A Functional Magnetic Resonance Imaging (fMRI) study of the effects of listening to Quran and music on brain activity and short-term memory

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INTRODUCTION

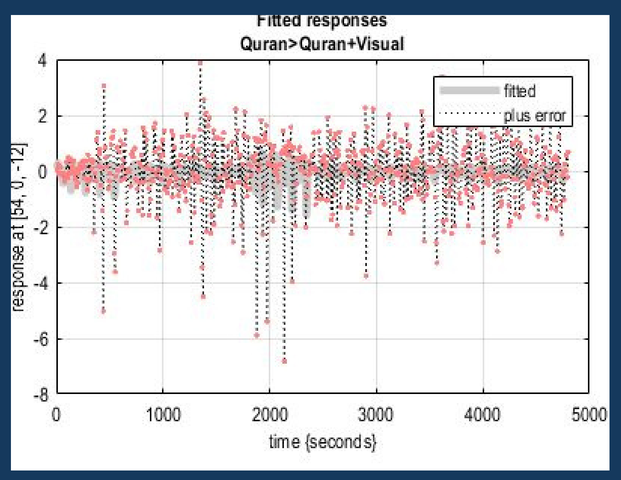
- **fMRI** measures the signal **changes in blood oxygenation** and **flow** in response to brain activity using BOLD imaging.
- **BOLD imaging** helps infer brain cell activity and identify specific brain regions involved in tasks.
- Increased neuronal activity leads to **higher oxygen demand** and **increased blood flow** in those areas.
- **Short-term memory** is the temporary storage of limited information in the brain, lasting around 20 to 30 seconds.

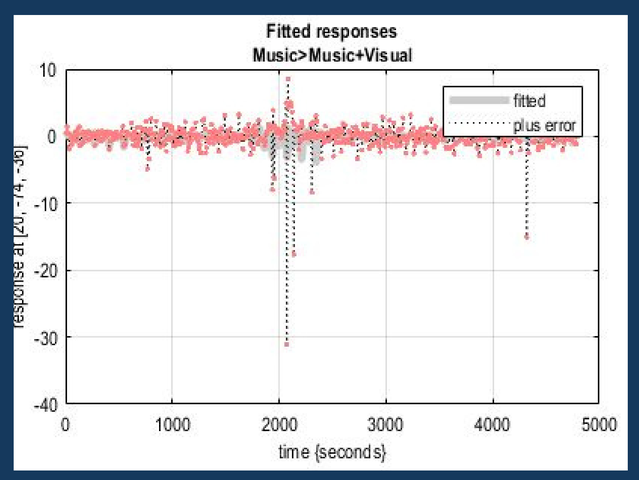
OBJECTIVES

- This study aims to compare short-term memory and brain activity in university students while listening to music and the Quran.

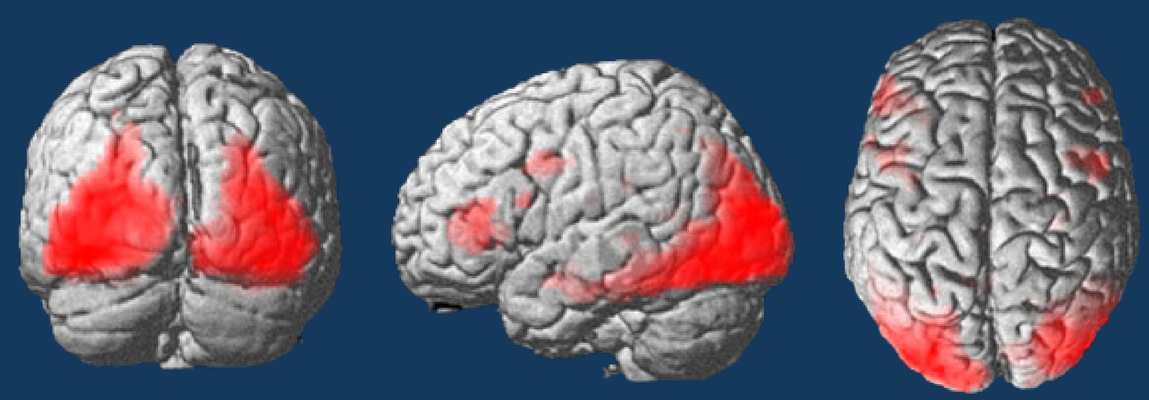
METHODOLOGY

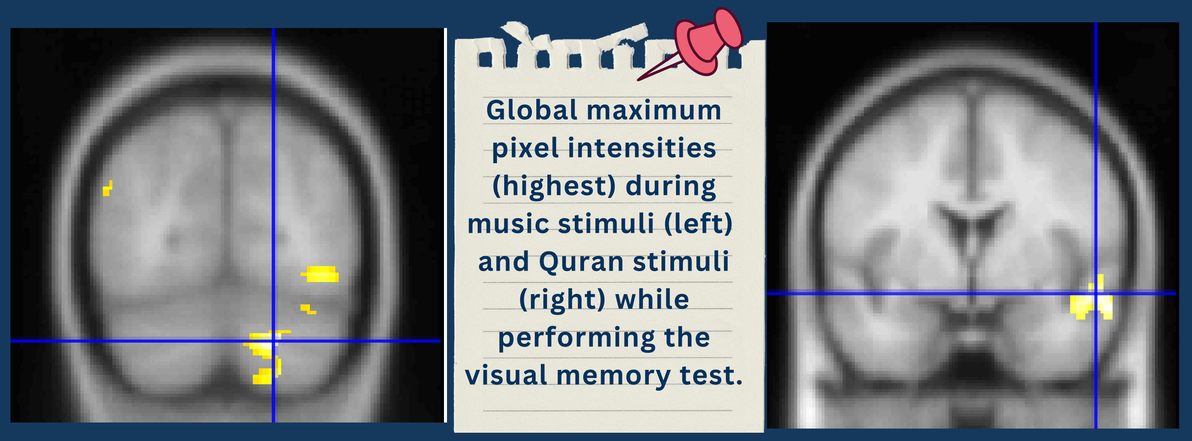
- The experiment consists of two phases after displaying the word "start" for 1.5 seconds.
- In the **first phase,** participants listen to the **Quran** while **seven Chinese numerals** are shown for **0.75 seconds** each. The word **"remember"** is then displayed for one second.
- The **second phase** is similar to the first but without the word "start" and with **instrumental music** as the audio stimulus.
- Participants have **two seconds to judge** and respond by **pressing the buzzer** if the sequence was the same or remaining silent if it was not.





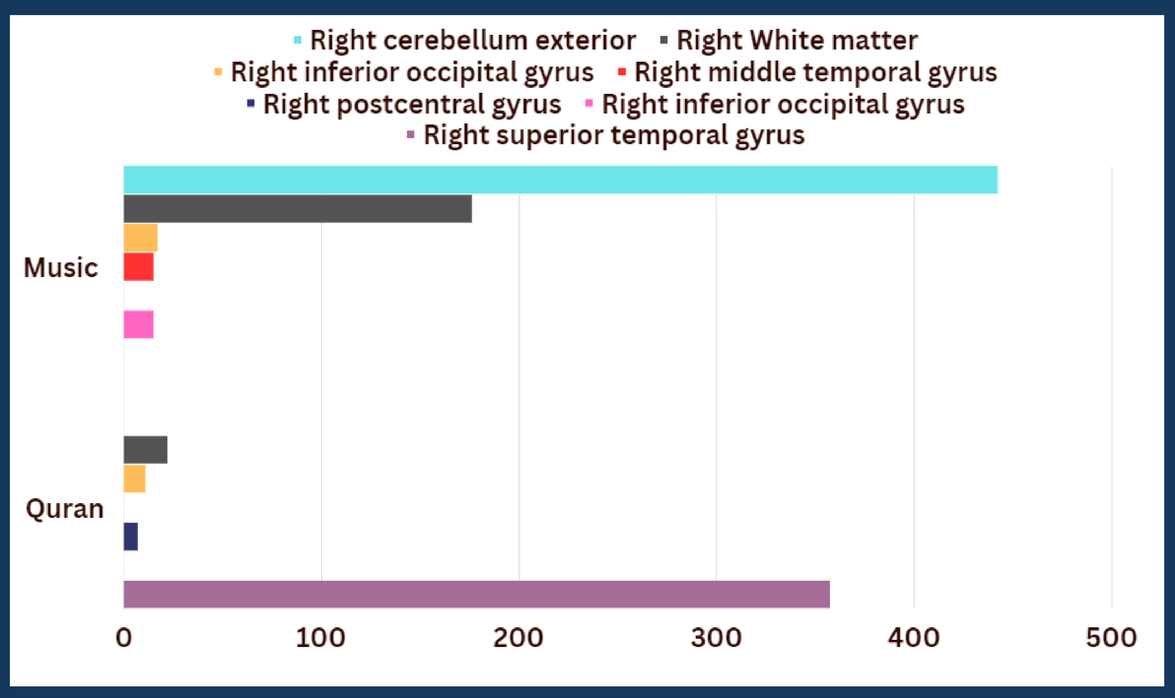
- **By using fitted response, we can model the relationship between the predictor variable (the task the participant is performing) and the response variable (the pixel intensities in different parts of the brain) to identify which brain regions are most active during the task, and how their activity changes over time.**





Global maximum pixel intensities (highest) during music stimuli (left) and Quran stimuli (right) while performing the visual memory test.

RESULTS



K clusters of activated pixels during audio stimuli and task performance

CONCLUSION

- Based on the results of the fMRI experiment, it can be concluded that listening to Quran and music have similar effects on short term memory and brain activity.
- This suggests that both Quran and music can be used to stimulate the brain and improve memory.

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REFERENCES

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