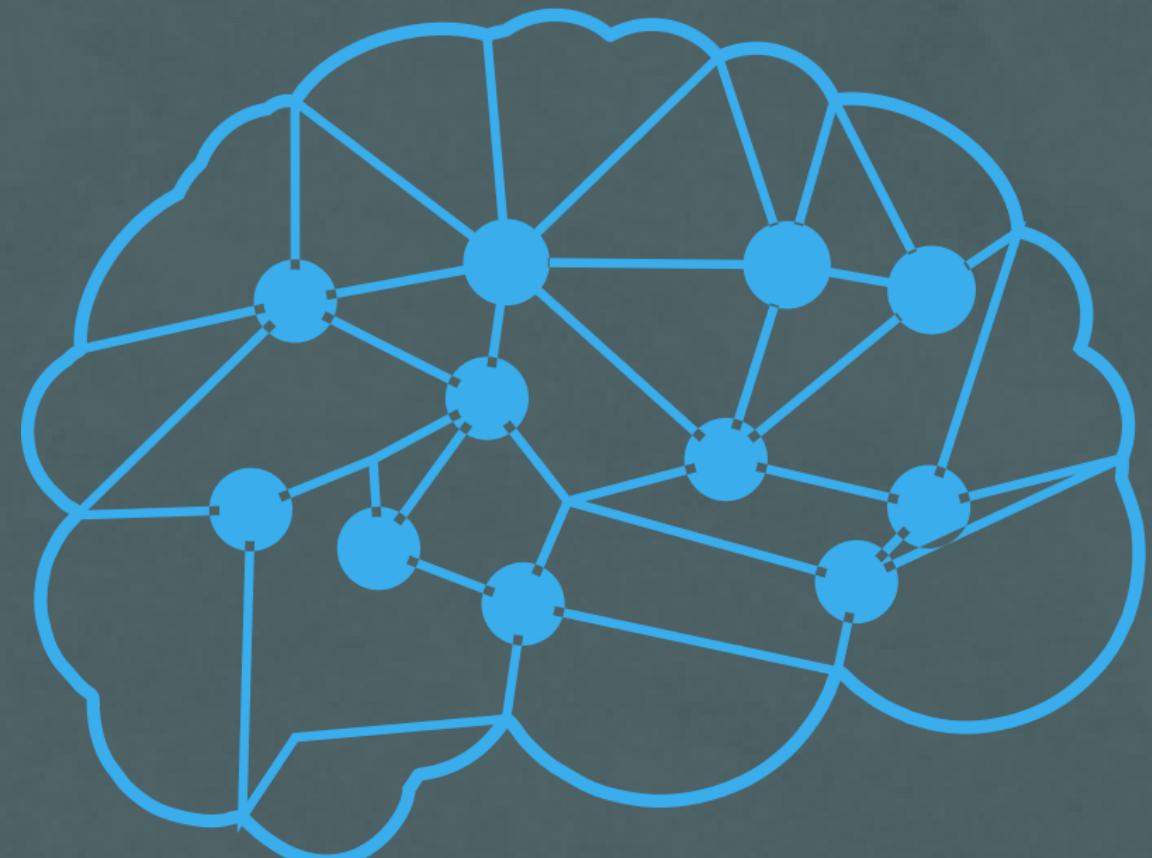


ANALYSIS OF EEG SIGNALS USIGN N-BACK TASK



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INTRODUCTION

- Problem statement

- To determine the most effective and reliable methods for measuring mental workload using EEG signals, and to identify the EEG features that best reflect changes in mental workload during different types of tasks and application domains.
- The goal of this research is to better understand the relationship between EEG signals and mental workload, and to develop effective and practical methods for measuring mental workload in real-world settings.

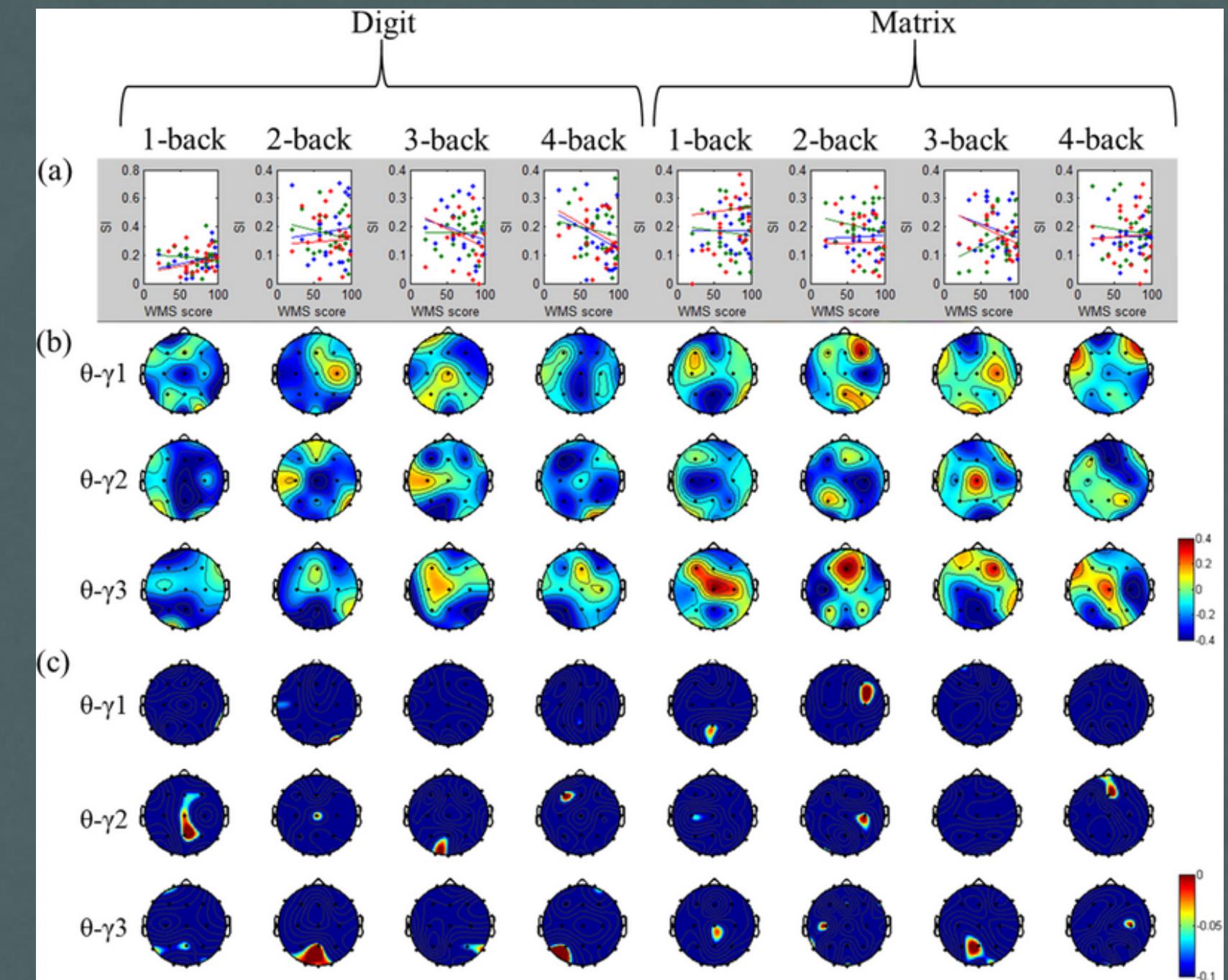
MOTIVATION

- The motivation for EEG-based mental workload assessment is to develop accurate and reliable methods for measuring mental workload in real-world settings
- In order to improve the design and safety of systems that require high operator attention, and to deepen our understanding of the neural basis of mental workload and its effects on human performance and well-being.

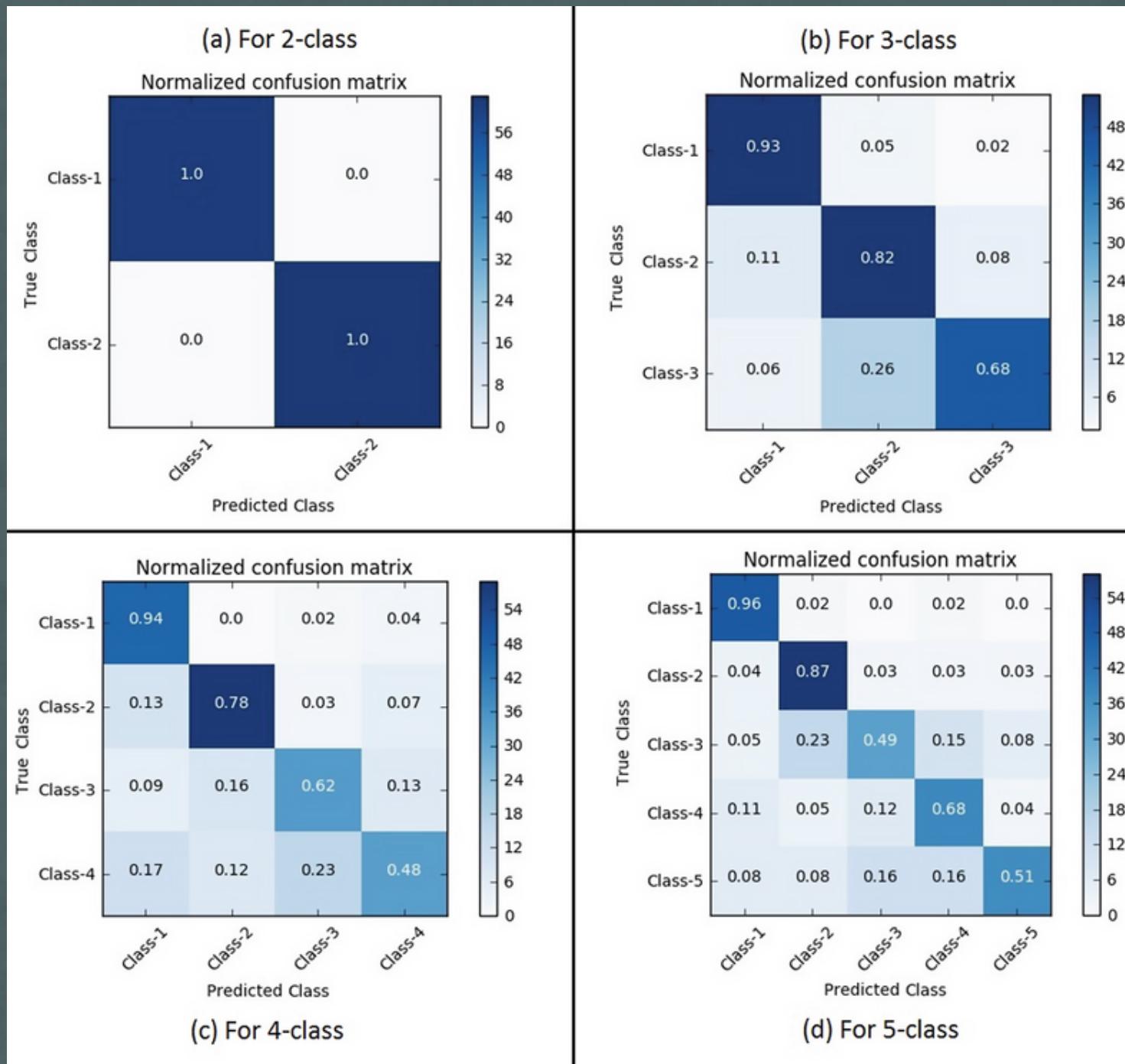
LITERATURE SURVEY

WORKING-MEMORY EVALUATION BASED ON EEG SIGNALS DURING N-BACK TASKS

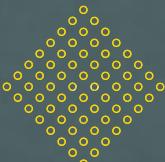
- The study aimed to develop an objective evaluation system for working memory ability using theta power, gamma power, and theta-gamma synchronization.
- Results showed that theta power is related to working memory recognition, while gamma power varied with the memory load and higher load levels were more appropriate for assessing working memory ability.



WORKING-MEMORY EVALUATION BASED ON EEG SIGNALS DURING N-BACK TASKS

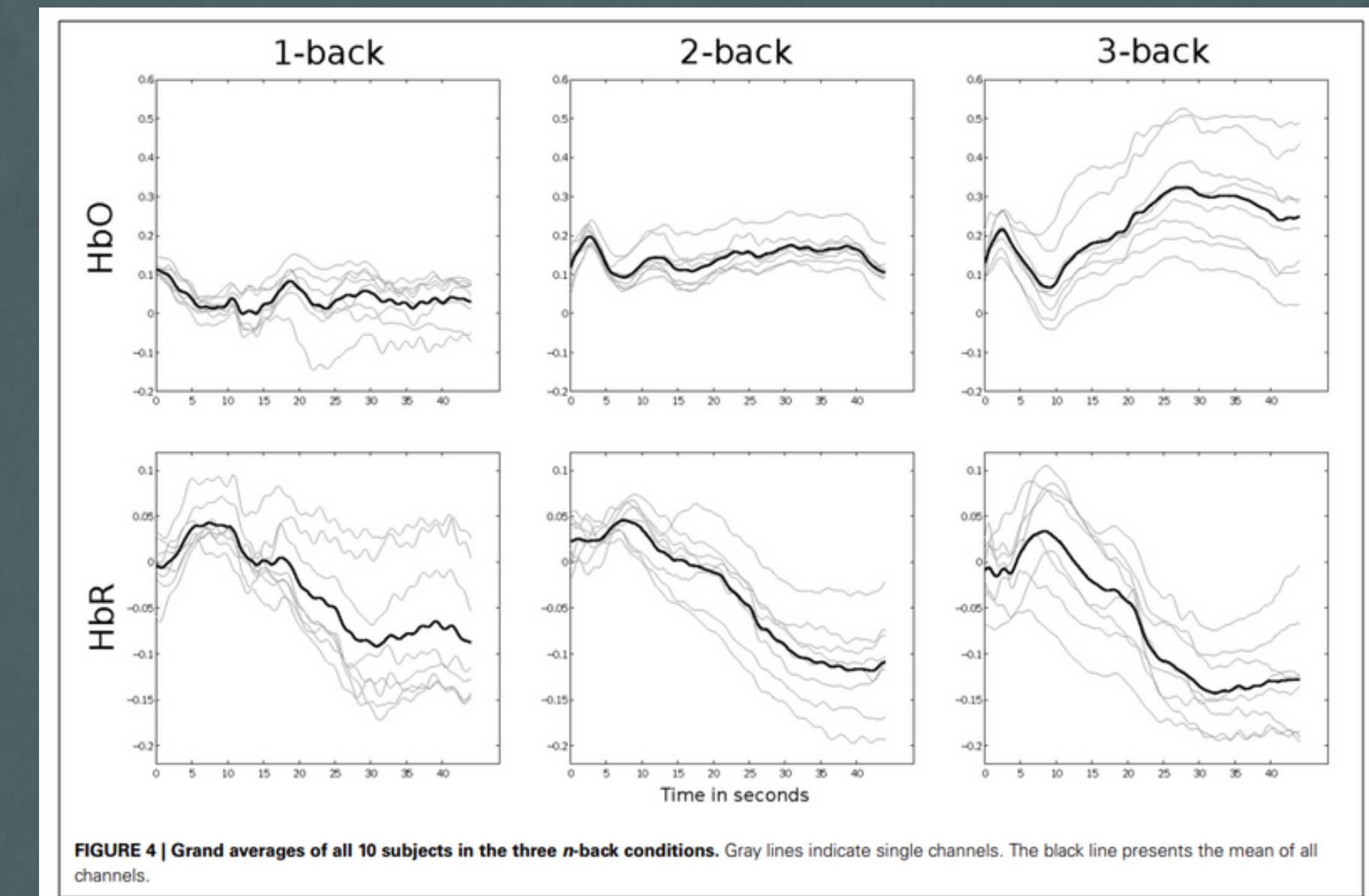


- In this research paper they are mainly focusing on the mental workload. They are taking the brain cell communication data using the EEG.
- They are analysing the mental workload using the data collected from the above method. With the help of these signals from the EEG they are evaluating the mental workload during human-computer interactions.



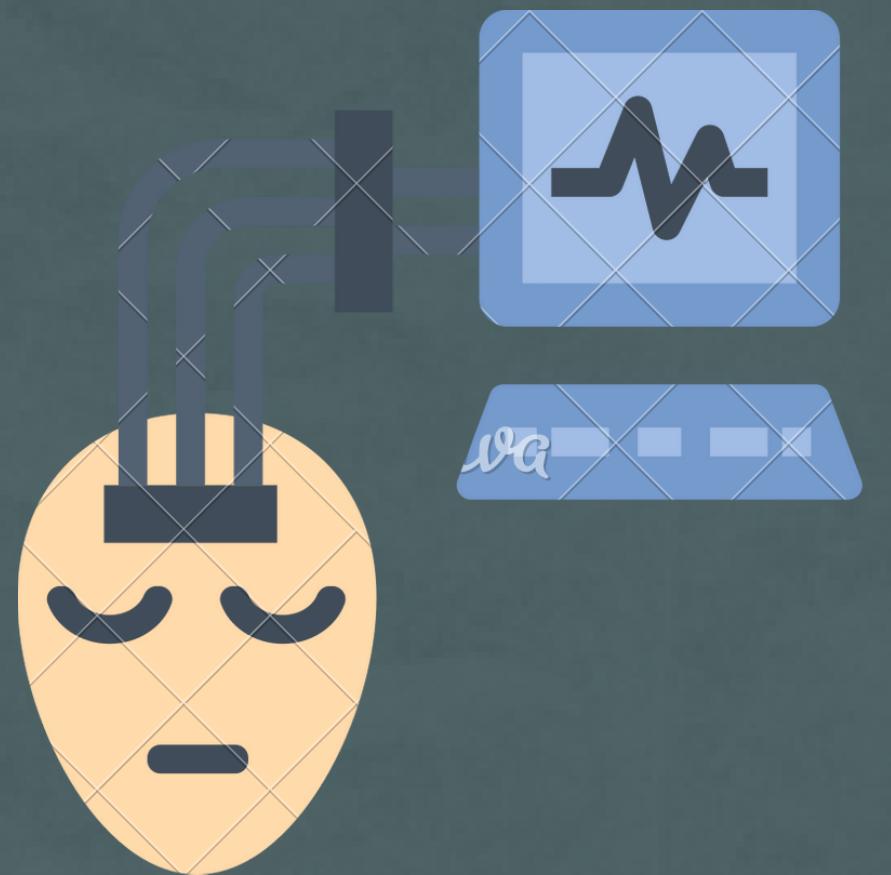
MENTAL WORKLOAD DURING N-BACK TASK— QUANTIFIED IN THE PREFRONTAL CORTEX USING FNIRS

- The study aimed to develop quantification of workload induced by different n-back conditions results in hemodynamic responses that are consistent enough to be classified on a single trial basis.
- Results showed that Classification between the workload induced by 2 and 3-back tasks resulted in an average of 61% accuracy.

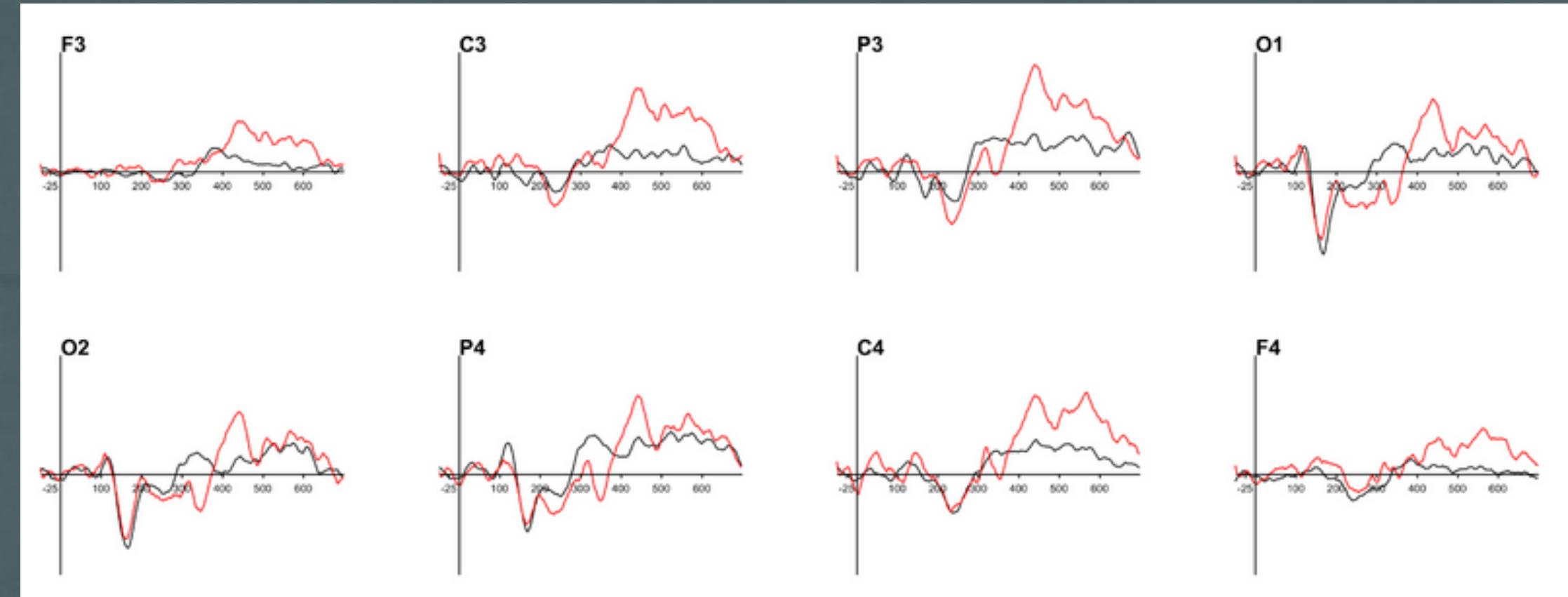


DATASET DESCRIPTION

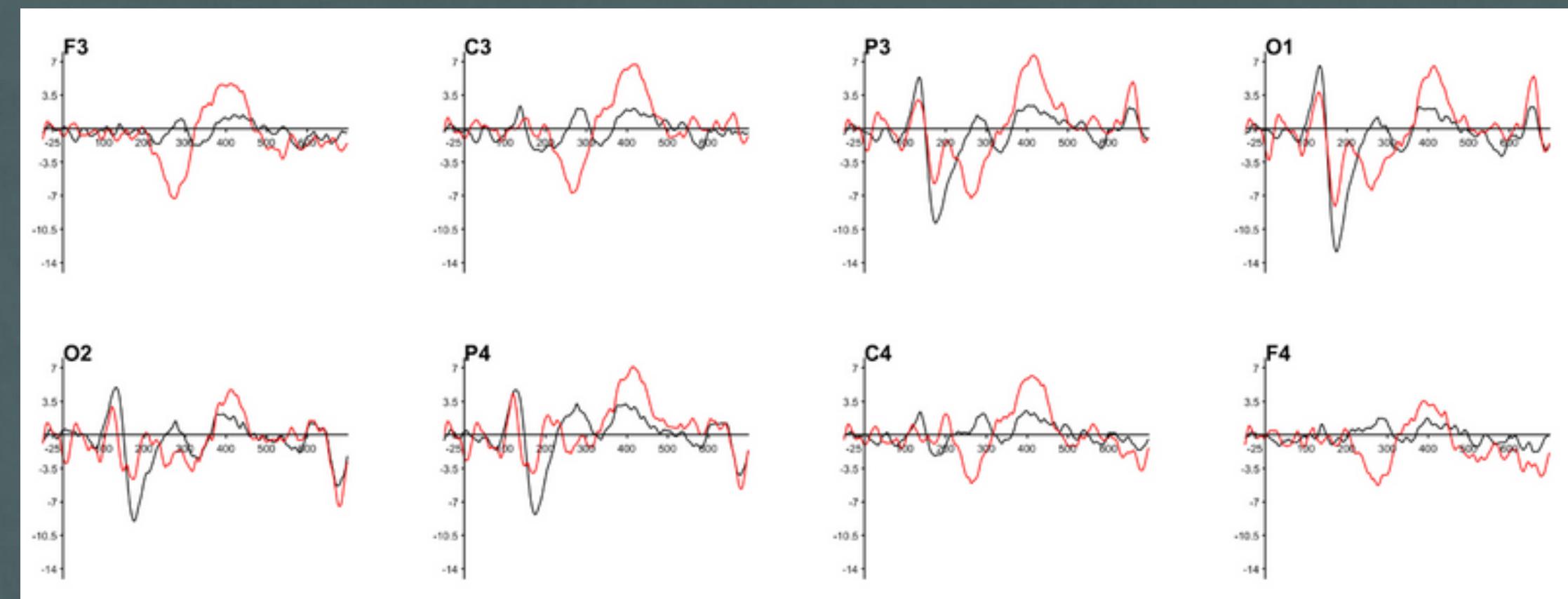
DATA COLLECTION



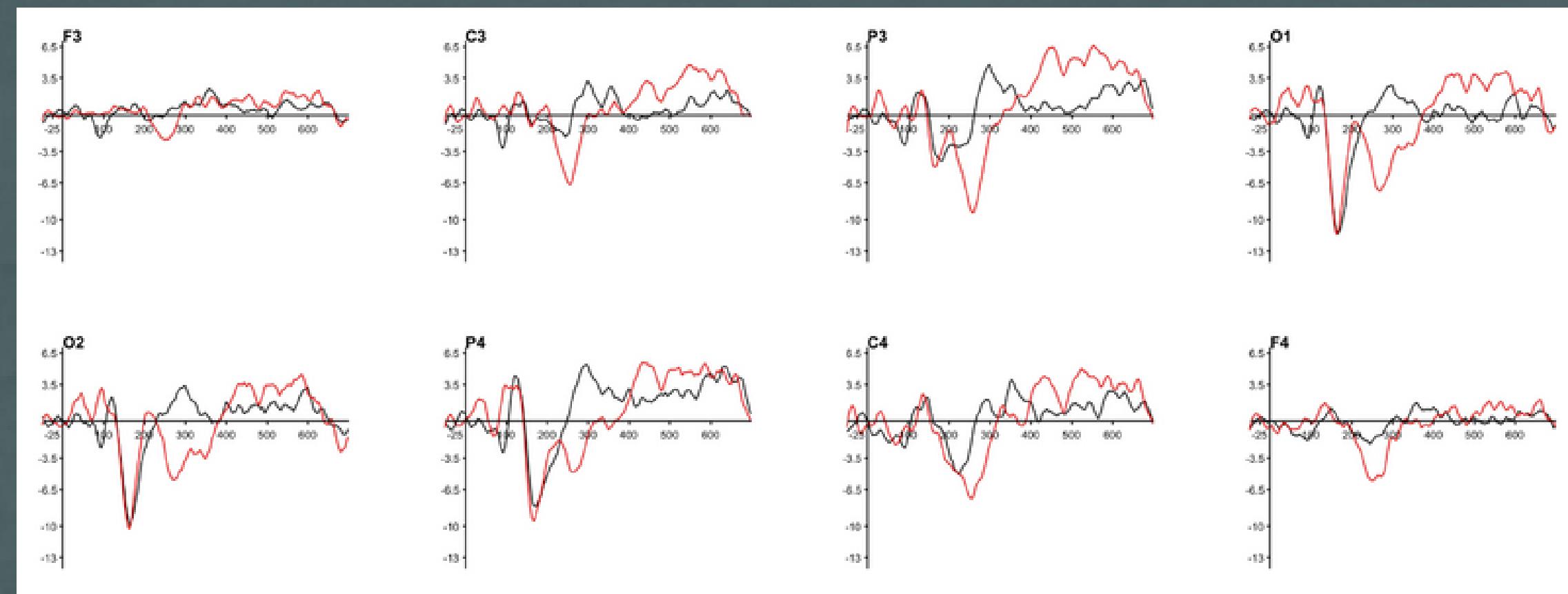
- A multi-session and multi-task EEG cognitive dataset for passive brain-computer interfaces.
- The EEG signals were recorded from 29 participants over three individual sessions and a total of 4 different tasks designed to evoke different levels of cognitive load while they completed a task requiring various levels of mental effort.
- For each session, the participants were comfortably seated approximately 50cm away from a 120Hz refresh rate computer screen. The screen was used to display the stimuli (numbers during the N-back task).
- The trials consisted of a number being displayed for 500ms, followed by a blank screen for 1500ms. The participants are instructed to hit the spacebar in case of a hit trial (e.g. in the 1-back condition, the same as the previous number).



- 0 back task of sub-1

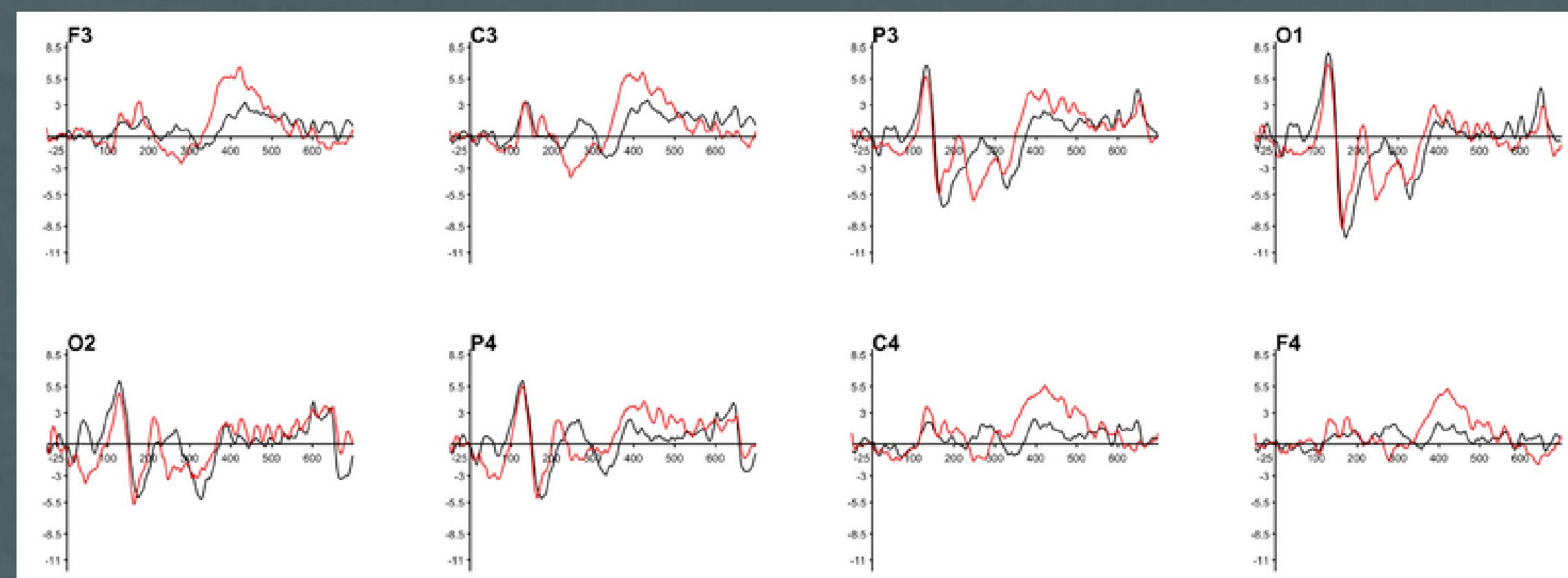


- 0 back task of sub-2

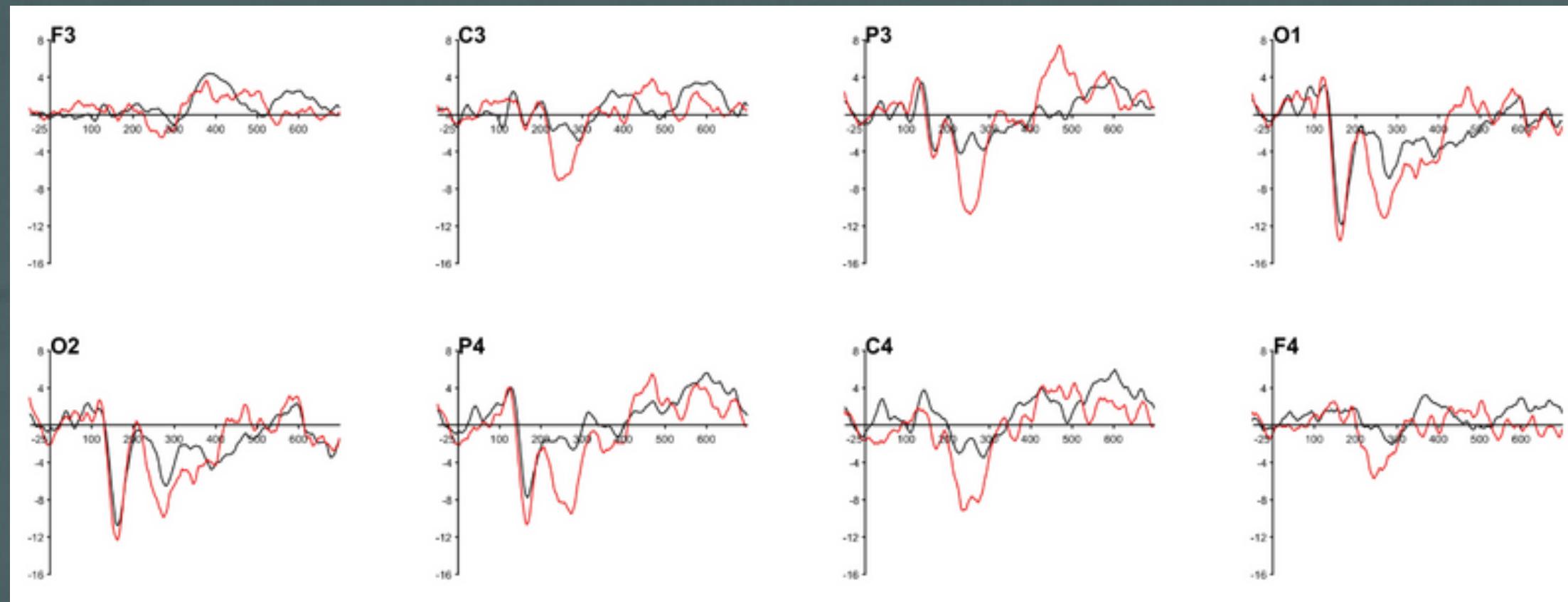


— BIN1: non-target-trial
— BIN2: target-trial

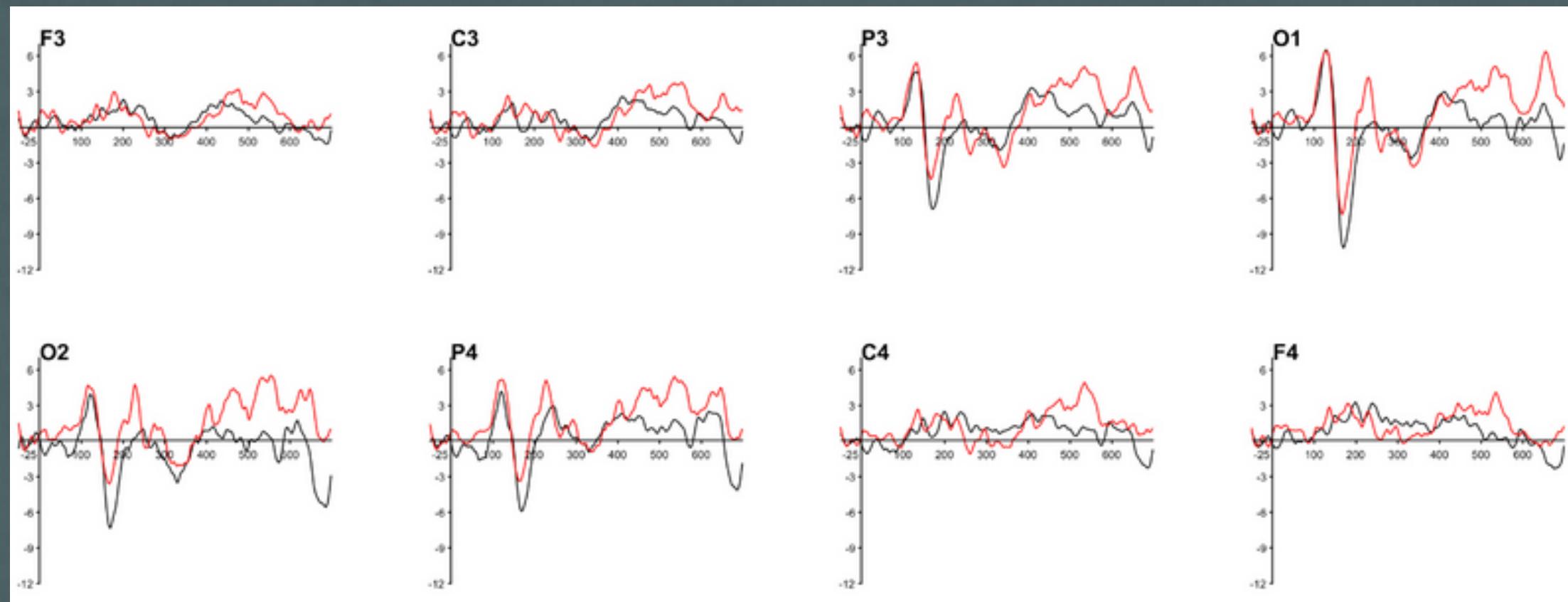
- 1 back task of sub-1



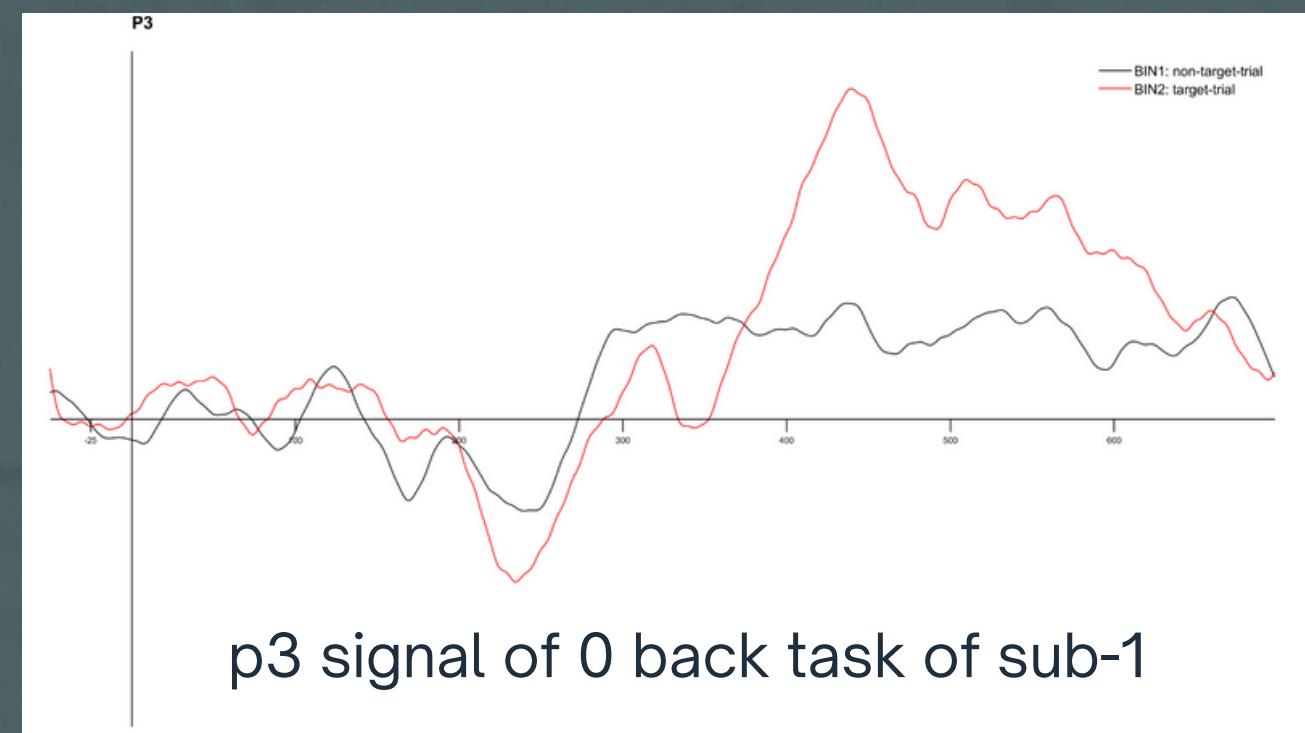
- 1 back task of sub-2



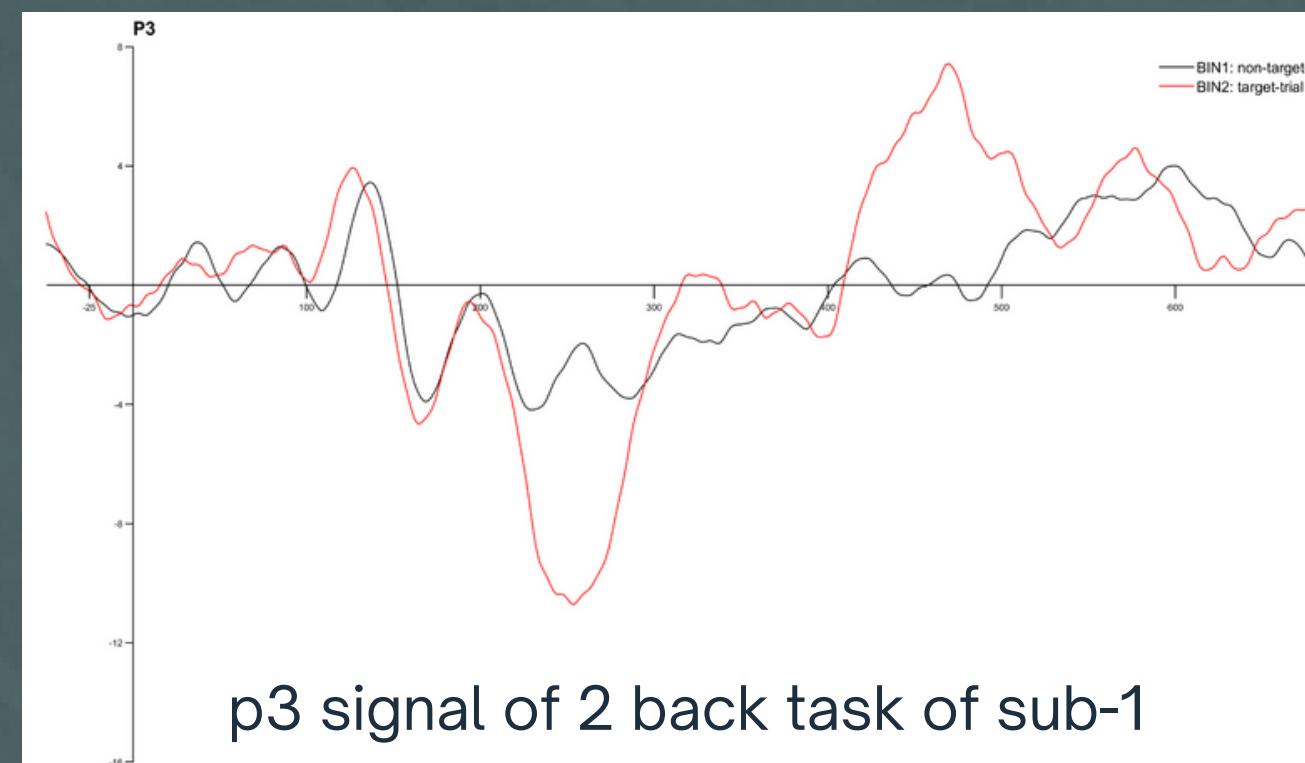
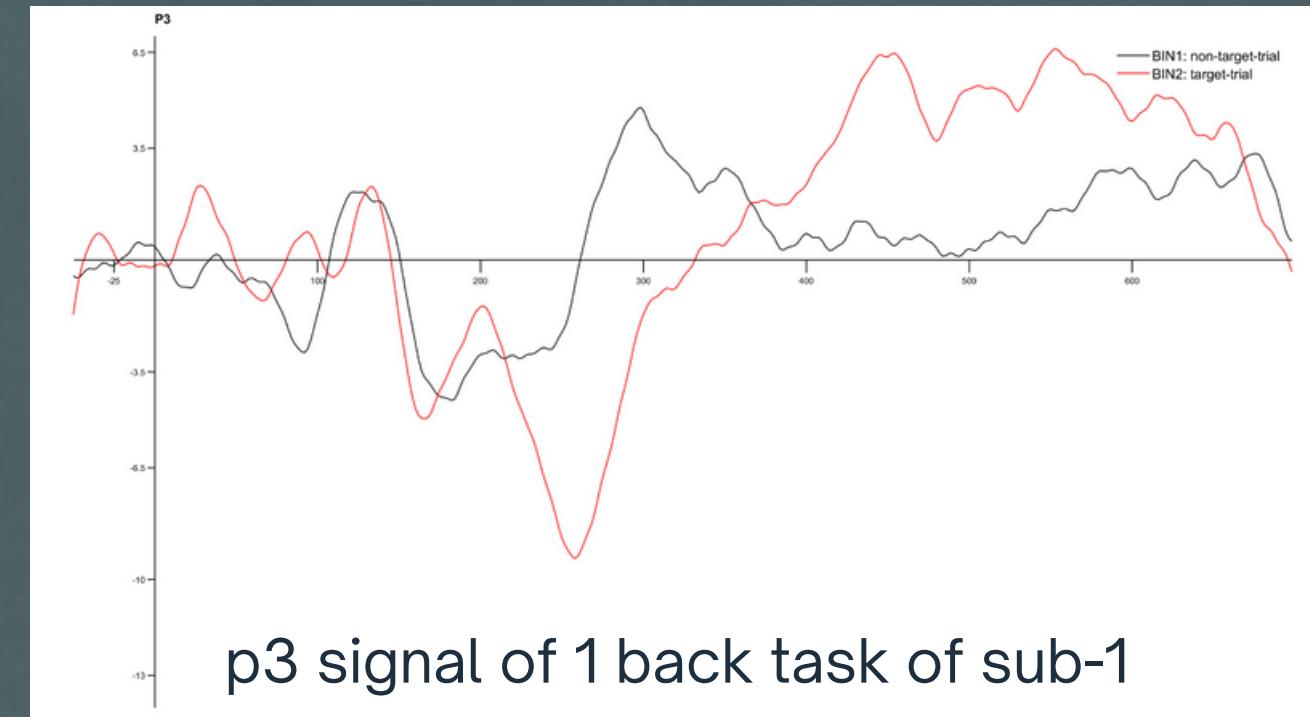
- 2 back task of sub-1

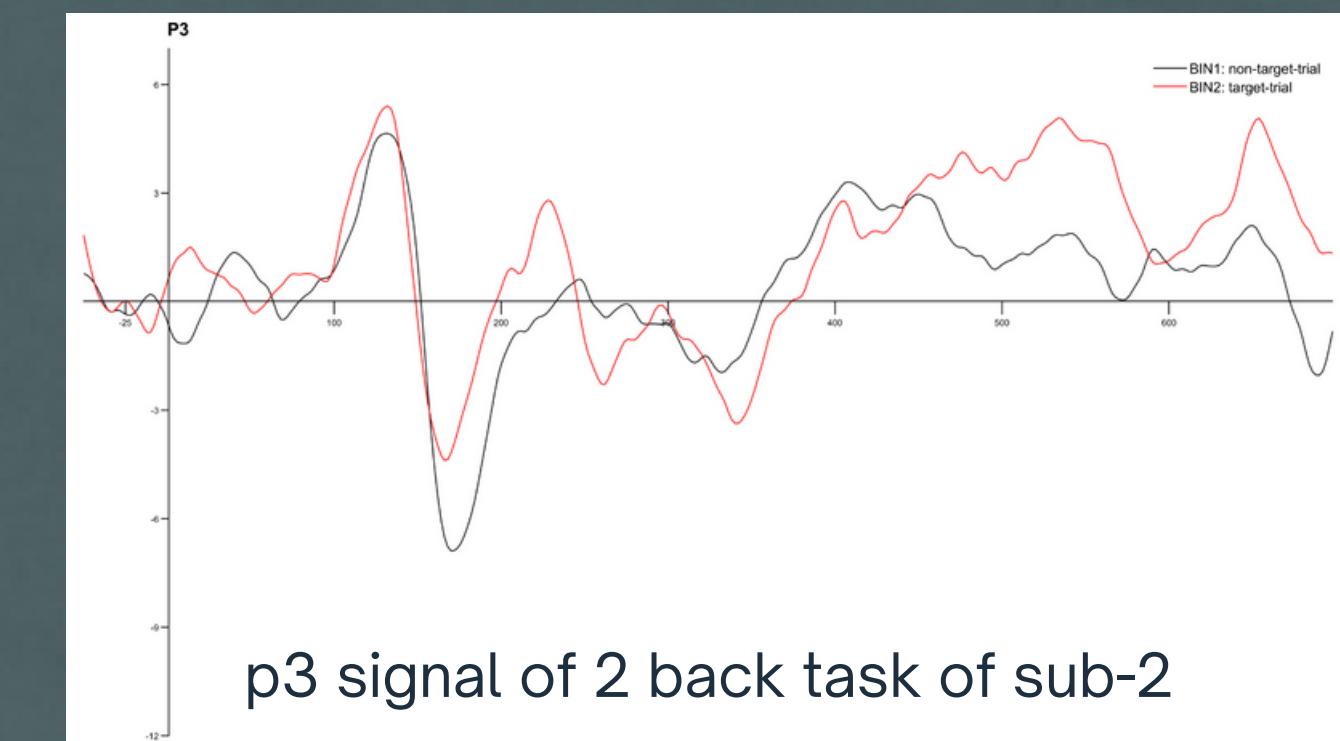
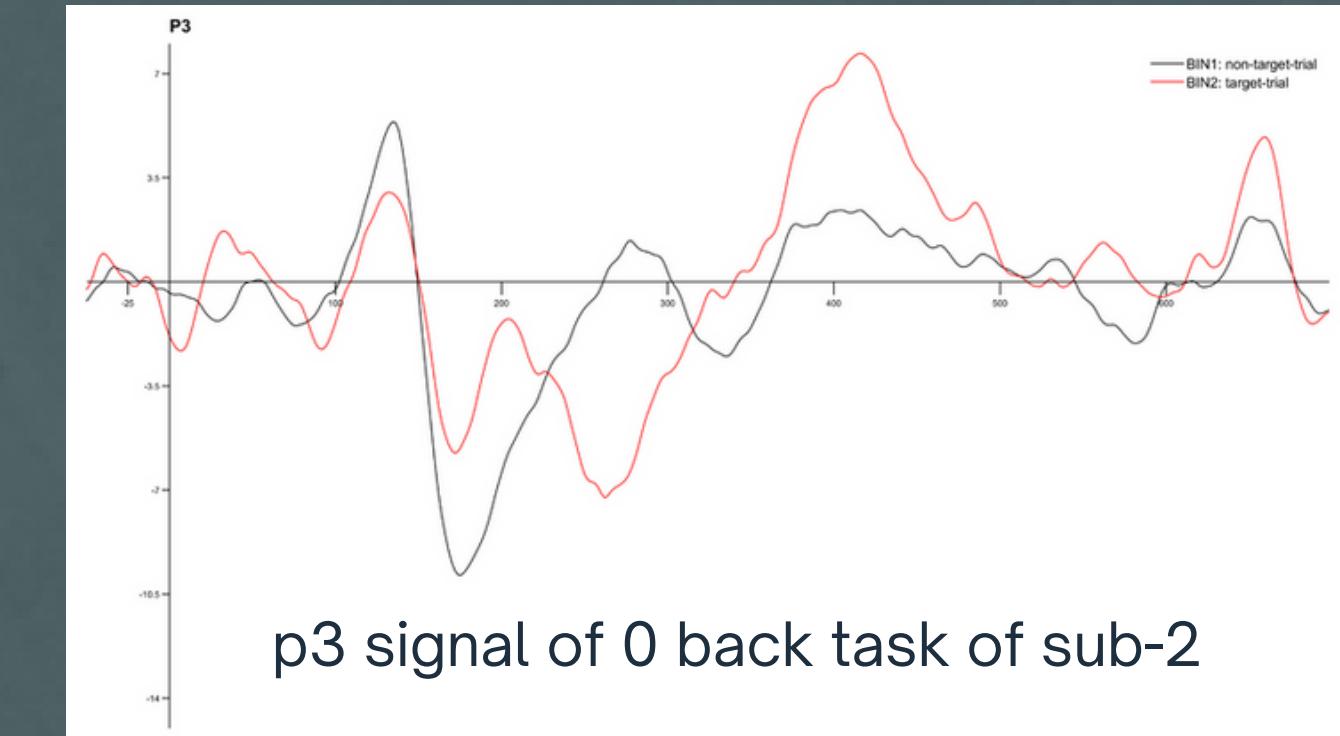
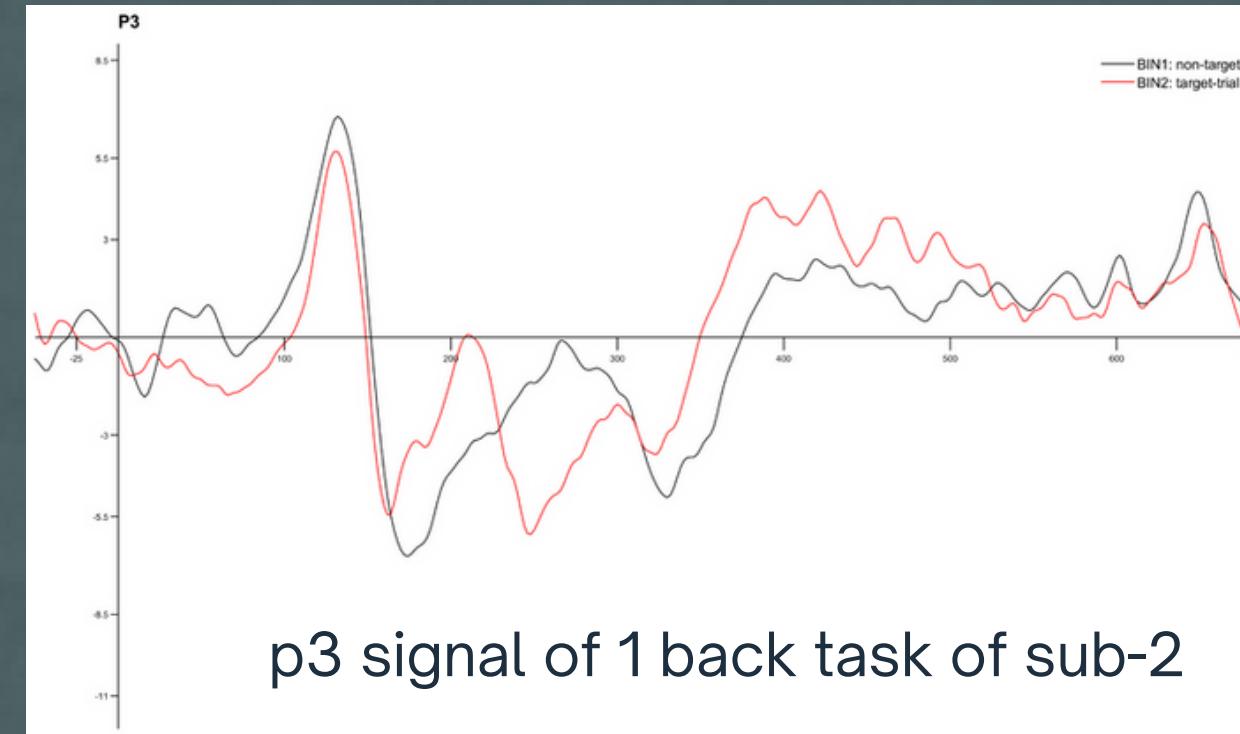
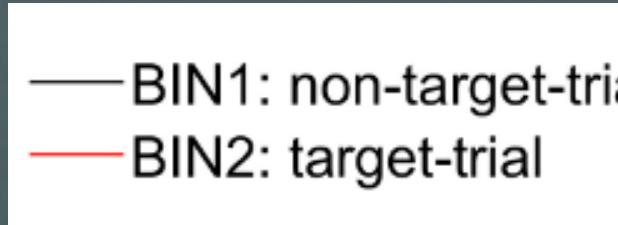


- 2 back task of sub-2

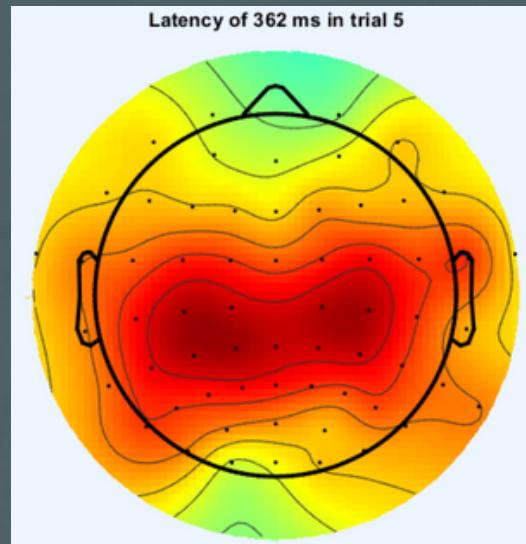


— BIN1: non-target-trial
— BIN2: target-trial

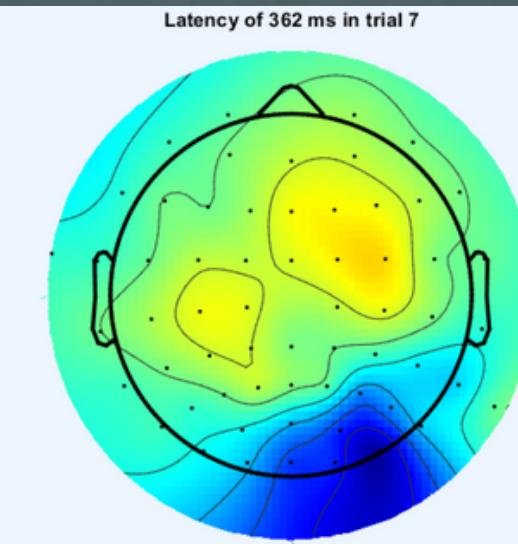




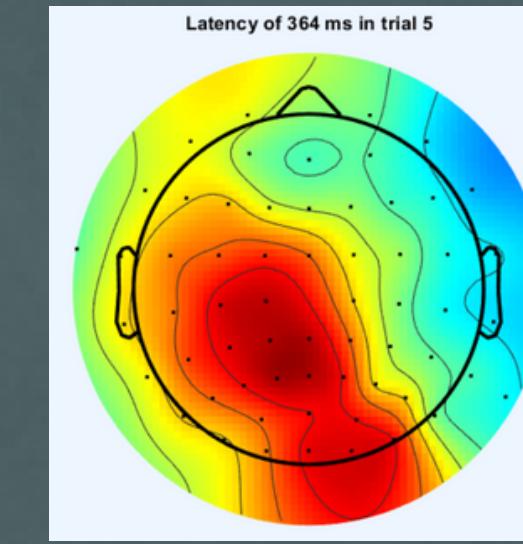
SCALP PLOTS



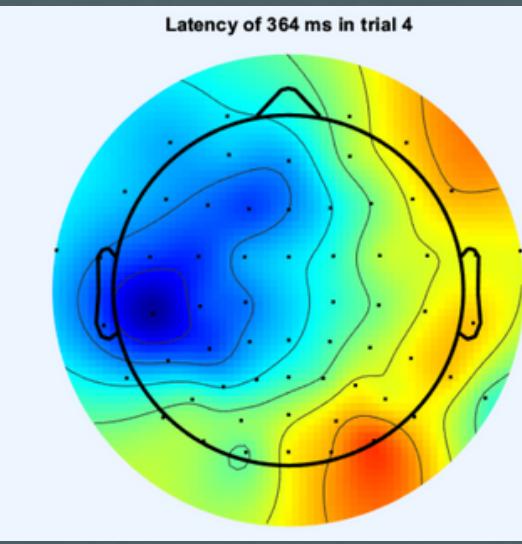
0 back: target



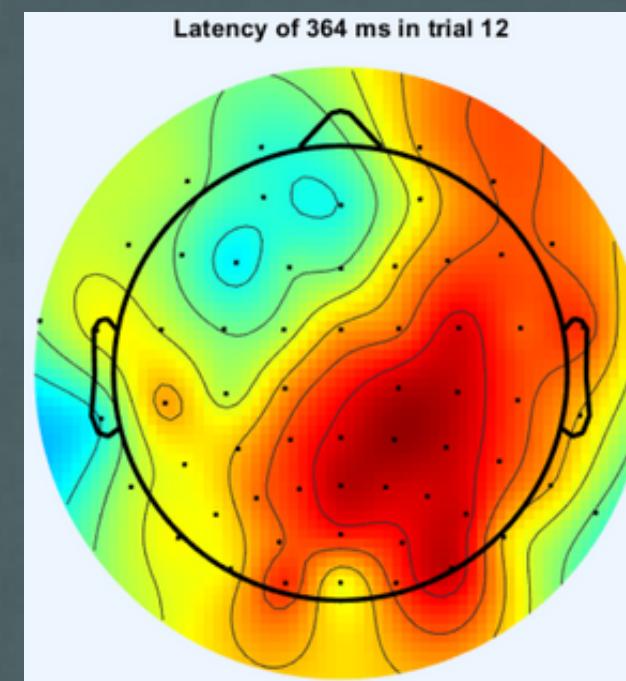
non target



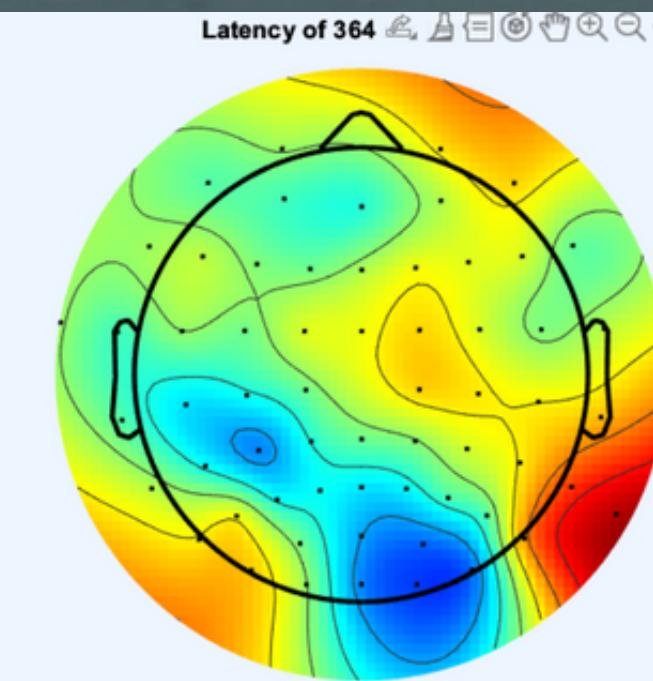
1 back: target



non target



2 back: target



non target

THANK YOU