

AT ETERNITY'S GATE: TEMPORAL LOBE EPILEPSY AND THE GENIUS OF VINCENT VAN GOGH

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INTRODUCTION

We came across the very interesting article by Yasmeen Cooper and Mark Agius (2018) questioning the fact whether neuropsychiatric symptoms of Van Gogh can be explained by schizoaffective disorder.

Several articles have investigated the mental illness of Van Gogh and it's still a matter of debate. Schizoaffective disorder, Meniere's disease, tertiary syphilis, acute intermittent porphyria, lead and terpenoid poisoning, brain tumors, temporal lobe epilepsy (TLE) and Vascular dementia have been proposed as his underlying condition.

However, most authorities believe that his symptoms cannot be explained with a single condition.

Epilepsy is a common condition affecting more than 0.5 to 1% of world population and it is among the oldest recognized diseases, with written records dating back to 4000 BC. Several famous people in the fields of art, science, politics and religion are known to sustain epileptic disorders. Here in, we tend to describe temporal lobe epilepsy (TLE), as a condition that may lead to

ingenuity in humankind, with several historical instances and we particularly focus on the famous Dutch painter Vincent van Gogh.

THE THEORY OF INGENUITY IN TLE PATIENTS

The underlying mechanism which leads to special capabilities in several instances of TLE patients lies beneath the loss of inhibition imposed by inhibitory basket cell interneurons. The neural connections in mesial temporal structures are summarized in Figure 1.

Following a hypoxic insult in early stages of life, inhibitory GABA (γ -aminobutyric acid)-ergic basket cell interneurons which are abundant in Cornu Ammonis 1 or CA1 (the most vulnerable region of brain to hypoxic damage) are lost. (Aitken & Schiff 1986) A phenomenon called kindling phenomenon (Sutula & Kotloski 2017) happens with loss of inhibitory control over this circuit, which fires several neurons in this area and is manifested with epileptic seizures.

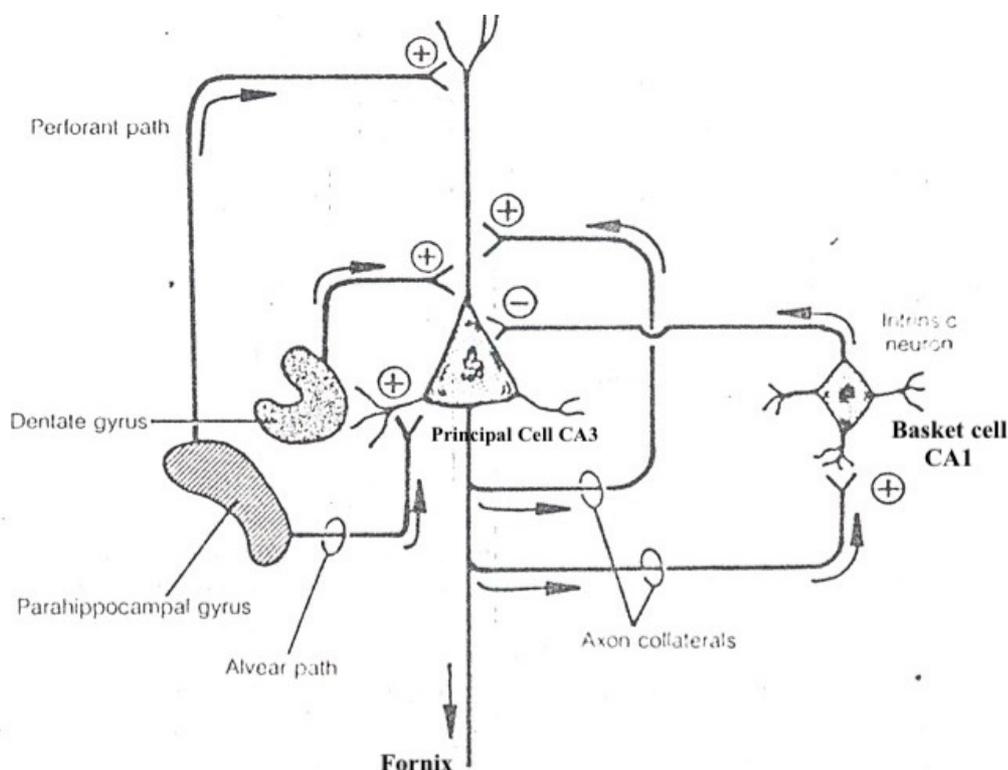


Figure 1. Mesial temporal structures

Table 1. Different manifestations of TLE

Name of Famous People Sustaining TLE	Specific TLE Manifestations	Structures and Circuits Involved
Joan of Arch	Auditory hallucinations; Pleasure and Revelation	Long association fibers to association auditory cortex; Nauta (Pleasure) Circuit; Right limbic mesial temporal structures (Taghipour & Derakhshan 2018)
Dostoevsky	Pleasure	Nauta (Pleasure) Circuit
Vincent van Gogh (Richardson et al. 2017)	Rage and grief	Amygdala- Emotion Circuit (Taghipour & Ghaffaripasand 2018)
Minakata Kumagusu (TLE confirmed with Right hippocampal atrophy in his post-mortem MRI)	Déjà vu	Long association fibers to association visual cortex

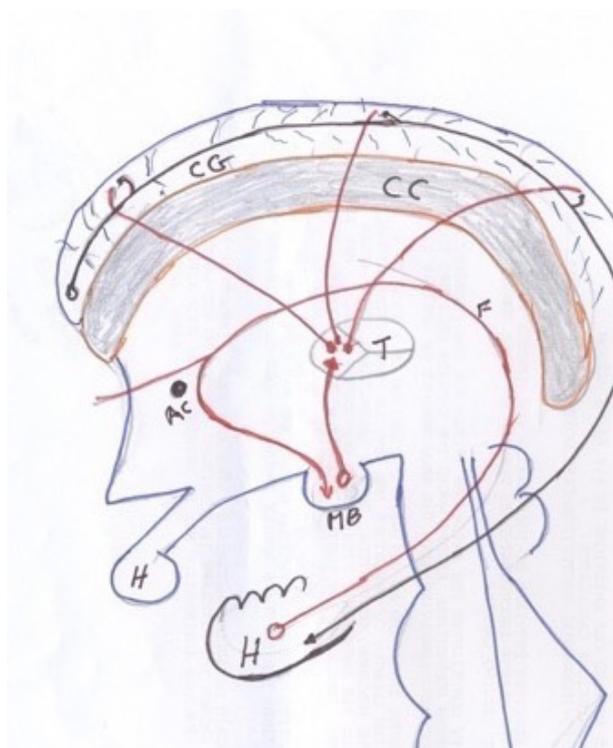


Figure 2. Papez circuit for memory

Considering the hippocampus as the entering gate of data to human brain, this loss of inhibition, may also lead to faster and better cognitive abilities. The inputs to the hippocampus (which is the primary station in Papez circuit for memory, Figure 2), will have a facilitated relay to the cerebral cortex, with loss of this inhibitory control in TLE sufferers which justifies their ingenuity.

DIFFERENT MANIFESTATIONS OF TLE IN GENIUS PEOPLE

Several types of focal seizures are reported in genius people with TLE, which shows the different structures and circuits involved. For example, Joan of Arc had instances of hallucination and revelation, Minakata Kumagusu suffered attacks of Déjà vu, Dostoevsky experienced pleasure and joy and Vincent van Gogh manifested with moments of rage during his seizures. (summarized in Table 1)

Showing rage is best justified with activation of amygdala, an almond-shaped cluster of nuclei in mesial part of each temporal lobe which has a key role in fight and flight circuit of brain.

RAGE AS A MANIFESTATION OF SHAME

Several documents are available showing Van Gogh's spells of rage, such as self-mutilation and suicide. The presentation of rage spells proves that a defective amygdala signaling was present in case of Van Gogh. However, most instances of his rage spells were rage at himself. From a sociologic perspective Van Gogh has been described as a shameful person. (Meissner 1996) Karl Marx describes shame as a social emotion which is a kind of anger which is turned inward. (Weyher 2012) This concept will justify van Gogh's spells of self-rage as shame.

THE DOUBLE-EDGED SWORD OF TLE

Even though TLE might have made a creative and genius artist out of Van Gogh, (due to facilitation in memory and emotion circuitry of his brain), same pathology led to the spells of self-rage and anger (in accordance with the famous story of mutilating his left ear and giving him to a prostitute) which is known as van Gogh syndrome. This syndrome manifests itself as self-mutilation of organs such as genitals, ear and limbs in particular. He finally committed suicide by shooting himself as one of the self-rage attacks mentioned in the previous section as an issue of shame.

His last words show the grief and rage in his recent moments of life: "Grieving is eternal."

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Contribution of individual authors:

Mousa Taghipour proposed the design of the study.
Nima Derakhshan wrote the manuscript.
Arash Saffarian helped with literature searches.

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