

The Neurophysiology of Religious Conversion Experiences

A Biological Psychology Research Paper

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Abstract - This paper explores various scientific studies and neurophysiological evidence that describe and authenticate the two main forms of religious conversion: *progressive* and *instantaneous*. Progressive conversion experiences are thought to occur via the Stage Model and are explained by the emotional-cognitive processing theory, while instantaneous conversion experiences have been found to result from seizure-like temporal lobe activity, leading to the localization of the 'God Spot' in the human brain. The potential for religious conversion (and general religiosity) is dependent on both environmental and genetic factors including 'Attachment Theory'-based learning and inheritance of the VMAT2 ('God') gene, respectively. A Christian worldview was applied to the analysis of the information presented in this paper to achieve the following conclusive rational: religious conversion experiences are regulated by neurological mechanisms that exist and operate as a result of genetic and environmental factors which are ultimately controlled by God the Creator.

Keywords: Amygdala, Attachment Theory, Brain Localization, Brain Mapping, Cerebral Cortex, Cultural Hitchhiking, Dopamine, Emotional-Cognitive Processing Theory, Epilepsy, Functional Magnetic Resonance Imaging (fMRI), God Gene Hypothesis, Neural Plasticity, Neurophysiology, Neuropsychology, Nucleus Accumbens, Prefrontal Cortex, Religious Conversion, Stage Model, Temporal Lobe, VMAT2 ('God') Gene

Introduction: The Basis of Neuropsychology

As one of the most rapidly evolving systematic enterprises worldwide, for centuries, science has existed as the empirical cause of social and cultural progression, contributing largely to advancements made in economics and technology. Ironically, such progression, although edifying in nature, has revealed that scientific knowledge gained is, and likely to always remain, seemingly proportional to that which remains unknown. As such, numerous fields of science have been developed and will continue to evolve in order to permit the continuous, comprehensive exploration of perpetual knowledge that has yet to be learned. In their book, entitled, *Neuroscience Psychology and Religion* (2009), authors Malcolm Jeeves and Warren S. Brown articulate one such field of science, referred to as *neuropsychology*, which focusses its studies on the neurological basis of human thoughts and behaviors. A central objective of neuropsychology is 'brain mapping' or 'brain localization,' whereby, with the use of functional magnetic resonance imaging (fMRI) techniques, the anatomical origin of a specific function within the brain can be determined, subsequently allowing for the neurophysiology of certain behaviors to be inferred (Jeeves and Brown 2009). Although functional localization in the

lower brain (*ie.* brainstem, midbrain, diencephalon, etc.) is relatively uncontroversial; debate amongst researches tends to arise over the precise localization of, and correct neurophysiological explanations for behaviors derived from more complex cognitive processing in the cerebral cortex (Jeeves and Brown 2009). As one could expect, certain behaviors have birthed a larger amount of debate than others. Not surprisingly, due to their inherent susceptibility to scientific criticism by nature, behaviors associated with religious experiences, such as prayer, mediation, and religious conversion, fall easily into this category. Despite the inevitable element of skepticism tied to religious experiences, this paper attempts explain and subsequently validate the specific behavior of *religious conversion*, by examining both the internal and external signs or 'symptoms' of such transformations, investigating the neurophysiological events thought to govern such experiences, and proposing a unique theory, guided by a Christian worldview, that applies a theological foundation to the genetic and environmental factors considered to influence the event of this neurological phenomenon.

Religious Conversion: A Brief Overview of Concept and Types

Before rushing too far into things, it is important to clearly define what is meant by the term 'conversion' as it pertains to religion. Perhaps the best explanation is given by William James in his published collection of Lectures delivered at Edinburgh University, entitled, *The Varieties of Religious Experience - a Study in Human Nature* (1902): To be converted, to be regenerated to receive grace, to experience religion, to gain an assurance, are so many phrases which denote that process, gradual or sudden, by which a self hitherto divided, and consciously wrong, inferior and unhappy, becomes unified and consciously right, superior and happy, inconsequence of its firmer hold upon religious realities. (James 1902, as cited in Leone 2004)

By these words, religious conversion appears to be both restorative and fulfilling, possessing the ability to breathe new life and energy into those who experience it by lifting them out of personal distress and turmoil into a state of desired well-being. Amidst a multitude of possible questions that could arise from a seemingly simple-to-describe event, the main questions that demand and require the most attention are as follows: What does the actual transformation process itself and subsequent new state of being look and feel like

for those who claim to have experienced a religious conversion? And more importantly, what sort of evidence exists that could possibly validate such a radical claim? To allow for thorough investigation of these questions and consequential attainment of conclusive answers, the general concept of religious conversion must be broken down into its two main 'types,' previously introduced by William James (1902): "gradual" [and] "sudden."

The Progressive ("Gradual") Experience

Module 1.1 – Method and Indications of Progressive Conversion: The Stage Model

Without intending to dismiss or undermine the possibility of a sudden, instantaneous religious conversion, it is worthwhile to note that according to Lewis Rambo, author of *Understanding Religious Conversions*, a religious conversion most often occurs as a process, which, like most other psychophysiological transformational processes, possesses and displays a characteristic mode of progression that can be broken down into and mapped by the developmental phases (aka. 'stages') of the *Stage Model*: Context, Crises, Quest, and Encounter (1993). Although the order of the stages is neither invariant nor universal, the stages are often experienced sequentially (in the order listed above) and it is through these stages that people experience religious conversions. Bearing in mind this notion, one can assume that any form of observable evidence and/or outward sign that suggests an individual is in the process of converting, must therefore too be progressive rather than finite. In fact, many contemporary theologians believe that genuine conversion transpires over an entire lifetime (Rambo 1993). This belief alone denies the possibility that the consequences of religious conversion can ever be immediate or outwardly apparent.

Nonetheless, many individuals will claim to *have been* converted, thereby implying an end to the process or point of completion. Rather than reprimand such claims, one could rightly perceive them as suggesting that the individual is in the later stage of conversion and therefore quite capable of delivering a reputable, verbal account of their process. Studies conducted on individuals that fit this description have revealed that most self-proclaimed religious converts are able to recall the time and place (*ie.* 'Context') in their lives when and where they believe their conversion was initiated (Heirich 1997). Consistent with the pattern of progression suggested by the stage model, the majority of individuals able to recall the origin of their conversion, will admit to experiencing some sort of crisis prior to or during this time, such as the loss of a loved one, immoral addiction, depression, or a significant amount of stress, causing them to feel hopeless or alone and prompting them to seek out or hope for some type of solution that had the potential to draw them out from their undesired state of isolated comatose (Heirich 1997). As religious converts, or better identified as those deeply vested in their journey of religious conversion, these same individuals will attest to experiencing the feeling or emotional transition of being 'saved' or revived during the period of their journey that could logically be surmised as the 'Quest' stage (Heirich 1997). On a consistent basis, such revitalization has

caused people to develop a greater appreciation for nature and small gestures made by others, as well as caused them to develop a deeper sense of compassion and empathy toward both human and non-human life (Thagard 2005). In essence, the process of religious conversion has proven to enhance the ability or tendency of an individual to perceive and appreciate moral value, thereby prompting them to embody similar values that aid them in achieving emotional and spiritual fulfillment.

Module 1.2 – Neurological Evidence: The Emotional-cognitive Processing Theory

Since religious conversions have been predominantly validated by inner feelings or emotions and subsequent actions dictated by those feelings, it is only necessary to assume that the brain, which exerts centralized control over all bodily functioning and processing, is largely involved in such experiences. The similarity and consistency amongst those accounts rendered by individuals who have undergone religious conversion suggests that a constant neurological mechanism might be responsible for causing the feelings of freedom and revival. According to Paul Thagard, author of numerous articles pertaining to the neuropsychology of religion, the process of religious conversion is a consequence of emotional-cognitive processing in the brain, derived from the normal operation and interaction of specific anatomical structures including the prefrontal cortex, amygdala, and nucleus accumbens (2005), which function primarily in cognitive processing, emotional processing, and motivational processing, respectively (Kalat 2009).

Although it does not make direct reference to the previously described Stage Model of religious conversion, this emotional-cognitive theory provides neurophysiological understanding that would appear to both rationalize and validate the basic premise and particular succession of events proposed in that model, as the following explanation attempts to clarify. Hypothetically speaking, for an individual beginning a religious conversion (assumed to progress according to the Stage Model), the amygdala and nucleus accumbens of the brain would act as the main neural structures responsible for processing the environmental stimuli, invoking an appropriate emotional response, and regulating those emotions; all of which would occur in the initial stages of Context and Crises. Studies have indicated that people who have experienced a recent crisis often exhibit neurological symptoms of decreased dopamine (DA) levels and reduced brain activity, similar to patients diagnosed with moderate to severe depression, which could imply functional alteration or incapacitation of the nucleus accumbens to facilitate normal DA reception (Skolnick 2005). Such disruption of chemical equilibrium in the brain is processed cognitively by the prefrontal cortex which exerts a negative feedback response by searching for and instigating a corrective solution, often in the form of a behavior, that could function to restore normal DA levels and, as a result, alleviate emotional distress (Thagard 2005).

This cognitive response of the prefrontal cortex would characterize the Quest period of the Stage Model, whereby the individual embarks on a self-guided journey that eventually leads them to the realization that the only true corrective

solution lies in the hope for salvation and belief in a divine power much greater than their own being (Heirich 1997). Procurement of this knowledge would mark the entrance into the final stage of conversion, known as the Encounter stage, which is characterized by intentional and consistent practice, as well as possible lifestyle adjustments made decisively and purposefully by the individual to position themselves with people and within an environment that would be likely to foster the development of their newly-acquired faith (Heirich 1997). Characterized by intellectual thoughts and actions initiated and directed by the prefrontal cortex, the Quest and Encounter stages of religious conversion are thought to progress via a learning process that is no less definite nor cognitive than the process of learning physical facts (Thagard 2005). As such, the latter stages of conversion rely on restructuring of the brain, facilitated by synaptic rearrangement and neural plasticity, which can consequently alter thought processing and result in a heightened sense of optimism and spiritual recognition (Thagard 2005).

The sequential progression of the four stages of religious conversion can thus be seen as essentially guided by an emotional-cognitive neurological mechanism which derives its appreciable efficacy from its ability to produce both emotional and explanatory coherence (Thagard 2005). Although the precise contours of religious conversion are likely to vary between different people and different groups, the process itself will forever remain unailing as a result of the innate, universal need for explanation and renewal, and pervasive appeal toward the possibility of existential transformation (Rambo 1993).

The Instantaneous (“Sudden”) Experience

Module 2.1 – Symptoms of Instantaneous Conversion

It is important to make note of the fact that the neurophysiological explanation for religious conversion presented above pertains specifically to cases where the conversion is experienced as a process that occurs specifically in accordance with the Stage Model. In cases where people have reported experiencing religious conversion as a sudden, mystical event; a separate neurophysiological explanation is offered. In these types of cases, instantaneous religious conversions have been likened to the occurrence of an epileptic seizure, specifically in the right temporal lobe of the brain. Those that have reported such an experience will often claim to have seen or interacted with heavenly, majestic beings and/or heard resounding ‘church’ music, which, by some mysterious method, transpired them into a transformed state of spiritual renewal, characterized by a relentless yearning for a God or other deity figure, and by deep feelings of eternal peace, love, and tranquility (Bhugra 1996).

Module 2.2 – Neurological Evidence: Locating the ‘God Spot’

Given that the right temporal lobe functions in permitting rhythmical, melodious, visual and spatial perception (Bhugra 1996), random neural misfiring in this region, like in the event of a seizure, could conceivably yield some of the effects explained by those who claim to have endured a spontane-

ous, mystical conversion. Furthermore, an important neural body known as the *amygdala* lies within the anterior portion of the temporal lobe and directly transmits emotional information (usually elicited by environmental stimuli) to the cortex (Jeeves and Brown 2009), which, in the case of abnormal neural firing in this region, could account for the sudden emotional changes described by individuals who have experienced this type of conversion. Interestingly, researchers have found that if *sodium amytal*, which acts to inhibit normal neural conduction, is injected into the right temporal lobe, that patient will experience an elevation of mood as a result of increased dopamine release in others areas of the brain (Bhugra 1996). This findings have allowed researchers to presume that the same mood-stimulating effects occur when seizure-like neural activity takes place in the right temporal lobe, thereby producing the feelings of peace, love, contentment, and spiritual desire that people maintain after a mystical conversion, which, by comparison, are similar to the eventual feelings attained through progressive religious conversion.

Coincidentally, with the use of functional Magnetic Resonance Imaging (fMRI), neurotheologists have identified the right temporal lobe as the area of the brain that shows the greatest amount of activation during prayer, meditation, or seeking contact with the transcendent, and have accordingly coined this region as the ‘God Spot’ of the brain (Jeeves and Brown 2009; Zohar and Marshall 2000). Considering this, one can assume that the cosmic presence, blissful visions, religious awe, and other effects that people claim to have experienced during an instantaneous conversion may be amplified, intensified, supercharged versions of the emotional states experienced during ordinary religious practices.

Religious Convergence Potential: Genetic and Environmental Influences

Like all human behaviors, those associated with religious conversions rely on the influence of coexisting genetic and environmental factors. Previous discussion of the Stage Model revealed that environmental factors play quite a prominent role in progressive conversion experiences, from the initial stage of Context through to the final stage of Encounter. Presumably, many of the environmental influences specific to the stages of Crisis and/or Quest could incite the occurrence of a mystical conversion; however, this opinion is speculative due to the spontaneity and inconsistency of such events. It is important to keep in mind that the genetic and environmental factors considered pertain specifically to religious conversions, but could similarly apply to or influence other religious events and/or general spiritual growth. For example, religious development in childhood has been widely explained by use of the renowned ‘Attachment Theory,’ which, in this case, suggests that children learn and develop religiosity through observation of their parents and family members (Kirkpatrick and Shaver 1990). This theory also plays a major role in the Encounter stage of religious conversion, whereby people who have made the conscious decision to convert, proceed to learn practice, praise, and worship techniques from those around them, simply by mimicking, copying, or re-enacting.

Although the influence of environmental factors on religious conversion tends to be rather incontrovertible, the role of genetic factors, on the other hand, tends to be much less obvious and therefore often disputed or simply negated. In his book, entitled *The God Gene: How Faith is Hardwired Into Our Genes* (2005), author and geneticist Dean Hamer introduces the 'God Gene Hypothesis' which, based on a combination of neurobiological, psychological, and behavioral studies, attributes religious tendency to the expression of the VMAT2 gene which is activated during religious contemplation. Physiologically speaking, the VMAT2 gene encodes a protein pump that transports monoamine neurotransmitters across synapses in the brain, producing the favorable sensations associated with mystic experiences and religious practices (Hamer 2005). Studies of monozygotic and dizygotic twins reared together and apart have found that the VMAT2 gene appears to be hereditary approximately 50 percent of the time (Hamer 2005). Although somewhat inconclusive, this research suggests that religiosity is partly heritable, therefore implying that humans *can* be genetically predisposed or 'hardwired' to undergo religious conversion. Given that the VMAT2 gene ultimately functions in producing an innate sense of optimism which in turn can produce positive effects both physically and psychologically, the evolutionary persistence of the VMAT2 gene is thought to be governed by natural selection (Hamer 2005).

To further this notion, author of *Religion, Fertility, and Genes: A dual inheritance model*, Robert Rowthorn, states in his article that, on average, religious people reproduce more children than their secular counterparts and that people who carry the God gene are more likely that average to *become* or remain religious and practice religious endogamy (2011). As a result, Rowthorn predicts that the God gene will eventually predominate as a result of 'cultural hitch-hiking,' whereby a gene spreads because it is able to 'hitch' a ride [so-to-speak] with a high-fitness cultural practice (2011). Similar to the alteration of dopamine reception in the brain in response to external crises, this concept also illustrates the intimate linkage between genetic and environmental factors as they pertain to religiosity in general, as well as to the potential for religious conversion.

Conclusion: Tying together the facts

The discussion of genetic and environmental influences in religious conversion leads to one final, fundamental question, best stated in an article by Finnish neuroscientists, Alexander and Andrew Fingelkurts (2009): Is the human brain hardwired to *produce* God, or to *perceive* Him? The first option suggests that the brain has evolved the ability to imagine and believe in a God in order to fulfill an inexorable spiritual desire that naturally exists in all humans; a concept favored by most evolutionary theorists (Jeeves and Brown 2009).

The latter approach assumes the role of the Divine in Creation – that human beings, as a whole, were specifically designed by God, in His image, to possess the capacity to come to know their Creator. Regardless of the answer chosen, the question itself accepts and supports the fact that religiosity is

ultimately made possible by the intricate anatomy and physiology of the brain, thus providing every single human being (with normal brain functioning) with equal opportunity and potential to come to know God. The option for which one chooses to advocate simply indicates whether their knowledge of God has been established or has yet to be discovered. In their book, entitled, *Why God Won't Go Away: Brain Science and the Biology of Belief*, Newberg et. Al assert that as long as the human brain is arranged as it is and the mind maintains its capability of sensing a deeper reality where suffering vanishes and desires are at peace; spirituality will continue to shape human experience, and "God will not go away" (2001). As has been articulated, the quest for this 'deeper reality' stems from the hunger that resides within every human being to find meaning and purpose in their lives, which usually manifests and becomes most apparent in the midst of crisis (Rambo 1993). Considering this, if the human brain is fully equip with the necessary machinery to experience religious conversion, and the operation of this machinery is stimulated by external factors, is it not, then, quite rational to presume that religious conversions ultimately occur as a result of the events mediated by the Coordinator of the Universe Himself? Some may agree but then question why a supposedly loving God would chose to reveal himself in such a way that inflicted upon people the emotional (and perhaps physical) distress associated with most crises. An *absolute* answer to that question will not be found in this paper, nor in any paper for that matter, as God works in mysterious ways that exceed the capacity of the human mind to comprehend. It is, however, worthy to point out the God's methods are consistent, as is evident in the biblical story of Job, to whom God revealed Himself in similar fashion. What this paper does intend to convey is the following theory which relies on the promise of the omnipotence of God: Religious conversion experiences are regulated by neurological mechanisms that exist and operate as a result of genetic and environmental factors which are ultimately controlled by God.

Although science has undoubtedly made tremendous strides over the past decades, birthing and developing innovative fields like neurophysiology which has taught the population an appreciable amount about human behavior; to believe that science can teach us *everything* is both imprudent and naïve. Science has yet to, and will likely always have yet to concretely explain theological meanings and purposes or to prove/disprove the existence of God for the very reason that science is ultimately driven by human minds, which, although created in the image of God, are limited as a consequence of their human nature, rendering them incapable of ever achieving true omniscience. Rather than deny or ignore the limitations of science, this paper intends to encourage its readers to accept these limitations as a mere illustration and reminder of the almighty power that God possesses over His creation.

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