Oceanic Experiences Coinciding with Temporal Lobe Epilepsy:

An Overestimation of the Past and Current Explanatory Power of Neuroscience

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The experience of being human is, in many ways, strange. As a species, we are animals that have colonized the planet using intrapersonal relations, rationality, and creativity. However, even given this grand achievement, there are still many mysteries about ourselves and the world that collectively we fail to understand. Most ironically, the thing that is doing the understanding, the mind, or the brain, has been speculated about endlessly but is still poorly understood. As the endless march of time pushes forward, humans now possess the historical wisdom and technological prowess to begin the next phase of untangling this puzzle. The novel combination of theory and know-how now allows us to probe ancient ideas, such as the self, consciousness, and epistemology, using the modern toolset of neuroscience. However, as Abraham Maslow and Mark Twain roughly said, "to a man with a hammer, everything is a nail." Neuroscience, like the usefulness of the hammer, offers one evidential explanation after another, yet with our current technological resolution, some of the experiences of the brain are still not wholly nail-like.

As neuroscience research has progressed, it is evident that structural lesions to specific brain regions can alter or altogether remove certain behaviors, meaning that the electrical and cellular activity of the brain somehow must correlate with subject experience. Nevertheless, how this felt experience connects to the correlated brain activity is a mystery as neuronal activity can be one of three things, the "cause of the experience, a marker of it, or a consequence" (Maselko, 2013, pp. 205). This dilemma is a problem of causation between experience and activity, as answering which comes first activity or experience is still not understood. Therefore, when neuroscientists make claims such as, "religious and mystical experiences are normal consequences of spontaneous biogenic stimulation of temporal lobe structures," the likelihood that it is a biased overgeneralization is high (Persinger, 1983, pp. 1255). Reductions like this one, which in totality suggests that the mystical or religious experience is merely synchronized electrical activity during

temporal lobe epilepsy (TLE), warrant a review that evaluates the validity of neuroscientific literature surrounding these experiences and the incorporation of intellectual arguments outside the neuroscientific evidence, like the psychological or metaphysical speculations.

An interdisciplinary evaluation of mystical or religious experiences shows that neuroscience is currently incapable of claiming that these experiences are merely byproducts of an overactive brain. The argument will be structured as follows. First, there will be a justification for using the term oceanic experience over other terms like mystical or religious, followed by a phenological description, and then a historical overview of this topic, predominantly focusing on Fyodor Dostoyevsky's epilepsy. Second, there will be an evaluation of the correspondence between the psychoanalyst Dr. Sigmund Freud and several of his critics, primarily that of the scholar of Hindu mysticism, Romain Rolland. Third, there will be an assessment of the neuroscientific literature, with a critical look at Persinger's work, *Religious and Mystical Experiences as Artifacts of Temporal Lobe Function: A General Hypothesis*, a prominent 1983 neuroscience of religion paper that has accumulated nearly four-hundred and fifty citations, with the content suggesting that neuroscience thoroughly explains the oceanic experience. Finally, there will be a brief examination of Baruch Spinoza's naturalistic pantheistic approach to the idea that everything is within a non-secular God. In the end, pointing out that neuroscience in its current form does not explain the rarity of these experiences, suffers from shorable flaws that prevent sweeping generalizations, and will likely need to be paired with top-down models to explain the additive qualities before scientists have a complete understanding of the oceanic experience.

Although it is typical to use the terms mystical, religious, or ecstatic experience to describe this, the range of phenomena that accompany TLE, the term oceanic experience offers more explanatory power, as it is used during the conversation between Rolland and Freud to depict all

three physical, mental, and metaphysical contexts (Werman, 1986). However, outside the pair's conversation, the term is referred to only once in the neurological literature during the description of "Dostoyevsky seizures" reported to create a "sense of initiation, illumination, or revelation" (Coles, A., & Collicutt, J., 2019, pp. 91). Therefore, to show that the terms oceanic/mystical/religious/ecstatic experiences or epilepsy all refer to the same set of events, during the definition process, only the aspects of the experience found in all three literature types, psychological, neuroscientific, and metaphysical, will be included. This circumnavigation provides conceptual evidence that authors of different times and disciplines have called this event many other names but refer to the same phenomenon.

Subjectively, the phenomenological aspects of the ictal (during a seizure) oceanic experiences can range from oneness with the universe, infinite timelessness/spacelessness, an intense experience of unconditional love/orgasm/ecstasy, visualization of bright lights, out-of-body-type experiences, and communication with some version of a creator (Baumann et al., 2005; Devinsky & Lai, 2008; Fisher, 2021; Persinger, 1983; Simmonds, 2006; Werman, 1986). Occasionally, literature with a neurological bent calls these aspects of the experience, psychosis, hallucinations, or delusions associated with neuropathology and psychomotor seizures (Devinsky & Lai, 2008; Holcomb & Dean, 2011 pp. 1191-1192; Persinger, 1983). Interictally or postictally (between and after seizures), long-term behavioral alterations, such as hypergraphia (drastic increases in writing around the topics of philosophy or religion typically in a journal), hyper/hypo religiosity (conversion), and mood changes (loss of humor/increased irritability) are a recurrent theme ((Baumann et al., 2005, pp. 330; Coles, A., & Collicutt, J., 2019, pp. 96). Unfortunately, besides the hyper-religiosity, the other long-term behavior alterations were not discussed by Freud and Colleagues during the oceanic debate, as it mainly focused on the experience during the

seizure. However, given all the cross-discipline similarities of the ictal portion, it is clear that oceanic experience is the same event as mystical and religious paired with TLE in other kinds of literature.

One of the most common but least reliable sources of knowledge regarding the oceanic feeling accompanied by TLE is historical recounts of affected individuals (Andersen et al., 2014). These accounts are often accompanied by "several layers of editing which prioritize educational, dogmatic, idealized agendas," which, along with the inability to prove the accuracy, leads to their unreliable nature. However, scholars agree that they are worth considering. Amenhotep IV, the Buddha, Mohammad, Alexander the Great, Joan of Arc, Soren Kierkegaard, and the founders of more current religions like the Mormons and Quakers record some variant of the oceanic experience (Baumann et al., 2005; Devinsky & Lai, 2008). Although the evidence supporting these claims is not substantial, Devinsky and Lai propose that most, if not all of these historical figures suffered from some form of epilepsy.

The most well-documented historical account of a prominent figure having epilepsy accompanied by oceanic feeling is the 19th-century Russian novelist Fyodor Dostoyevsky. As this account is nearly 150 years old, there has been debate about what type of epilepsy the author suffered from, and for the longest time, the agreed-upon hypothesis was that the author had primary generalized epilepsy (PGE) (Baumann et al., 2005, pp. 328-330). This diagnosis was supported by journal entries noting the nocturnal nature of his seizures and medical records noting that one of his sons also had epilepsy. With the combination of the nocturnal phenotype and the likely genetic component, it seemed clear that Dostoyevsky suffered from PGE. However, the uncovering of personal recounts of what Dostoyevsky called "ecstatic auras" and additional records suggesting

that an encephalitic infection likely caused his son's epilepsy, researchers now believe that he instead suffered from TLE.

Additional literature examining Dostoyevsky's epilepsy provides some of the first neurological research evaluating the oceanic experience using an EEG polygraph test (Cirignotta et al., 1980). This group presents both researcher observations and polygraph test results of two subjects during these rare "ecstatic auras" referred to by the paper as "so-called Dostoyevsky epilepsy." From the researcher's observational standpoint, the oceanic experience manifests as masticatory movements, automatic head movements, and unresponsiveness to stimuli, accompanied by a subjective inner joy. The team also states that the focal point of the subject's epilepsy determined using electroencephalography were the temporal lobes. These pieces of rudimentary evidence altogether connect Dostoyevsky's condition to the temporal lobe and a rare recurring theme throughout history.

Therefore, Dostoyevsky's personal account of the oceanic feeling offers a significant piece of psychological evidence. Paraphrasing one of his recounts an oceanic experience, in the moments before a seizure, he experienced an 'explosion of noise, followed in the next few seconds by the affirmation of God, which was accompanied by a joy that could have lasted "seconds, days, or months" that he would not trade for any another experience' (Devinsky & Lai, 2008). Suppose this is an accurate recount of his internal experience and that these tiny bits of neurological speculation are accurate. In that case, something about the synchronization of his temporal lobes and connected areas altered his perception of time, space, valance, seemingly providing him the knowledge that could be called a folk understanding of the idea that everything is a complex arrangement of the fundamental particles and forces that reductive science supposes. This purely

mental experience appears to have a top-down additive quality that probably contributed to his mastery of diverse and dark psychological storytelling.

The origin of the term oceanic experience stems from an extended conversation between Sigmund Freud and Romain Rolland, which along with the critiques of this conversation from other intellectuals, offers one of the most well-rounded accounts. Several years into their communication, Freud sent Rolland a copy of *The Future of an Illusion*, a text arguing that religion by nature was neurotic and that it was a necessity to replace it with science (Fisher, 2021, pp. 4-22). Rolland agreed that there were downfalls to religious belief, responding that Freud's analysis of organized religion was fair but that his book failed to address the 'subjective fact' of the religious sensation, as the oceanic experience was "the subterranean source of religious feeling." This challenge issued to Freud by Rolland sparked the unresolved multi-year debate on the oceanic experience, which has accumulated much academic interest in the years since.

Between 1929-1930 Freud offered his analysis of the oceanic experience. However, he also quoted during this same period, acknowledging the difficulty of this task because he has never had one of these experiences and struggles to fathom its qualities (Fisher, 2021, pp. 27). Still, Freud speculates that the oceanic experience is not the subterranean source of religious experience but could be several manifestations of human psychology. He claims these experiences might be the maximization of the ego's narcissistic function, a defense mechanism of the ego that incorporates the threats of a boundless universe into itself to protect its fragility, or the regression of the individual to a child-like state when the ego does not consider itself separate from the external world—standing firmly by his psychoanalytical reductionist viewpoint (Fisher, 2021, pp. 29; Simmonds, 2006, pp. 131).

Unbeknownst to Freud, Rolland, during this time, was writing a book in defense of the oceanic experience, which criticized European scientists for being "extreme Rationalists" who discarded the oceanic experience without experimentation and proposed that this form of religious knowledge and science are not in opposition in the search for truth (Fisher, 2021, pp. 30-38). Expanding on this latter point, Rolland suggests that notions of unity and the disillusion of the subjective and objective were truths derived from this personal oceanic experience. However, after reading Rolland's book, Freud made a point to disregard these intuitions claiming that any knowledge gained by irrational means "cannot reveal anything but primitive, instinctual impulses and attitudes," and as neither were willing to concede further, their debate ended.

In the years since this exchange, other prominent intellectual figures have weighed in, pointing out flaws in reductive Freud's arguments. First, Freud's theory that the oceanic experience is an expression of the nondifferentiated ego from birth is outdated, as work by Austrian psychoanalyst Melina Klein suggests there is ego separation at this stage (Simmonds, 2006, pp. 131). Second, Freud pathologizes the oceanic experience by pathologizing religion. British psychologist Harry Guntrip asserts this point by pointing out, "If . . . we dismiss all religion because there is such a thing as neurotic religion, we are on dangerous ground, for there are also neurotic forms of politics, of art, of marriage . . . . We cannot dismiss everything because it can be neurotic" and "If religion can express neurotic dependence, atheism can express equally neurotic independence" (Simmonds, 2006, pp. 134-135). Third, the oceanic experience is justifiably an altered state of consciousness that from a metapsychological perspective "possess explanatory and organizing power," but is currently not valid because it relies on the concept of psychic energy (Werman, 1986, pp . 135). However, this proposed lack of validity due to a lack of understanding about the nature of psychic energy is an argument from ignorance. As some future version of top-

down system control may offer a framework that incorporates a more understood version of psychic energy. Although, as there is no theory outlining what this top-down system would look like, the reductive neuroscientific viewpoint still offers more explanatory power.

With the emergence of neuroscience, it was inevitable that researchers would turn their various technologies available to the field towards the brain correlates of the oceanic experience. The researchers interested in the topic of the neuroscience of religion have since asked questions like, is there intrinsic wiring for God in humans, if so, what brain regions are associated, and if there are associated region, does a "God module" exist as a network of these implicated regions (Maselko, 2013). Over the last four decades, these questions have led to the implication of the temporal/partial lobes, the broader limbic system, and modulatory areas of the brain stem as the structures that activate in correlation with the perceptual changes during TLE and the oceanic experience. Within this border network, the connection between the amygdala and the hippocampus appears critical, as it intricately connects to the surrounding cortices and theoretically mediates an individual's sense of self in spacetime, the affective component of anticipation, as well as enabling the invocation of imagery incorporation via vast amounts of input from the language centers (Persinger, 1983, pp. 1255).

A seminal work on TLE and the oceanic experience by Persinger claims that microseizures referred to as temporal lobe transients (TLT) of the deep temporal lobe structures, like the amygdaloid-hippocampal pathway, produce infantile memories, intense meaningfulness, and distortions of space/time (1983, pp. 1255-1259). In conjunction with the species-specific similarities of the temporal lobe and the cross-cultural nature of the oceanic experience, this information set points to the plausibility that abnormal hyperactivation does create the mental distortions of the oceanic experience. This research also offers a collection of mild and intense

external stimuli associated with producing this brain state, bringing about oceanic experiences, such as rocking back and forth or music up to the more extreme stimulus of hypoxia or psychedelic drugs. Later work by the same researcher showed that with an eighty percent likelihood, the research team could induce the presence of an invisible sentient being in participants using an electromagnetic head cap that he called the God helmet. (Andersen et al., 2014, pp.). Collectively, providing a body of evidence to support his point that these experiences are merely artifacts of the brain.

Similar neuroscience research investigating the unification with God felt by Carmelite nuns during remembering the mystical experiences also corroborates the idea that the activation of these ROIs correlates with oceanic experiences (Beauregard & Paquette, 2006). This research team asked the fifteen nuns a week before the experiment to remember the instances they felt the most unity with God and the time they felt to most unity with another person. Then during four five-minute fMRI sessions, nuns were asked to concentrate on these two experiences while their blood oxygen level detection (BOLD) signal was measured using fMRI. The BOLD comparison showed that the temporal and parietal lobes and the brainstem were activated disproportionally in the mystical condition.

However, as these studies are the forerunners of this research, there is an extensive list of methodological concerns currently plaguing their soundness. For starters, only 0.4-3.1% of individuals who suffer from TLE report oceanic experiences during their seizures, raising the concern that about the ecological validity of the data as researchers may not be measuring authentic experiences (Maselko, 2013, pp. 207). This small range also requires neuroscientists to explain its rarity before asserting that it is completely understood. There are also experiment limitations; for instance, a massive critique of the God helmet suggests is that it is $1/1000^{th}$ the strength of a typical

TMS device, making the production of the sentient being likely due to suggestibilit3eqwy (Andersen et al., 2014, pp. 225-226). Therefore, if researchers want to explain this phenomenon from a physical science perspective, there is a need for experimental design improvements, such as higher temporal and spatial resolution in neuroimaging, new methods of experience inducement, and increased ecological validity.

A final consideration is that the phenomenological aspects of oceanic experience do reveal something about God. The work "On God" by Baruch Spinoza, a 17th-century philosopher, presents a highly naturalistic viewpoint of the pantheistic notion of God, the ideas that were likely the reason for his ex-communication from his Jewish community (Nadler, 2020). Using fourteen axioms and his definitions of substance, attributes, and God, he concludes that everything is inside of God, but not in the anthropomorphized sense, as he conceives the version of divine judgment passer as "… existing in only a philosophical sense." This idea that everything is 'in' God, and all substances are an expression of one entity, strongly mirrors the primary theme of the oceanic experience of the All, a unity, a oneness, or a merger with the creator. If this is the case, neuroscientific investigation of religion is on the right track in understanding the nature of oceanic experience. However, it suggests the need for an extensive interdisciplinary bridge that needs to be built to achieve this understanding, which may even be presently missing planks.

As neuroscience and the oceanic experience have coevolved, TLE has become the perfect intersection to simultaneously probe the brain and its religious tendencies. Currently, to say that oceanic experience is an entirely understood phenomenon is false. The challenges that still lie ahead for neuroscientists are to explain the top-down insight of unity and its relationship to behavioral change, along with why so few people, even within the TLE subpopulation, have oceanic experiences. There is also the need for technological advancement. Neuroimaging

technologies need to be able to show the real-time movement of electricity in the brain accurately. More precise and powerful TMS equipment could enable inducement of these experiences, which will have the byproduct of solving ecological validity. At the same time, the incorporation of top-down models of the world will likely need to be incorporated to explain why this reoccurring brain-state seemingly has had additive benefits to individuals and a massive impact on society.

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