

TEMPORAL LOBE EPILEPSY (TLE), “DÉJÀ VU” PHENOMENON AND RELIGIOUS EXPERIENCES

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ABSTRACT:

A LOT OF CONTROVERSIES APPEAR REGARDING TEMPORAL LOBE EPILEPSY TO BRIDGE THE GAP BETWEEN RELIGION AND NEUROSCIENCE. TLE WAS DESCRIBED IN LITERATURE IN 1869 BY RUSSIAN WRITER DOSTOEVSKY (WHO SUFFERED FROM EPILEPSY), IN HIS WORK “THE IDIOT”, WHEN THE HERO PRINCE MYSHKIN DESCRIBED HIS EPILEPTIC FEELINGS OF SUBLIME SACREDNESS OF THE INNER LIGHT. NEUROTHEOLOGY IS THE SCIENCE TRYING TO UNDERSTAND THE BRAIN ACTIVITIES AND TO FIND AN INTEGRATION IN RELIGION CONCEPTS. TLE AURA OR PSYCHIC CRISIS IS DEFINED BY SIMPLE OR COMPLEX HALLUCINATIONS, MYSTIC DIVINE EXPERIENCE, AND UNPLEASANT EXPERIENCE OF FEAR AND DÉJÀ VU PHENOMENON. NEPPE AND FUNKHOUSER (2006) DESCRIBED THE NOTION AS ALREADY SEEN, BUT IT MEANS ALSO ALREADY HEARD, MET OR VISITED. THE “DÉJÀ VU” PHENOMENON IS ALWAYS A SUBJECTIVE EXPERIENCE WHICH CAN APPEAR IN NORMAL SUBJECTS OR IN PATHOLOGIC STATES LIKE TLE, SCHIZOPHRENIA OR OTHER TYPES OF PSYCHOSIS. IT CAN ALSO BE A SUBJECTIVE PARANORMAL EXPERIENCE. NEPPE’S DEFINITION IS NOW UNIVERSALLY USED, DEFINED AS “ANY SUBJECTIVELY INAPPROPRIATE IMPRESSION OF FAMILIARITY OF THE PRESENT EXPERIENCE WITH AN UNDEFINED PAST” (NEPPE, 1983). DÉJÀ VU HAS AN IMPACT ON NEUROSCIENCE AND DESCRIPTIONS FROM HISTORY AND LITERATURE AND THE MULTITUDE OF DESCRIPTIONS FROM EXPERIENCES DEMAND VARIOUS SCIENTIFIC EXPLANATIONS.

KEY WORDS: TEMPORAL LOBE EPILEPSY; DÉJÀ VU; THE SELF; CONSCIOUSNESS; MEMORY; THE HUMAN BRAIN.

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BACKGROUND

Manipulation of the limbic system has caused subjects to report feelings of ‘forced motion’, physical distortion and hyper emotionality⁵. Stimulation direct to the temporal lobe can cause a sense of spiritual well-being experience, paranormal experience and feelings of hyper-religiosity. The majority of the patients (80%) claimed to have experienced a feeling of ‘not being alone’ and sensed a ‘spiritual presence’ when their temporal lobe was stimulated.⁶

Déjà vu phenomenon can be classified in four modern concepts, which are etiologically distinct: psychotic déjà vu (in schizophrenia), temporal lobe epileptic déjà vu or TLE déjà vu (specifically in temporal lobe aura or seizures) , subjective paranormal experience déjà vu (in subjective paranormal experiences), and associative déjà vu (in ostensible ‘normal’ patients). This subtypes are nosologically distinct and appear in different subpopulations, which means that they can be explained by different causes.⁷

The French term ‘déjà vu’ is used as a generic term referring to all types of déjà vu experiences, although it literally means ‘already seen’. From the 36 types of described déjà vu experiences, none of them is exclusively related to one of the above nominated four nosological entities. However some of them are more likely to occur in certain circumstances, for example the feeling of ‘déjà visite’, which is more common in normal individuals.⁸

Vernon Neppe, one of most important researchers in the field of déjà vu, wrote his first book on this subject in 1983 “The Psychology of Déjà Vu” describing 10 new types of déjà vu. In the pre-modern era, before 1979, there were already 11 terms regarding déjà vu experiences described in literature. By the year 2006 he revised his research “Déjà Vu Revisited” and added 9 more terms describing déjà vu experiences : “déjà paradoxe”, “déjà après”, “déjà ésotérique”, “déjà retrosenti”, “déjà hallucine” etc. These new terms which he discovered in 2006 make reference to the clinical subtypes of déjà vu experiences, for example “déjà ésotérique” and “deja hallucine” are related to psychotic déjà vu, while “déjà après” is often found in TLE patients describing the post ictal period as a déjà vu experience.⁹

The most important aspect of defining an experience as déjà vu is for it to fit the definition given by prof. Neppe, therefore the primary criteria for it to be a déjà vu experience is to be a subjective experience of an undefined past. The experience cannot be proven by anyone else except the person experiencing it, so the “déjà vu exists only in the percipients inner reality”¹⁰.

THE SELF AND ‘DÉJÀ’ EXPERIENCE IN TLE PATIENTS

The concept of the self is a modern point of view from philosophy, sociology and biology, but there are many contradictions regarding this subject. René Descartes was the first philosopher who treated this subject in a new manner, his concept of “I think therefore I am” became very popular among scientists. He privileged thinking above being, a concept that defined thinking as a superior activity of the brain which now longer needed the presence

⁵ Ford C, ”Neurotheology: Which Came First, God or the Brain?”, 2002 <http://www.serendip.brynmawr.edu/biology/bio3/web3/ford.html>.

⁶ Persinger. M. A (1997) cited in Ford. C, “Neurotheology: Which Came First, God or the brain?”, 2002. <http://www.serendip.brynmawr.edu/biology/bio3/web3/ford.html>.

⁷ Neppe V. M. & Funkhouser A. T. S. (Eds.) “ Déjà Vu: A Second Look”, Seattle, WA, USA, Brainvoyage.com (Brainquest Press), 2006.

⁸ Neppe V. M. ”Déjà Vu: Origins and Phenomenology: Implications of the four subtypes for future research” ;The Journal of Parapsychology ,2010, vol. 74, no.1, 61-97.

⁹ Neppe V. M., Bradu, D., ”Déjà vu subtypes: four challenges for researchers”.,(Eds.) ”Déjà Vu: A Second Look”. Seattle, WA,USA,Brainvoyage.com, 2006.

¹⁰ Funkhouser 2006.

of a god as its reality. In his work he stated that the mind or self was separated from the body, as distinct and superior and the body was considered inferior and impure¹¹.

Thinkers like Hegel¹² and Freud in his famous work “The Ego and Id” have stipulated theories regarding the concept of the “self”, placing the self as a product of external and internal stimuli which are converted to different sensations which lead to building images and feelings stored in the memory of the unconscious self. The unconscious self cannot therefore determine if the experienced sensations are from outside or from the inside. This lack of discrimination creates a process of optical projection of images separate from the unconscious self. This is the known process of building up an ego.

Persinger states that overstimulation and unsyncopated reaction in one area of the temporal cortex can cause misinterpretation of “the self”. A neuronal imbalance in the left hemisphere of the temporal lobe makes the brain perceive the right hemisphere as a personified “other entity” or God¹³. This physical reaction in the temporal cortex causes a chain reaction in the limbic system, which hyper stimulates the amygdala (seat of higher emotion) and hippocampus (seat of stored memory/experience). This can induce hallucinogenic visions and arousal feelings. Hyperstimulation induces feelings of euphoria and rapture which are associated with high concentrations of opiate receptors in the amygdala and the release of enkephalins in large quantities¹⁴.

The famous “God machine” was invented by Persinger in his attempts to study what happens with the brain, and especially the temporal lobe during seizures. This machine is actually a helmet designed to replicate the effect of epileptic seizures, concentrating electric influxes in the temporal lobe generating a “magnetic field pattern”. In order to imitate the state of epilepsy, the experiment implies restrictions from external influences, by means of blocking audio-visual information and sensory deprivation, just like it happens during seizures.¹⁵

As the temporal lobe is stimulated by electric impulses, the majority of subjects reported having paranormal experiences and states of hyperreligiosity.¹⁶

Newberg’s term “hyperquiescence” describes a state of intense relaxation of the mind, which can be achieved during meditation¹⁷. The mind can block external influences and thoughts by entering a state of total tranquility. Eastern religions like Hinduism and Taoism are known for their practicing rituals and meditation techniques. They have developed certain meditation exercises, which can increase the activity of the so called “Third Eye”. The “Third Eye” is another term for the pineal gland located in the center of the brain between the left and the right hemisphere. It is considered to be the seat of higher vision and as a possible perception organ to see beyond space-time. A study conducted by Leadbeater generated the idea of microscopic and telescopic vision by extending an “etheric tube” on the “third eye”.¹⁸

¹¹ Descartes R, “Discourse on the Method” ,1644.

¹² Hegel G.W.F., *Phenomenology of Spirit*, translated by A.V. Miller with analysis of the text and foreword by J. N. Findlay (Oxford: Clarendon Press, 1977); Paragraph 179, Pg. 111.

¹³ Ford C, ”Neurotheology...

¹⁴ Joseph R . cited in Bradley. F, “On Neurological Origin of Mystical Experience, the Limbic System et al”,1997.

¹⁵ [9] Martin M., “Spirituality and the Brain: Does Research Show New Evidence for Faith, or a Challenge to Religion?”,2002 http://www.abcnews.go.com/sections/scitech/nightline/neuro020114_spirit_feature.html

¹⁶ Ford C, *Neurotheology...*

¹⁷ Newberg A., D’Aquili E., Rause V., “*Brain Science and the Biology of Belief: Why God Won’t Go Away*”, Ballantine Books, New York, 2001.

¹⁸ Leadbeater. C.W. , “*The Chakras* “ Wheaton, Illinois, USA:1927 Theosophical Publishing House , 79.

Microscopic vision would imply the possibility of seeing a whole new universe, quantum particles like quarks.¹⁹

There is a whole new spectrum in science today regarding quantum mechanics, general relativity and the theory of consciousness. We haven't yet fully discovered how the universe works, because there still is no clear link between quantum physics and Einstein's general relativity theory. The human mind is as a small universe as well, waiting to be discovered. For that matter several studies are being conducted in order to understand how consciousness is produced by the human brain. Sir Roger Penrose's, an eminent mathematical physicist, studies focused on the theory of consciousness, also known as "orchestrated objective reduction" or Orch OR. His theory of consciousness has been recently reviewed by Stuart Hameroff, a prominent anesthesiologist and Roger Penrose himself, due to recent discoveries of quantum coherence found in plant photosynthesis, bird brain navigation, our sense of smell and brain microtubules vibrations. The microtubules are important components of the cell's skeleton and their vibrations in the neuron seem to be the fine-level process that generates consciousness. Studies in anesthesia have also postulated the idea of the vibrating microtubules in the neurons for sustaining non-conscious brain activities and blocking consciousness.²⁰

It is not very surprising that different fields of science connect to each other in order to explain how the mind works or how the universe is constructed. Reality is a product of the mind, as subjective as it is it can be related to other things, objects or events. Everything in the universe is related to each other; even space is defined by the objects containing it. The universe and the human brain are defined by processes relating to each other, creating space and time. Perhaps in the near future mankind will be able to reproduce an artificial intelligence based upon quantum processes in the human brain.

By trying to define what consciousness is and how it is created in the human brain, scientists want to solve the question above all questions that is consuming our minds: "Is there a God? Are there other superior supernatural beings?" The answers come one at a time and apparently are not linked together, but the research in the field of temporal lobe epilepsy may offer some promising explanations regarding this matter.

Temporal Lobe Epilepsy is a nosological entity in Neurology, defined in 1985 by the *International League against Epilepsy* (ILAE) as a condition characterized by "recurrent, unprovoked seizures originating from the medial or lateral temporal lobe." TLE seizures consist of simple partial seizures without loss of awareness and complex partial seizures associated with loss of awareness. The main pathologic substrate for this condition, found in approximately two thirds of patients with temporal lobe epilepsy who were treated surgically was hippocampal sclerosis. EEG studies showed that the majority of patients (90%) who had epileptiform abnormalities in the temporal region also had a history of seizures. The temporal lobe is known to be the most epileptogenic region of the brain.²¹

Hippocampal sclerosis is observed through neuroimaging techniques such as magnetic resonance imaging (MRI) as a high-signal intensity on T2-weighted or fluid-attenuated inversion recovery (FLAIR) sequence MRIs and/or atrophy of the hippocampus.

¹⁹ Phillips S., "Extrasensory Perception of Quarks" Wheaton, Illinois, USA 1980 Theosophical Publishing House ISBN 978-0-8356-0227-3

²⁰ "Discovery of quantum vibrations in microtubules inside brain neurons corroborates controversial 20-year-old theory of consciousness", January 16, 2014 <http://www.kurzweilai.net/discovery-of-quantum-vibrations-in-microtubules-inside-brain-neurons-corroborates-controversial-20-year-old-theory-of-consciousness>.

²¹ David Y. K. "Temporal Lobe Epilepsy" <http://emedicine.medscape.com/article/1184509-overview#aw2aab6b2b2aa>.

The term describing hippocampal sclerosis in neuroimaging is called mesio-temporal lobe sclerosis.

Other diagnostic modalities include computer tomography (CT) with poorer resolution on soft tissues of the brain; positron emission tomography (PET-CT) useful for surgery in detecting interictal seizures and localizing them; single-photon emission CT (SPECT) also used for surgical purpose ; magnetic resonance spectroscopy; electroencephalography (EEG) indicated in all patients with suspected temporal lobe epilepsy; magnetoencephalography (MEG) mainly used for co registration with MRI to give magnetic source imaging in 3-dimensional space.

The various etiologies of temporal lobe epilepsy include cryptogenic, idiopathic (very rare), neuroinfections, posttraumatic contusion or hemorrhage, malignancies such as meningiomas, gliomas, gangliomas, vascular malformations. Berkovic also described a familial form of TLE²².

Statistics show that approximately 50% of patients with epilepsy have partial epilepsy, which often originates from the temporal lobe. Since most cases of TLE are not confirmed by video-electroencephalography and the majority is classified by clinical history and EEG recordings alone, the true prevalence of temporal lobe epilepsy remains hidden.²³

The sex ratio is equal for both sexes; however there is an increase of seizures for female patients during the menstrual period, also known as catamenial epilepsy. All age groups are affected; even the elderly are subjected to this condition who can develop new-onset seizures at an advanced age.

Temporal lobe epilepsy is clinically defined by symptoms such as aura (a type of warning for the subject, it lets him know the seizure is about to occur) and cognitive impairment. There are three major types of aura: somatosensory and special sensory aura (olfactory, gustatory, and visual illusions and hallucinations; vertigo); autonomic aura (changes in heart rate, piloerection, and sweating) and psychic aura with elements of déjà vu or jamais vu; depersonalization or derealization; fear or anxiety; dissociation.

TLE complex partial seizure consists of a type of aura, dilated pupils with a motionless stare, behavioral arrest, and the occurrence of automatisms such as oral alimentary, manual or unilateral dystonic limb postures. The evolution of the seizure can lead to secondarily generalized tonic-clonic seizure. Confusion, aphasia and amnesia are common features of the postictal period.

There are questions regarding a predisposition for some temporal lobe epilepsy patients for paranormal and religious experiences. Some patients claim of having intense hallucinations and physical reactions regarding Christian practices or figures from the Bible during their seizures. On recovery from seizure they experienced euphoria and intense spiritual enlightenment. Patients with strong beliefs in the esoteric and agnostic can have experiences of alien encounter, abduction and near death experiences during their seizures. From the vast amount of experience descriptions from TLE sufferers it is possible to consider that their experiences are based upon their beliefs. Christians with strong beliefs are more likely to encounter God or other biblical figures during their seizures, while on the other hand agnostic patients are more likely to have paranormal experiences related to their esoteric beliefs.

²² Berkovic S.F, McIntosh A, Howell R.A. , Mitchell A, Sheffield L.J., Hopper J.L., “Familial temporal lobe epilepsy: a common disorder identified in twins”. *Ann Neurol.*, 1996,vol.40,no.2, 227-35.

²³ David Y. K. Temporal...

It is known today that repeated epileptic seizures have a cumulative effect and that they produce cerebral damage. Intractable epilepsy may be associated with widespread structural cerebral damage. The brain structures affected mostly are the hippocampus, cerebellum, and neocortex. These structural damages occur only after a few years of epilepsy history, however there have been detected some subtle changes after a 3.5-year period which were not related to a history of overt seizures.

A study performed in 2010 in County Hospital of Arad analyzed structural changes as a result from recurrent seizures in 43 subjects with the mean age of 20.6 years. The brain lesions were studied by serial magnetic resonance imaging (MRI) with morphologic analysis of the temporal lobes and volumetric analysis of the amygdala and hippocampus. The study group included 8 patients with cryptogenic TLE, 14 with symptomatic partial temporal epilepsy, 21 with generalized epilepsy (5 idiopathic, 13 cryptogenic, and 13 symptomatic). Patients with temporal lobe epilepsy (TLE) were significantly more likely to have recurrent seizures than were those with extra temporal or generalized epilepsy. One patient had preexisting hippocampal sclerosis. The frequency of bilateral hippocampal or amygdala atrophy ($p < 0.06$) and combined hippocampal-amygdala atrophy ($p < 0.03$) was higher in patients with temporal lobe developmental malformations. The presence of „d  ja vu” was found only in two TLE patients and was persistent with a correct treatment.

Structural abnormality can be best revealed with three-dimensional analysis of volumetric MRI, these abnormalities include bilateral amygdala or amygdala-hippocampal atrophy which are associated with a higher risk of seizure recurrence. Patients with temporal lobe developmental malformations are frequently associated with hippocampal atrophy. Regarding cerebral damage as a result of epilepsy we can conclude that it may occur before the onset of seizures or develop insidiously over a more prolonged period, except preexisting cerebral lesions or alcohol abuse.

The relationship between the human brain and spiritual experience was studied by Newberg and D'aquili in 2001, when they analyzed Tibetan monks and Franciscan nuns during deep meditation and prayer. In order to map the brain regions implicated in meditation they injected a radioactive tracer to the subjects and the tracer detected brain areas where there was an increased neuronal activity and blood concentration. The imagistic studies were taken with SPECT (Single Photon Emission Computerised Tomograph) and the most active area of the brain was the prefrontal cortex with a dramatically increased neuronal activity, an area associated with attention and concentration. In contrast to that, areas of the brain associated with space orientation and time perception which are located in the parietal lobe showed very low activity. This is very important because it topographically explains why the brain can't distinguish the limit between the self and the external world during trance and meditation. It also explains why those involved in deep meditation experience a feeling of "unity" with the universe, overcoming time boundaries and connecting with God.²⁴

A famous psychologist Bentall found a scientific explanation behind the reason why some temporal lobe epileptics claim of hearing voices during their seizures, especially the „voice of God”. His explanation suggests an important implication of the motor language area or Broca's area during seizures, but also in states of deep meditation. These two conditions are altering the contact with the external world by not receiving any external stimuli. The Broca's area is then misled, confusing the internal voice or ego as an external entity, perceiving it as God, or other biblical figures and for agnostic patients with alien or spiritual beings.²⁵

²⁴ Newberg A. et al "The measurement of regional cerebral blood flow during the complex cognitive task of meditation: a preliminary SPECT study", *Psychiatry Research: Neuroimaging Section* 106, 2001, pg. 113-122.

²⁵ Bentall R. cited in Powell V. "Neurotheology – With God in Mind",

It can now be explained via neuroscience and brain mapping what regions in the brain are involved in paranormal experiences and déjà vu phenomenon. With the prefrontal cortex activated and low activity in the parietal lobe, the brain enters a state of trance where it cannot distinguish time and space boundaries. Massive neuronal discharges during epileptic seizures in the left temporal lobe cause the brain to interpret the other cerebral hemisphere as another entity, depending on its spiritual and cultural beliefs.

Funkhouser notes the importance of the level of consciousness involved in a déjà vu episode, many of those episodes being similar regarding this matter. The feeling they leave of us right in the moment of occurrence is that we are totally aware of everything that is happening and that it conforms with our 'memory' of it. This means that the entire brain capacity is not required to produce a déjà vu experience, only a small portion of the conscious self and the I-function being needed to resemble the experience.²⁶

Although one person can sometimes effortlessly recall in detail a déjà vu experience, that experience is nowhere to be found in the memory of that person. So the events "remembered" are not a product of memory of specific events that happened in the past. This matter has been explained by Janet P. in 1942 as an "overlap" between short and long-term memory, resulting in perceiving recent events as events more distant in time. The theory that explains this process of overlapping memories is that the storing of those events happens before the conscious part of the brain even receives the information and processes it.²⁷

There are controversies regarding this theory, especially for it does not explain how the brain stores these memories without a sensory input first. The storing of sensory input could be explained as a process of "memory-in-progress", the reason why during the event itself we believe it to be past memory. The déjà vu experience is a very common phenomenon and in a survey by Brown approximately two-thirds of the population have had déjà vu experiences²⁸. There are also studies that confirm that déjà vu is a common experience in healthy individuals, with a range of 31% to 96% of persons describing it. Wild E. considers unusually prolonged or frequent déjà vu experiences, or associated with other symptoms such as hallucinations could be an indicator of neurological or psychiatric illness²⁹. Results from studies certify that déjà vu experiences can be caused by the consume of certain drugs and by some pharmaceutical drug associations³⁰.

The use of certain hallucinogenic drugs can cause limbic hypersensitivity and induce the effect of paranormal experiences and déjà vu phenomenon. The drug action is connected to the neurotransmitter levels, which are altered during this process. Feelings of euphoria are due to the increased levels of dopamine and the high serotonin levels in the amygdala.³¹ High levels of dopamine are known to be involved in the pathogenesis of psychosis and schizophrenia.³² Other drugs such as cocaine, amphetamines and methamphetamines can cause a temporal state of psychosis by increasing dopamine levels 10 times higher. Antipsychotic medications inhibit dopamine levels at receptor levels, acting as dopaminergic

<http://www.clinicallypsyched.com/neurotheologywithgodinmind.htm>.

²⁶ Funkhouser, A. T. "Deja experience research." <http://www.deja-experience-research.org> , 2006

And: Funkhouser, A. T. "Explanations for déjà experiences." <http://www.deja-experience-research.org>, 2006

²⁷ Janet P. "Les Dissolutions de la Mémoire". Disorders of Memory, 1969, p.152.

²⁸ Brown, A. S. "The déjà vu illusion." Current Directions in Psychological Science, 2004 , vol.13, 256-259

²⁹ Wild, E. "Deja vu in neurology." Journal of neurology, 2005, vol.252 , no.1, 1-7.

³⁰ Taiminen T., Jääskeläinen S. , "Intense and recurrent déjà vu experiences related to amantadine and phenylpropranolamine in a healthy male". Journal of Clinical Neuroscience, 2001,vol. 8, no 5, 460-462

³¹ Chapman. D, "Brain Mechanisms and Anomalous Experience"

http://home.comcast.net/~dchapman2146/pf_v3n3/NeuroWeird.htm

³² "[Disruption of gene interaction linked to schizophrenia](#)". St. Jude Children's Research Hospital. Retrieved 6 July 2006.

antagonists.³³ Also religious practices such as Amerindian rituals performed by shamans are known to make use of hallucinogens such as mescaline, peyote and psilocybin. These drugs are used for the purpose of increasing the neuronal activity in the limbic system and induce a feelings of high spiritual enlightenment.³⁴ In 1972 Lilly studied the effect of LSD, another hallucinogenic drug, combining it to social and sensory deprivation and experienced the presence of „spiritual, god-like beings”.³⁵ The effect is called psychedelic and it is due to the agonist effect of those drugs on the 5HT receptors of serotonin. Serotonin is known as the neurotransmitter involved in the states of happiness, well-being and euphoria. But not only drugs are used in order to achieve such superior mental states, dancing and chanting in a particular way are contributing to help create a barrier to the outside world and to reject external output of the senses.³⁶

Even practice like yoga can have a powerful effect on neurotransmitter activity, by increasing the level of self-awareness and blocking outside signals and information. Yoga is known to have the same effect on the brain activity as drugs do and can become addictive and dangerous, because the mind becomes relaxed and open to suggestions.

THE BIBLE AND DÉJÀ VU

Runehov questions the problems regarding explaining religious experiences by contemporary scientists and she analyses the research performed on religious experiences by canadian neuropsychologist Persinger and the works of Newberg and d'Aquili. She questions whether religious experiences are a product of the human brain or experiences of some type of “ultimate reality”. The question raised is if these religious experiences are sacred in the spiritual sense or just a result of neuronal processes. From a neuroscientific point of view these experiences are consequences of a damaged, malfunctioning or mentally deranged brain or they are part of some sort of existential crises. Some neuroscientists explain religious experiences are part of the human brain as all human experiences are. The conclusion of Runehov's research calls for interdisciplinarity, for neuroscience only can explain religious experiences in a methodologically restricted way. Philosophy and theology are also limited by their methods to explain religious experiences. These experiences are not sacred or neural, but sacred and neural and must be studied properly from different point of views.³⁷

Historical and biblical figures seem to have suffered from neurological disorders that went undiagnosed or misdiagnosed because by that time they weren't understood and named. Researchers speculated that St.Paul of Christianity may have suffered from temporal lobe epilepsy. St.Paul's conversion is described separately in the book of the Acts in the bible, one is a third person narrative and one is a speech he gave when he was arrested in Jerusalem (Acts of the Apostles 22:6-21). They both contain elements to support a TLE interpretation, describing how he fell to the ground, seeing a blinding light and hearing a voice claiming to be "Jesus of Nazareth". After this episode which is very suggestive for a TLE aura, he could not see and he did not eat or drink for three days on his way to Damascus.

³³ Lieberman J.A., Kane J.M., Alvir J., "Provocative tests with psychostimulant drugs in schizophrenia". *Psychopharmacology*, 1937, vol.91, no.4, 415-33

³⁴ Powell V. "Neurotheology – With God in Mind",

<http://www.clinicallypsyched.com/neurotheologywithgodinmind.htm>

Schultes. R. E, Hofmann. A, Ratsch. C, "Plants of the Gods: Their Sacred, Healing and Hallucinogenic Powers", Healing Arts Press, Vermont, 2002

³⁵ Lilly. J. C (1972) cited in Chapman. D, "Brain Mechanisms and Anomalous Experience"

³⁶ Powell V. "Neurotheology – With God in Mind",

<http://www.clinicallypsyched.com/neurotheologywithgodinmind.htm>

³⁷ Runehov A, "Sacred or Neural? The Potential of Neuroscience to Explain Religious Experience" ,*European Journal of Science and Theology*, 2007, Vol.3, No.2, 71-74

This experience made St. Paul a devout follower and missionary of Christianity³⁸. Auditory hallucinations of divine voices, visions of divine figures, and physical collapse are all common elements of TLE, and they are especially common in documented cases of sudden religious conversion in people with temporal lobe epilepsy.

Another text from the Bible sums up the beliefs about déjà vu and the history of mankind repeating itself. “What has been is what will be, and what has been done is what will be done, and there is nothing new under the sun. Is there a thing of which it is said, “See, this is new”? It has been already in the ages before us. There is no remembrance of former things, nor there any remembrance of later things yet to be among those who come after.” (Ecclesiastes 1:9-11). Déjà vu can be considered from this point of view, a process of “remembering” an ancient history of mankind trapped in our DNA. The fact that “there is nothing new under the sun” is just a way of recovering memories from our unconscious collective self. The fact that “there is nothing new under the sun” is just a way of recovering memories from our unconscious collective self. The text found in Ecclesiastes 3:11 “He has made everything beautiful in its time. Also, he has put eternity into man's heart, yet so that he cannot find out what God has done from the beginning to the end.” Reminds us of how little of the entire brain capacity we are using. We are unable to access our entire memory and brain activity, because of our unconscious self.

In conclusion, TLE is a pathology related to déjà vu phenomenon, but it cannot explain entirely the processes which lead to it to those without epilepsy. Certain areas in the brain are activated during seizures and cause the brain to enter a state of trance, experiencing hallucinations and visions mostly of them according to the individual's beliefs. Concepts like the self, consciousness, memory storing, distinguishing time and space, between what is real and what is not are still under investigation by scientists and philosophers. The human brain is a complex micro cosmos ready to be discovered step by step by mankind. No one can foresee what will be in the future, but if it develops exponentially, maybe in the far future we will be able to discover more of that cosmos. As Charles Dickens wrote in *David Copperfield* in 1850 “We have all some experience of a feeling that comes over us occasionally of what we are saying and doing having been said and done before, in a remote time—of our having been surrounded, dim ages ago, by the same faces, objects, and circumstances—of our knowing perfectly what will be said next, as if we suddenly remembered it.”.

³⁸ Marissa Leow, James Noble, Carl Harris, Rachel Diamond, Maya Weisinger
<http://www.macalester.edu/academics/psychology/whathap/ubnrp/tle09/Religiosity.html>.