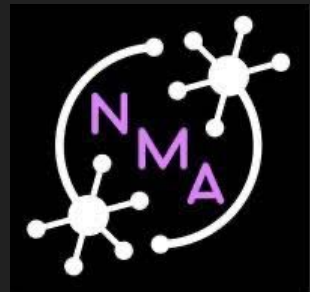
Analysing parcel activation in decision-making tasks versus the resting state

How does parcel activation in the brain differs when gambling versus resting?

Team: Energetic Iguanas
Pod: energetic-iguanas



Project Overview

Background: Gambling involves rigorous decision-making and related behaviours (risk-assessment, stress etc). Decision-making is a complex cognitive process that involves the simultaneous orchestration of multiple neural systems.

Regions of interest: The orbitofrontal cortex (OFC), the prefrontal cortex (PFC) and the hippocampus.

Scientific Question: We wanted to answer the following questions:

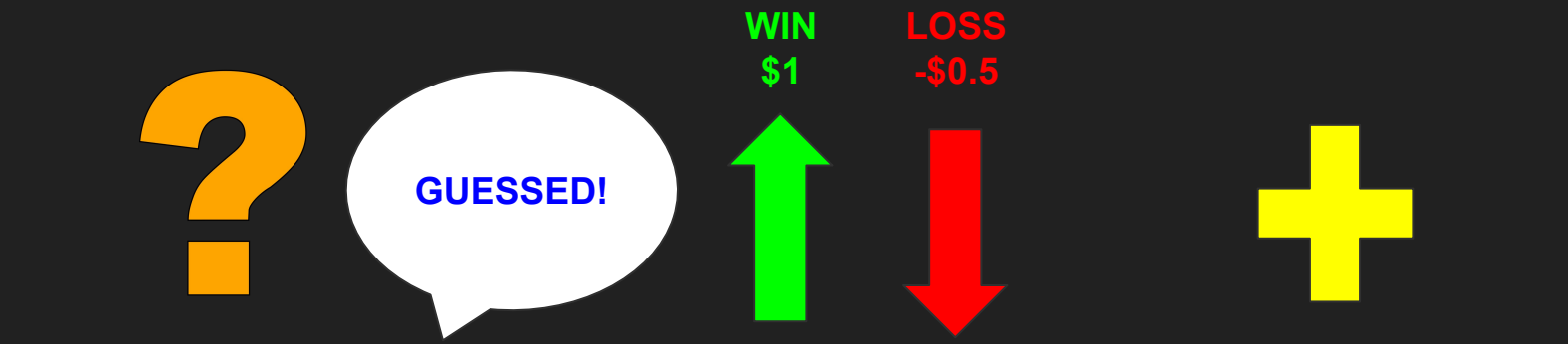
I. Are these 3 regions functionally connected to each other?
II. How does their activity differ in a decision-making task (like gambling) from the resting-state?

Presumption: The participants in the dataset are healthy, neurotypical individuals with no form of addiction towards gambling.

Dataset: HCP-2020 (fMRI)

Gambling task: a card-guessing game

4 tasks [2 Mostly rewards, 2 Mostly losses] : 8 guesses each



Guess if the number on the card is > or <5

1.5s

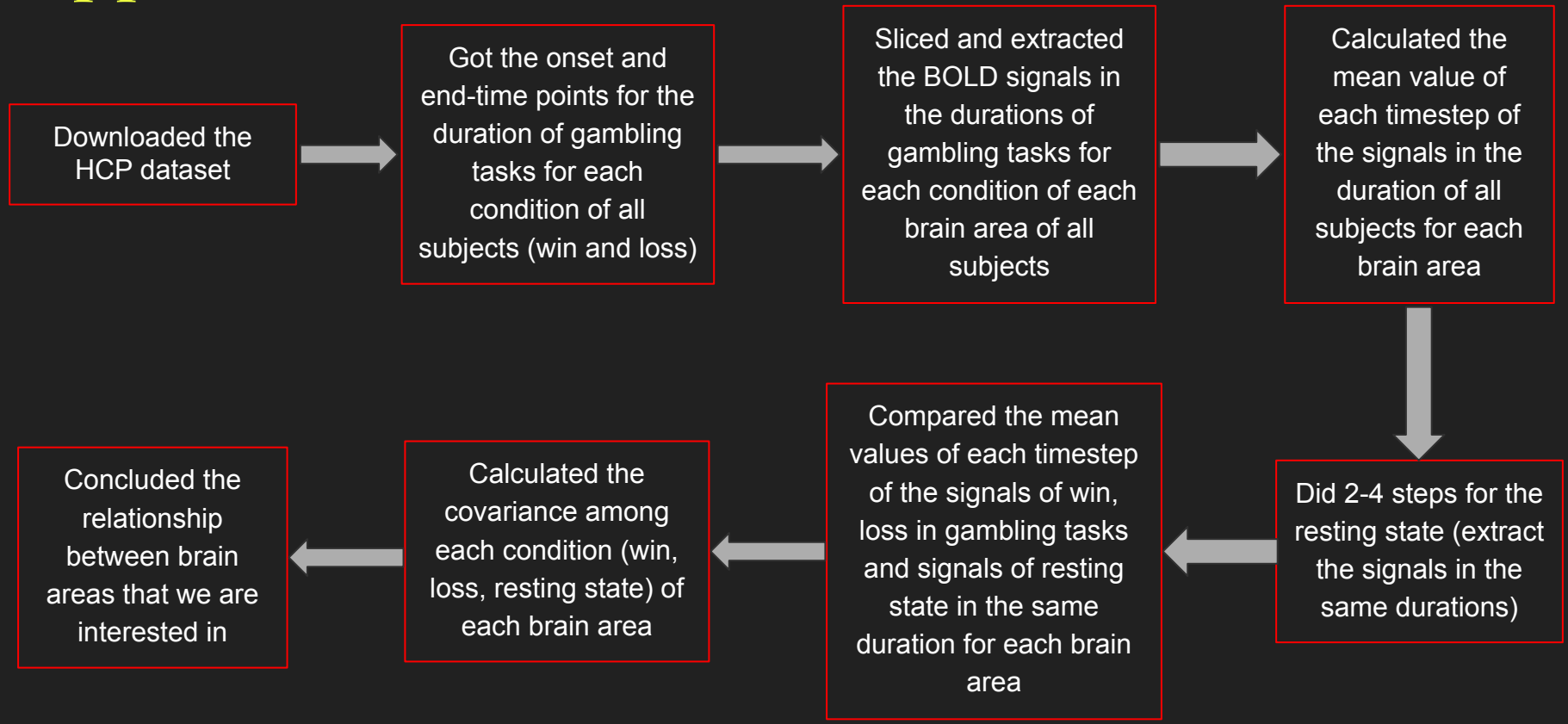
Visual feedback of outcome

1.0s

Inter-task Interval

1.5s

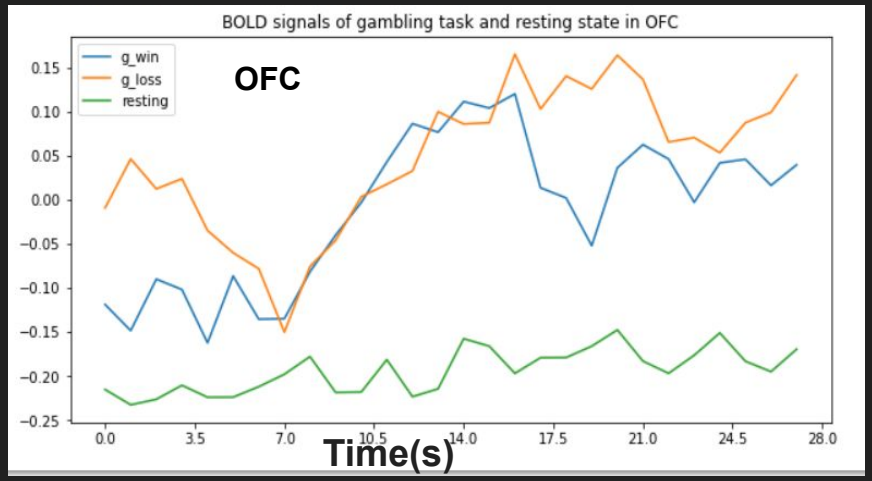
Approach

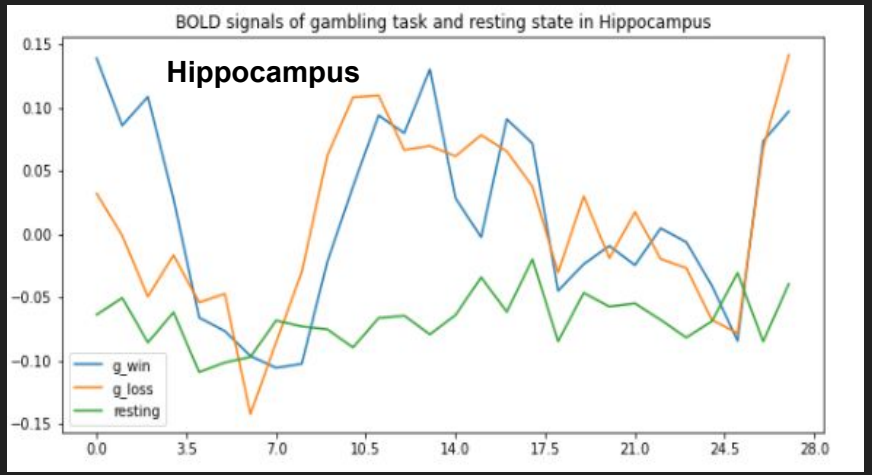


Colab:https://colab.research.google.com/drive/1M6b7dnYuS-eHecM4t9AcJvpuxGl671hF#scrollTo=1EQFmW1ruKrR

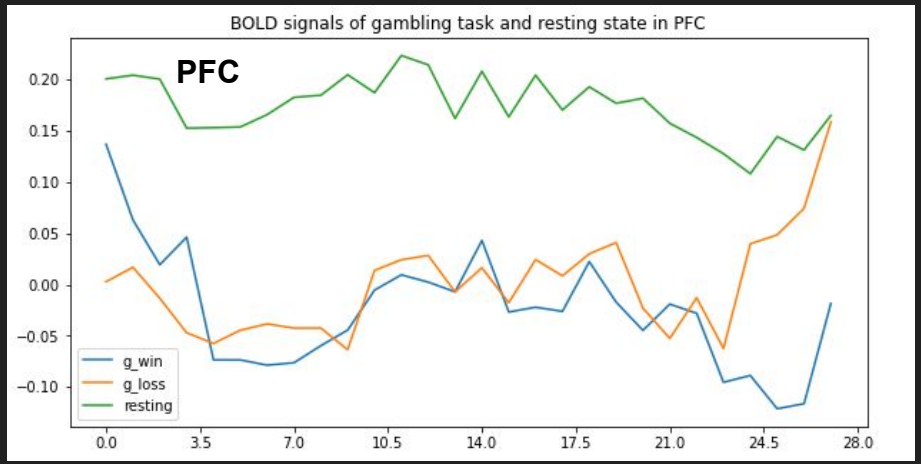
Change in activity with state, guess and outcome

BOLD-signal

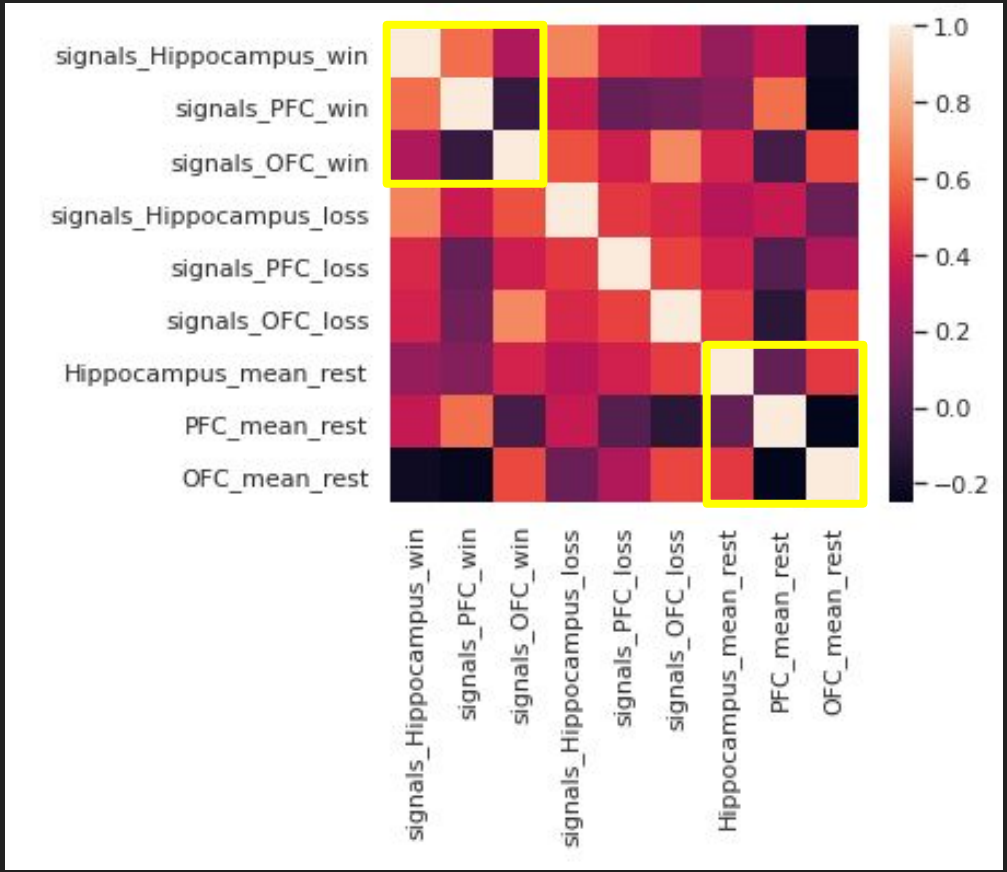




1 guess = 3.5s
 # guesses = 8



Resting state connectivities differ from gambling task



Discussion

I. Are these 3 regions functionally connected to each other?
YES, Orbitofrontal cortex and Hippocampus (r ~ 0.5)
NO, OFC and Prefrontal cortex nor Hippocampus and PFC

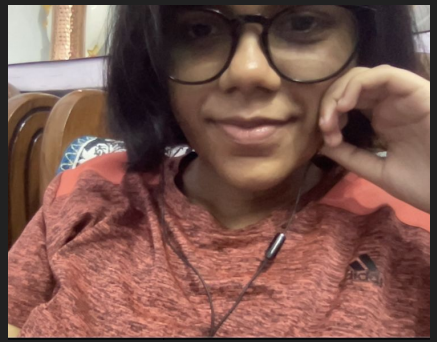
II. How does their activity differ in a decision-making task (like gambling) from the resting-state?

- **Higher activation of :**
OFC - Reward-processing
Hippocampus - Pattern seeking and working memory

Reduced activation of:
PFC - Decision-making and working memory

The team :)

Fadime Kezer



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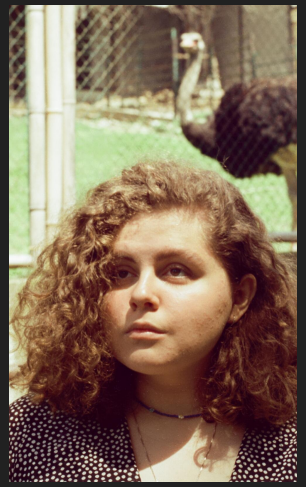

Anna Maslova

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References

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