientific context or a philosophical context. Some of these uses, according to the mainstream scientific community, qualify as pseudoscience. Huxley used it mainly in a philosophical context. The use of the term *neurotheology* in published scientific work is currently uncommon. A search on the citation indexing service provided by Institute for Scientific Information returns five articles. Three of these are published in the journal *Zygon: Journal of Religion & Science*, while two are published in *American Behavioral Scientist*. Work on the neural basis of spirituality has, however, occurred sporadically throughout the 20th century.

In an attempt to focus and clarify what was a growing interest in this field, in 1994 educator and businessman Laurence McKinney published the first book on the subject, entitled “*Neurotheology: Virtual Religion in the 21st Century*”, written for a popular audience but also promoted in the theological journal *Zygon* (L. McKinney, 1994, p. 24). According to McKinney, neurotheology sources the basis of religious inquiry in relatively recent developmental neurophysiology. In accordance with his theory, pre-frontal development, in humans, creates an illusion of chronological time as a fundamental part of normal adult cognition past the age of three. The inability of the adult brain to retrieve earlier images experienced

by an infantile brain creates questions such as “where did I come from” and “where does it all go”, which McKinney suggests led to the creation of various religious explanations. The experience of death as a peaceful regression into timelessness as the brain dies won praise from readers as varied as author Arthur C. Clarke, eminent theologian Harvey Cox, and the Dalai Lama and sparked a new interest in the field.

What Andrew Newberg and others discovered is “that intensely focused spiritual contemplation triggers an alteration in the activity of the brain that leads one to perceive transcendent religious experiences as solid, tangible reality. In other words, the sensation that Buddhists call *oneness with the universe*.” (Andrew Newberg; E. D’Aquili; V. Rause, 2002). The orientation area requires sensory input to do its calculus. “If you block sensory inputs to this region, as you do during the intense concentration of meditation, you prevent the brain from forming the distinction between self and not-self”, says Newberg. With no information from the senses arriving, the left orientation area cannot find any boundary between the self and the world. As a result, the brain seems to have no choice but to perceive the self as endless and intimately interwoven with everyone and everything. “The right orientation area, equally bereft of sensory data, defaults to a feeling of infinite space. The meditators feel that they have touched infinity.” (S. Begley, 2001). The radical Catholic theologian Eugen Drewermann developed a two-volume critique of traditional conceptions of God and the soul and a reinterpretation of religion (*Modern Neurology and the Question of God*) based on current neuroscientific research. (Eugen Drewermann, Eugen, 2006–2007). However, it has also been argued “that neurotheology should be conceived and practiced within a theological framework” (Wilfried Apfalter, 2009, p. 170). Furthermore, it has been suggested that creating a separate category for this kind of research is moot since conventional Behavioral and Social Neurosciences disciplines can handle any empirical investigation of this nature. (Dr. Milind Ovalekar, 2006). Notwithstanding, not everybody is open to the correlational study. Some scientists have called it ‘quasi-scientific’ and question the validity of the endeavor (J.S. Feit, 2003, p. 1). Similarly, while some religious believers have expressed suspicion of any attempts to probe the neurobiology of belief, thinking that it was somehow irreverent, others have appealed to it in support of claims for the existence of the soul (M. Beauregard and D. O’Leary, 2008). In addition, the Press, to a large extent, have had a field day in publicizing the various findings and claims in an often sensationalist manner. There is a great deal of potential for a balanced and sober approach to the field which tries to steer an authentic middle ground, allowing the facts to speak for themselves.

According to a reputed American journalist, *neurotheology* is stalking bigger a game than simply affirming that spiritual feelings leave neural footprints, too. By pinpointing the brain areas involved in spiritual experiences and tracing how such experiences arise, the scientists hope to learn whether anyone can have such experiences, and why spiritual experiences have the qualities they do (S. Begley, 2001).

These are noble and worthwhile questions; if we can understand how spiritual experiences take place then our spiritual lives would be enhanced and our practices of spiritual formation vastly enriched. Few, surely, could argue with such a treasure. The issue, however, is not so simple. In his review of the book, *The Spiritual Brain* – by Mario Beauregard and Denyse O’Leary –, Dr. Bryan Appleyard, the British author, has stated: “Neuroscience is a combat zone. It is here, in the human brain, that the final conflict between materialism and, to invent a word, soulism is being fought. For materialists, the outcome is not in doubt. Our minds, ourselves, our awareness are merely the outcome of the electrical activity of the few pounds of hyperconnected matter between our ears. All claims to the contrary are wishful thinking or superstitious remnants” (B. Appleyard, 2007,p.1). Thus we come to the crux of the controversy surrounding neurotheology: writers committed to a materialist ontology and a reductive approach to the mind are arguing not only for neural correlates to spiritual experience but are intending to eliminate spirituality entirely by arguing that these experiences are *caused* by the brain in some manner. Candidates for this causal mechanism vary from evolutionary adaptations to genetic mechanisms, brain modules or circuits of various descriptions, temporal lobe discharges related to temporal lobe epilepsy (TLE) etc. But, clearly, these writers have made an unjustified leap from correlation to causation. Some religious believers have made the opposite mistake; pointing out that none of these arguments is sufficient to explain spirituality, they want to argue that the only sufficient explanation, therefore, is that these neural phenomena must be pointing to an authentic source of the experiences, namely God and/or the soul (a vision imparted by most of theologians and also by many scientist).

The challenge for both extremes is pointed out by science writer George Johnson: “In the neurological search for the spiritual, there is no shortage of data. But pile it as high as you like, and you're left staring across the same divide. Depending on your predisposition, you can interpret all these experiments in two different ways. The believers take them as scientific evidence for the reality of their visions, while the atheists claim more proof that God is all in your head” (Johnson, 2007, p. 1).

3. THE ARCHETYPES AND THE GODS

The archetypes are much bigger than individual people, and therefore no person can completely fulfill an archetype. It is normal to project an archetype onto a person (such as projecting the Mother archetype onto your personal mother), but with maturity we retract the projections, and differentiate the real person from the idealized archetype. Nevertheless, the unfulfilled potential of the archetype remains, and we are left with a longing for the idealized figures they represent. Further, the archetypes call for complete *actualization* (for that is their biological function), and urge us to seek them. Likewise, the sum total of the archetypes, the Self, seeks actualization of the genomic potential of the species in the life of the individual, which gives rise to the drive for fulfillment that C. G. Jung called *individuation*.

Once the projections are withdrawn, we realize that the archetypes exist independently of the concrete individuals that may manifest them; or, in other words, we may say that the archetypal structures exist in the genotype independently of the individuals that trigger their innate releasing mechanisms. That is, the archetypes are autonomous; they exist independently of human psyches in the same sense that the human genotype exists independently of individual humans. (Bruce MacLennan, 2002, p. 7). It is well known that the archetypes correspond to the gods of various pantheons, and that mythology often encodes archetypal relationships. We will take the identity of god and archetype for granted, and focus on the question of whether the gods are real or “merely psychological.” According to common scientific standards, we may say that the archetypes (the gods) are objectively real phenomena if and only if they are 1. *empirical*, 2. *stable*, and 3. *public*.

Thus, *firstly*, the archetypes are empirical phenomena in the primary sense of those words because they manifest as appearances (Greek, *phainomena*) that arise in experience (Grk., *empeiria*). The archetypes themselves are not directly experienceable, because they reside as potential perceptual-behavioral structures in the unconscious. However, we experience their effects when they actualize in consciousness, and from these empirical effects we can infer the archetypal structures causing them, which does not make them any less real. “The existence of the instincts can no more be proved than the existence of the archetypes, so long as they do not manifest themselves concretely” (C.G. Jung, 8, 1967-78, p. 155). That these experiences need not have external referents, that is, corresponding physical phenomena external to the observer, does not negate their empirical validity. Psychology must take them as givens (Lat., *data*), for its subject matter is the psyche and whatever appears to it (*phainomena*). All sciences, from physics to sociology, are grounded in the experiences (“observations”) of an individual psyche. *Secondly*, the archetypes are *stable* phenomena, another criterion of objective reality. From the earliest recorded mythologies, to the cosmologies of surviving traditional cultures, to the dreams and fantasies of contemporary people, we find the same archetypes recurring across time and place. Indeed, it was this observation that first led Jung to hypothesize the existence of archetypes (Bruce MacLennan, 2002, p. 7). *Thirdly*, the foregoing also shows that the archetypes are *public* phenomena; that is, when suitably trained observers investigate the unconscious, they reach consistent conclusions about its archetypal structure. Therefore the archetypes are empirical, stable, and public, which are the accepted scientific standards for the objective reality of a class of phenomena. Hence, one can infer, the archetypes – the gods – are real.

But it's worthwhile to say a little more about the manner of existence of the archetypes, about their *ontological* status. Fortunately, we have some analogous situations to guide us, for if, as has been argued, the archetypes are the psychical aspect of phylogenetically-defined perceptual-behavioral structures, then the archetypes are functions of the human genotype, which is a mathematical pattern. Therefore the archetypes exist in the same way as other mathematical patterns, as (Platonic) forms or Ideas independent of their physical embodiment. They are formal, not material.

The archetypes are a source of meaning because they integrate individual lives into the greater patterns of humanity and the universe; they give transpersonal meaning and significance to situations and relationships in human life. From an ethological perspective humans are primed, through innate releasing mechanisms, to respond in characteristic ways to the corresponding releasers (Hornblower & Spawforth, 1996). When we are in an archetypal situation, we are under the influence or compulsion of a god. That is, we are drawn into the narrative of a phylogenetic “script” (which does not imply, of course, that we have no control over the situation); we may feel like we are living a myth (as, indeed, we are).

There are two poles to the archetypal relation: the experiencing ego and the “other” towards which the perceptual-behavioral “script” is directed. The entire relationship is divinely (archetypally) guided, and each pole may be experienced as inspired by a god. The ego may experience itself as “possessed” by a divinity, whose intentions may conflict with the ego’s. Similarly, the “other” (often a person) may be perceived as divine, numinous, magical, or radiant. For example, the beloved is experienced as a god or goddess: “first there come upon him a shuddering and a measure of that awe which the vision inspired, and the reverence as at the sight of a god, and but for fear of being deemed a very madman he would offer sacrifice to his beloved, as to a holy image of deity”. (Plato, *Phaedrus* 251a).

Of course, the beloved is not a god or goddess. People are not archetypes, and the practical difficulties of treating them as such are well known. In psychological terms, we should withdraw the projection; although the archetypal relation is authentic, we cannot forget that an archetype cannot be manifested completely by an individual; the archetype may touch a human, but it is superhuman and resides elsewhere (Bruce MacLennan, 2002, p. 10).

It is even more dangerous to confuse oneself with a deity, the ancient sin of *hybris*, the psychological condition of ego inflation. “Possession” by a divinity is not necessarily a bad thing (who would reject the divine madness of love?) – another word for it is inspiration (Grk., *entheos*, “having the god within”) – but it is crucial to be consciously aware of what is taking place (an archetypal actualization), nor should one abandon the “ethical orientation” of the ego.

4. THE NEUROSCIENCE OF ENLIGHTENMENT

Coming back to the main point of our paper, i.e. the nexus between science and theology or religious life, a question arises: Can neuroscience deliver on the promises presented by religion: freedom from suffering, violence, scarcity, and disease? In other words, can this science of nervous system and brain deliver us into a life where health, peace, and abundance reign? The pledges of the world’s religions are so universal that it’s likely the longing for joy, inner peace, and well-being are hardwired into the human brain and have become a social instinct as powerful as the drive to procreate. The Bible, the Koran, and Buddhist and Hindu scriptures all teach that we can be delivered into a paradisiacal state, whether after death, at the end of time, following many reincarnations, or as a result of personal effort and merit. This state of liberation is called grace or Heaven by Christian religions, Paradise by Muslims, while Eastern traditions refer to it as awakening or enlightenment, using various terms such as *samādhi*, *mukti*, *bodhi*, *satori*, and *nirvana*. But what if grace, *samādhi*, and enlightenment are really based in biological science? What if they are states of higher order and complexity created by programmable circuits in the brain? What if these circuits could make it possible to attain lifelong joy, inner peace, health, and well-being now, in this physical world, and not in some distant future or afterlife?

4.1. The brain and the enlightenment

So with all this expanded brain power, what are we striving for? In the East, enlightenment has traditionally been associated with qualities such as generosity, compassion, peaceful acceptance, and an experience of oneness with all creation. In the fiercely individualistic West, our rather vague notion of enlightenment suggests an acceptance of the world as it is, or of discovering how we can change it for the better. Enlightenment for us also implies the common longing for novelty, exploration, and creativity, as personified by the explorers who venture into space. (David Perlmutter & Alberto Villoldo, 2011, 34)

If we take the Eastern qualities of enlightenment out of their religious context and place them in the realm of biological science, we find that they are attributes associated with the activation of the prefrontal cortex, the newest part of the human brain. On functional MRI scans (Magnetic resonance

imaging), people who meditate regularly are shown to have developed brains that are wired differently than the brains of people who don't meditate. They are better able to remain calm and stress-free, live in peace, and practice compassion. Curiously, their prefrontal cortex is the most active region in their brain during the states they describe as samādhi, or enlightenment. For instance, in Lamaism or Tibetan Buddhism, Tenzin Gyatso, the 14th Dalai Lama (the current one), describes enlightenment as "a state of freedom not only from the counterproductive emotions that drive the process of cyclic existence, but also from the predispositions established in the mind by those afflictive emotions" (Dalai Lama, 2009, p. 88). Thus, he is suggesting that enlightenment is a state of freedom from destructive emotions and from the limiting beliefs and repetitive behaviors created by these emotions.

Generosity and compassion arise only when the prefrontal cortex is able to throttle back the more prehistoric regions of the brain. Yet, for the prefrontal cortex to create functional pathways for joy and peace, the entire body and brain need to be healthy, fed with the proper nutrients, and trained with an inner discipline. We must heal our bodies and minds to empower the prefrontal cortex-the new brain, which is biologically programmable for bliss, extraordinary longevity, peace, and regeneration. For too long, this brain region has been kept offline, silenced by the same forces-scarcity, violence, and trauma-from which it promises to deliver us. (David Perlmutter & Alberto Villoldo, 2011, p. 35)

Once this new region in the brain is brought online, brain synergy is possible. Synergy means that the whole is greater than the sum of its parts. Engineers are familiar with how synergy operates. The tensile strength of stainless steel, for example, is nearly ten times greater than the tensile strength of iron, even though stainless steel is basically iron with a minute amount of carbon added to it. Both carbon and iron, by themselves, are brittle and flake easily. Yet, when combined, they make an extraordinarily strong material.

Brain synergy signifies a neurocomputer whose circuits are all turned on, tuned in, and operating collaboratively, each region attending to its functions-much as the heart attends to circulating blood while the lungs attend to respiration-creating a system that cannot be defined or even described by its component parts.

Beginning in the 1990s, some neuroscientists turned their attention to Buddhist meditation as a subject of research. Meditation has proven to be a congenial subject of research because it is largely stationary, predictable, and has a base of willing test subjects. The primary concern of this research has been to link meditative states with heightened or lowered activity in specific regions of the brain. Research done by Eugene D'Aquili and Andrew Newberg (1999) has shown that such meditation consistently correlates with heightened activity in some areas of the brain (the prefrontal cortex, for instance) and lowered activity in others (most specifically areas in the parietal lobes associated with spatial orientation). D'Aquili and Newberg theorize that it is the alteration of these brain states that leads to the particular experiences (e.g., a sense of unity and a loss of distinction between self and other) that meditation is traditionally said to give rise to.

4.2. Prayer on the Brain: Neurotheology

As technological progress becomes more and more pronounced in virtually every area of life, many scientists have found new ways to use these advances to explore some profound questions about the intersection of the physical and the divine. One area of research that has recently emerged is the discipline of neurotheology.

Neurotheology, as defined by Dr. Andrew Newberg, is "an integration of neuroscience with religion" (Eugene D'Aquili & Andrew B. Newberg, 1999, p. 3). A neuroscience expert from the University of Pennsylvania, Dr. Newberg has been using brain scan technology to learn more about electrical activity in the brain during religious or meditative experiences. Although the field is relatively new, scientists have been asking questions about the brain's role in religious belief for decades. As understanding of the structure and function of the brain has continued to develop, new theories have emerged. Some ideas have been discredited or ruled incomplete, while some areas of study, like neurotheology, have grown and yielded interesting results.

One of the more interesting studies involved Buddhist monks, Franciscan nuns, and Pentecostal Christians. The same scanning technology used to explore the causes of Alzheimer's and Parkinson's disease was directed towards their prayer and meditation practices. What the researchers found is that the

subjects' frontal lobes, parietal lobes, and limbic systems all showed similar heightened activity. Though the data has been interpreted by different people in different ways, what is clear is that prayer and meditation seem to have a unique biochemical effect on the brain. Scientists like Dr. Newberg have been using such data to create a fuller picture of the neurological landscape when a person enters a religiously sensitive mindset.

The most important underlying question is a matter of perspective: were humans physiologically programmed to pray? Or is the brain activity simply evidence that, for those who believe in a divine being, prayer is "all in their head"? The most recent research doesn't answer this question, of course, but it does move the conversation into new territory.

The goal for Dr. Newberg and many of his colleagues is "to find ways in which both science and religion or spirituality can be enhanced by the other rather than diminished or attacked." (Eugene D'Aquili & Andrew B. Newberg, 1999, p. 14). Now that these exciting new studies have demonstrated clearly that prayer and meditation make the brain work in a unique way, there is an opportunity to begin a new dialogue between science and spirituality.

Neurotheology represents the chance to ask new questions and evaluate spirituality from a scientific perspective, and researchers like Dr. Newberg are fully embracing the endless possibilities this new area of study unlocks. The hope, as always, is that a deeper understanding about how the brain works can help inform similarly deep questions about what it means to be human.

For Christians and other devotees, prayer is just one of the many ways to practice living in the power of the spirit. This new neurological data being gathered probably won't fundamentally change the beliefs of the faithful, but it might lead to a greater understanding of and respect for the scientific components of religious life among all people in every culture.

Revolving round the topic, there is a concept that clerics like Bishop Stephen Sykes give some credence as well: could there be such a thing as a talent for religion? St. Sykes does, though, see a great difference between a 'sensed presence' and a genuine religious experience. Scientists like Andrew Newberg want to see just what does happen during moments of faith. He worked with Buddhist, Michael Baime, to study the brain during meditation. By injecting radioactive tracers into Michael's bloodstream as he reached the height of a meditative trance, Newberg could use a brain scanner to image the brain at a religious climax.

The blood-flow patterns showed that the temporal lobes were certainly involved but also that the brain's parietal lobes appeared almost completely to shut down. The parietal lobes give us our sense of time and place. Without them, we may lose our sense of self. The adherents to many of the world's faiths regard a sense of personal insignificance and oneness with a deity as something to strive for. Newberg's work suggests a neurological basis for what religion tries to generate. (Horizon, *God on the Brain*, 2014)

4.3. Neuroscience and religious experience

A recent area of neuroscientific exploration has been the nature of religious experience itself and its possible roots in the brain. There has been a long tradition of scientific speculation on the nature of religious experience. For much of its history, when neuroscience has on rare occasion turned its attention to the topic of religious experience, the tendency has been to associate it with one or another form of mental illness. William James, for instance, chided medical materialists (as he called them) for attempting to reduce religious experience to mental illness. One early favorite candidate has been temporal lobe epilepsy, which has been known to produce in some individuals profound religious experiences prior to the onset of seizures. The Russian novelist Fyodor Dostoevsky is probably the most famous example of this phenomenon. Knowledge of such instances has been used by some neuroscientists (Robert Persinger in 1987, for example) as a general explanation for religious experience. Research by V. S. Ramachandran (Ramachandran and Blakeslee, 1998) has shown this to be unlikely, however, as religious individuals with no epilepsy seem to respond differently in tests using religious imagery than individuals with temporal lobe epilepsy (V.S. Ramachandran, 1998, p. 198).

There are deep divides as to how to interpret such research. Some argue that studies that correlate brain states with religious experiences show that these religious experiences are not real, i.e., religious experiences are nothing but a form of brain dysfunction or even mental illness with no basis in any kind of higher reality. On this account, religious experience is necessarily illusory in character, and

such research can be taken as evidence for a more general reductive account of religion. D'Aquili and Newberg, however, have argued that their research shows that religious experience is part of the normal functioning of the brain and should not be characterized as a form of mental illness, as has often been the case in psychology. They also argue that the implications of such research are not reductive. Rather, they claim, it should be admitted that the realities such brain states reveal are just as real as those of ordinary experience, and so one should not be privileged over the other (Eugene D'Aquili & Andrew B. Newberg, 1999, p. 164).

Some important limitations of these studies should be noted. To date, the studies done have been small, involving few subjects, thus raising the probability of error or variant results in further trials. In addition, it is important to note that meditational practices vary from tradition to tradition, and what holds true for one form of meditational practice may not hold true for all. Furthermore, it would be a mistake to suppose that religious experiences arising from meditation can simply and straightforwardly be used as a model for explaining all religious experiences. Religious experience is diverse and complex, and there are likely multiple factors involved (Gregory R. Peterson, 2005, p. 6487).

One of the criticisms of neurotheology is that the field focuses too much on individual religious experiences, particularly the mystical ones, people have and that it does not take into account the other aspects of religions. For neurotheology to achieve its full potential as a field of study, it is important for any investigator to understand the complexity and diversity of experiences that are religious or spiritual. In other words, religion is much more than just the experiences that individuals can have, especially the strong mystical experiences that are not common. Religions typically have many different rituals, holidays, and cognitive, emotional, and behavioral components that all can be evaluated from a neuropsychological perspective. Even issues such as forgiveness, love, or altruism can be considered from a neuropsychological perspective to gain better insight into how and when such feelings and behaviors take place. It is this ability to explore the neuropsychological basis of such concepts that can ultimately be a strength of neurotheology (Andrew B. Newberg, 2005, p. 6493).

The emotional elements of religion are also an important aspect of neurotheological analysis because a variety of emotions are fundamental to religions and religious experience. The autonomic nervous system (in conjunction with the hypothalamus) that regulates basic body functions, such as heart rate, blood pressure, and hormones, and the limbic system that regulates basic emotional responses can produce a wide variety of complex feelings. Religious concepts pertaining to love, joy, envy, or awe are likely associated with concomitant changes in these components of the nervous system. Neurotheology seeks to study the relationship between the nervous-system structures and such elements of religions and religious experiences (Michael Gazzaniga, 2000, p. 76).

Neurotheology may also have a special status because neurology is universal in the sense that all human beings have brains that function in a similar manner. The challenge for future neurotheological development is to evaluate the similarities and differences among individual brain functions, as well as the phenomenological differences both within and across religious traditions. It has also been argued that neurotheology may provide a basis for a metatheology and even a megatheology. A metatheology comprises both the general principles describing, and implicitly the rules for constructing, any concrete theological system (Harold Koenig, Michael McCullough, and David Larson, 2001, p. 245). A metatheology must evaluate how and why foundational, creation, and soteriological myths are formed; how and why such myths are elaborated into complex theological systems; and how and why the basic myths and certain aspects of their theological elaborations are objectified in the motor behavior of ceremonial ritual. A megatheology, on the other hand, should contain content of such a universal nature that it could be adopted by most, if not all, of the world's great religions as a basic element without any serious violation of their essential doctrines. Since brain function is universal and necessarily has an impact on how human beings understand and practice religion, a fully developed neurotheology may provide a basis for a megatheology (Andrew B. Newberg, 2005, p. 6494).

4.4. Brain functions and theological topics

The brain, especially the right hemisphere, has the ability to perceive holistic concepts such that we perceive and understand wholeness in things rather than particular details. For example, we might understand all the cells and organs to comprise the whole human body. From a religious or spiritual

perspective, we might understand a concept of absolute oneness as pertaining to God. Furthermore, the holistic process in the brain allows for the expansion of any religious belief or doctrine to apply to the totality of reality, including other people, other cultures, animals, and even other planets and galaxies. In fact, as human knowledge of the extent of the universe has expanded, the notion of God has incorporated this expanding sense of the totality of the universe. The holistic function pushes us to contemplate that whatever new reaches of the universe astronomers can find, God must be there. No matter how small and unpredictable a subatomic particle might be, God must be there, too (Eugene D'Aquili & Andrew Newberg, 1999, p. 77).

In the most general sense, the quantitative processes of the brain help to produce mathematics and a variety of quantitative-like comparisons about objects in the world. The quantitative function clearly both underlies and supports much of science and the scientific method. Science essentially is based upon a mathematical description of the universe. In terms of philosophical and theological implications, the quantitative function appears to have heavily influenced the ideas of philosophers such as Pythagoras who often used mathematical concepts such as geometry to help explain the nature of God and the universe. (A. Sayadmansour, 2014, p. 53)

Also, the binary processes of the brain enable us to set apart two opposing concepts. This ability is critical for theology since the opposites that can be set apart include those of good and evil, justice and injustice, and man and God among many more (AR. Damasio, 2000, p. 175). Many of these polarities or dichotomies are encountered throughout religious texts of all religions. Much of the purpose of religions is to solve the psychological and existential problems created by these opposites. Theology, then, must evaluate the myth structures and determine where the opposites are and how well the problems presented by these opposites are solved by the doctrines of a particular religion such as Christianity, Judaism or Islam. The ability of the brain to perceive causality is also crucial to theology. When the causal processes of the brain are applied to all of reality, it forces the question of what is the ultimate cause of all things (Brandt, Clément, & Manning, 2010, p. 308). This eventually leads to the classic notion of St. Thomas Aquinas's "Uncaused First Cause" as an argument for God's existence. For monotheistic religions, the foundational doctrines posit that God is the uncaused cause of all things. However, this very question of how something can be uncaused is a most perplexing problem for human thought. In fact, theologians, philosophers, and scientists have tangled with causality as integral to understanding the universe and God. Aristotelian philosophy postulated four aspects of causality i.e. efficient causality, material causality, formal causality, and final causality. The question of causality thus became applied to God to determine how, in fact, God could cause the universe (John Hick, 2010, p. 60).

Two other important brain functions are related to the ability to support willful or purposeful behaviors and the ability to orient our self within the world. Neuroscientifically, the willful function is regarded to arise, in large part, from the frontal lobes (L.O. McKinney, 1994, p. 48). There is evidence that frontal lobe activity is involved in executive functions such as planning, coordinating movement and behavior, initiating and producing language. Evidence has also shown the frontal lobes to become activated when an individual performs a meditation or prayer practice in which there is intense concentration on the particular practice (D. Fontana, 2003, p. 147).

Another area in which neurotheology could provide important scientific information is in understanding the link between spirituality and health (Harold Koenig, Michael McCullough, and David Larson, 2001, p. 254). A growing number of studies have shown positive, and sometimes negative, effects on various components of mental and physical health (R. Carter, 2004, p. 46). Such effects include an improvement in depression and anxiety, enhanced immune system, and reduced overall mortality associated with individuals who are more religious. On the other hand, research has also shown that those individuals engaged in religious struggle, or who have a negative view of God or religion, can experience increased stress, anxiety, and health problems (M. King, P. Speck & A. Thomas, 1999, p. 1298). Research into the brain's responses to positive and negative influences of religion might be of great value in furthering our understanding of the relationship between spirituality and health.

5. CONCLUSION

One of the most important goals of cognitive neuroscience is to better understand how human beings think about and interact with our environment. In particular, this relates to our perception and response to the external reality that the brain continuously presents to our deep consciousness (L. Miller, 2018). Neurotheology is in the unique position to be able to explore epistemological questions that arise from neuroscience and theology. Thus, integrating religious and scientific perspectives might provide the foundation upon which scholars from a variety of disciplines can address some of the greatest questions facing humanity. As an emerging field of study, neurotheology has the potential to offer a great deal to our understanding of the human mind, consciousness, scientific discovery, spiritual experience, and theological discourse. In particular, there are many potentially rich areas to consider in the context of Christianity and other main religions of the world.

Overall, neurotheology seeks to facilitate a dialogue between religion and science with the eventual goal of helping to integrate these perspectives around the nexus of neuropsychology. That neuropsychology provides some universal perspective on human behavior and thought that can also be utilized in an approach to the study of religions and theology lies at the heart of neurotheology. Furthermore neurotheology seeks to integrate theoretical development, empirical studies, and philosophical and theological interpretation. Neurotheology as a field of study thus holds many opportunities for expansion and may play a critical role in future theological and religious study (Andrew Newberg, Eugene d'Aquili, and Vince P. Rause, 2002, p. 214-215).

It should be added that neurotheological scholarship must tread carefully upon these topics and attempt to develop clear, yet novel methods of inquiry. All results of neurotheological scholarship must be viewed and interpreted cautiously and within the context of existing doctrine, beliefs, and theology. However, if neurotheology is ultimately successful in its goals, its integrative approach has the potential to revolutionize our understanding of the universe and our place within it (A. Sayadmansour, 2014, p. 55). Better understanding of human mind, its biology and neurocircuitry has the potential to solve man-made problems. It can even create a bridge between the empirical science of neurology with the intangibility and sensitivities of theology.

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