Impacts of Alcohol use on Reaction Time with its Interaction and Interventions with tACS.

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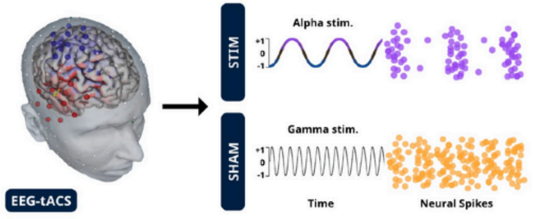
Introduction

Alcohol Consumption

Alcohol consumption impacts cognitive functions like reaction time, attention, and decision-making. It also affects alpha oscillations, brain waves important for relaxation and attention, reducing their amplitude and frequency. This study explores how drinking patterns influence responses to transcranial alternating current stimulation (tACS), a cognitive enhancement tool. We aim to find out if alcohol use can slow down thinking abilities, even after the person is sober, and whether it changes how effective tACS is. The findings could help tailor cognitive treatments and inform public health guidelines.[3]



Transcranial Alternating Current Stimuli (tACS)

tACS is a non-invasive brain stimulation method that provides a weak electrical current to the scalp, increasing the likelihood of neural firing in the targeted region of the cortex[1].

Acknowledgment

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References

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2:Chen J, Qin J, He Q, Zou Z. A Meta-Analysis of Transcranial Direct Current Stimulation on Substance and Food Craving: What Effect Do Modulators Have? Front Psychiatry. 2020 Jun 26;11:598. doi: 10.3389/fpsyt.2020.00598. PMID: 32670118; PMCID: PMC7332543.

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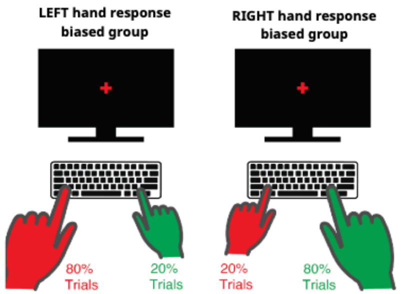
Procedure

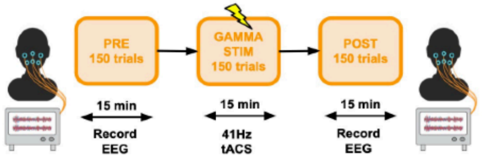
Oddball Paradigm (n=74)



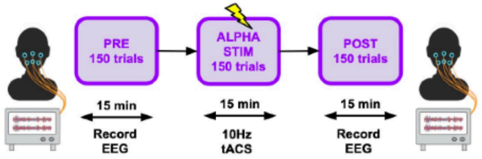
We observe participants accuracy and reaction time while performing the oddball task

Block Design

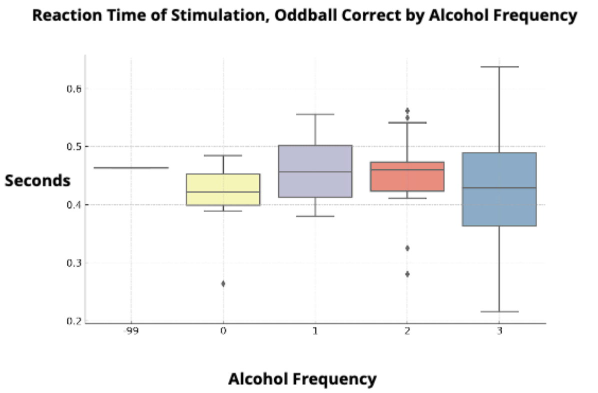
I. Day 1 - Gamma stimulation session (GAMMA STIM - 41Hz)



II. Day 2 - Alpha stimulation session (ALPHA STIM - 10Hz)



Data Collected



Never Used (0): Participants who never consumed alcohol exhibited the fastest and most consistent reaction times, suggesting efficient cognitive processing.

Past Month (3): Recent alcohol users showed slower and more variable reaction times, indicating potential cognitive impairment from recent consumption.

Lifetime (1) & Past Year (2): These groups had intermediate reaction times, suggesting a lingering, though reduced, impact of alcohol compared to abstainers.

Implications: Alcohol consumption may hinder cognitive function, influencing the effectiveness of neuromodulatory treatments. These insights can guide medical practices, public safety measures, and strategies to enhance cognitive health.[2]

Study Limitations: Our findings primarily involve university students around 20 years old, whose drinking habits typically include occasional social drinking. This demographic may not fully represent the broader impacts of alcohol on cognitive functions, limiting the generalizability of our results to other populations.

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