neuromatch

AGREEABLENESS AND THE DEFAULT MODE NETWORK DURING A THEORY OF MIND TASK

Pod: Ra 2025

Team: The Un-Agreeables

Introduction

What do we think when we think of nothing?

Is thinking about myself important to understand what others are thinking?

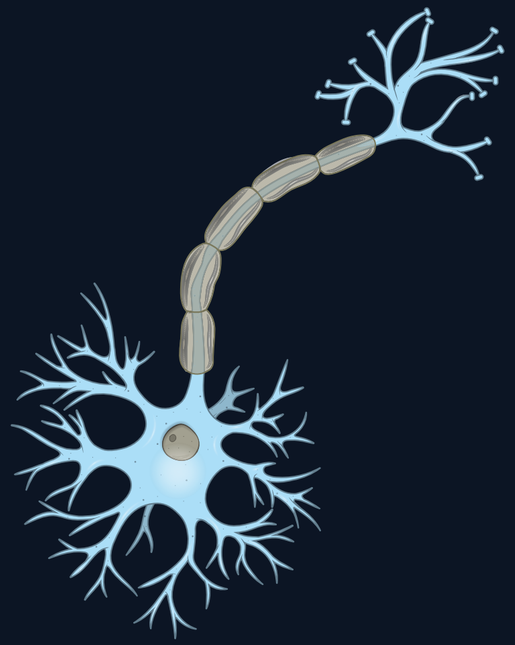
Can this also be related to personality traits?

Our question

Are people who are more agreeable better at Social Cognition tasks? And will this greater ability show up as greater brain activations in agreeable people?

In more scientific terms

Do people with a **higher agreableness score** show an increased activation in overlapping regions of the **Default Mode Network (DMN)** during a **theory of the mind (ToM) task**?



Our Hypothesis

Individuals with **higher Agreeableness scores** will show greater BOLD fMRI activation in key regions of the **Default Mode Network (DMN)** during a **Theory of Mind (ToM) task.**

Data

fMRI and personality data from the Human Connectome Project (n=100)

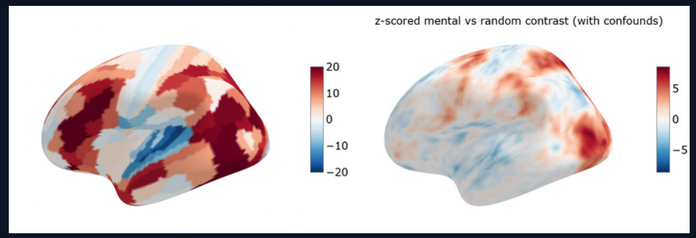
Task: SOCIAL task

Preprocessing

Region-wise timeseries data provided by NeuroMatch Academy

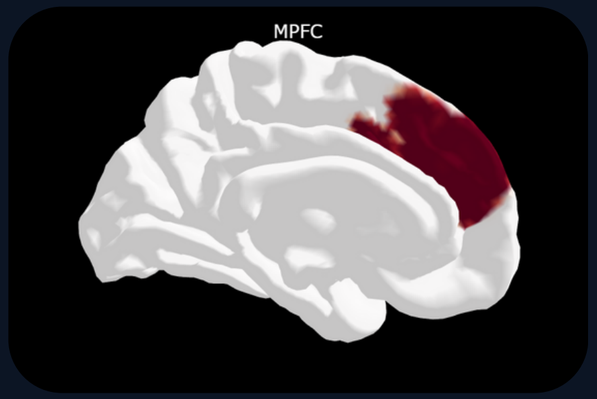
Voxel-wise data repreprocessed and parcellated (Nilearn)

Contrast: MENTAL > RANDOM

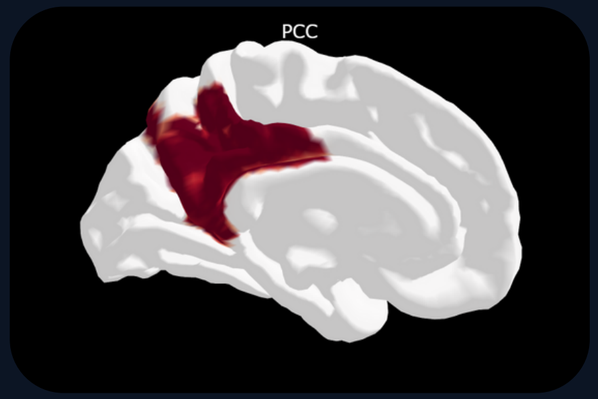


Parcellation: Glasser multimodal atlas

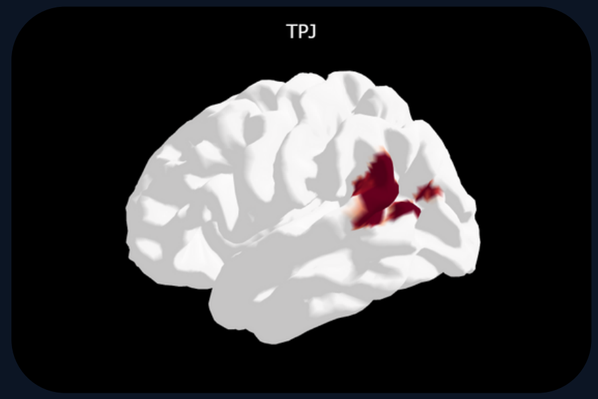
Medial Prefrontal Cortex



Posterior Cingulate Cortex



TemporoParietal Junction



Analysis

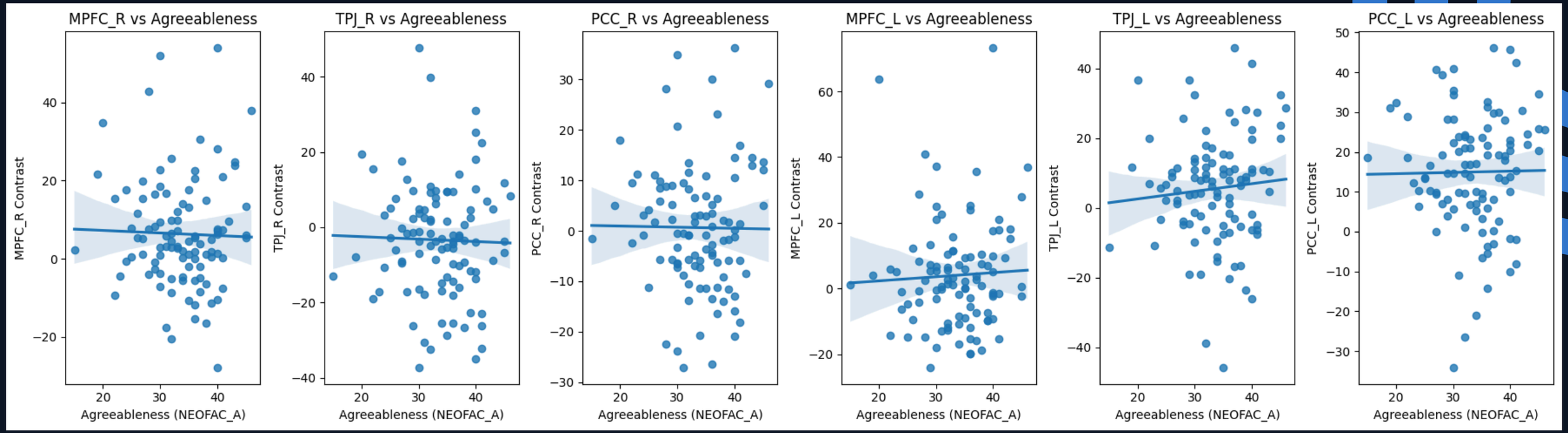
General Linear Model to test the relationship between personality scores and fMRI contrast

Also machine learning!!!

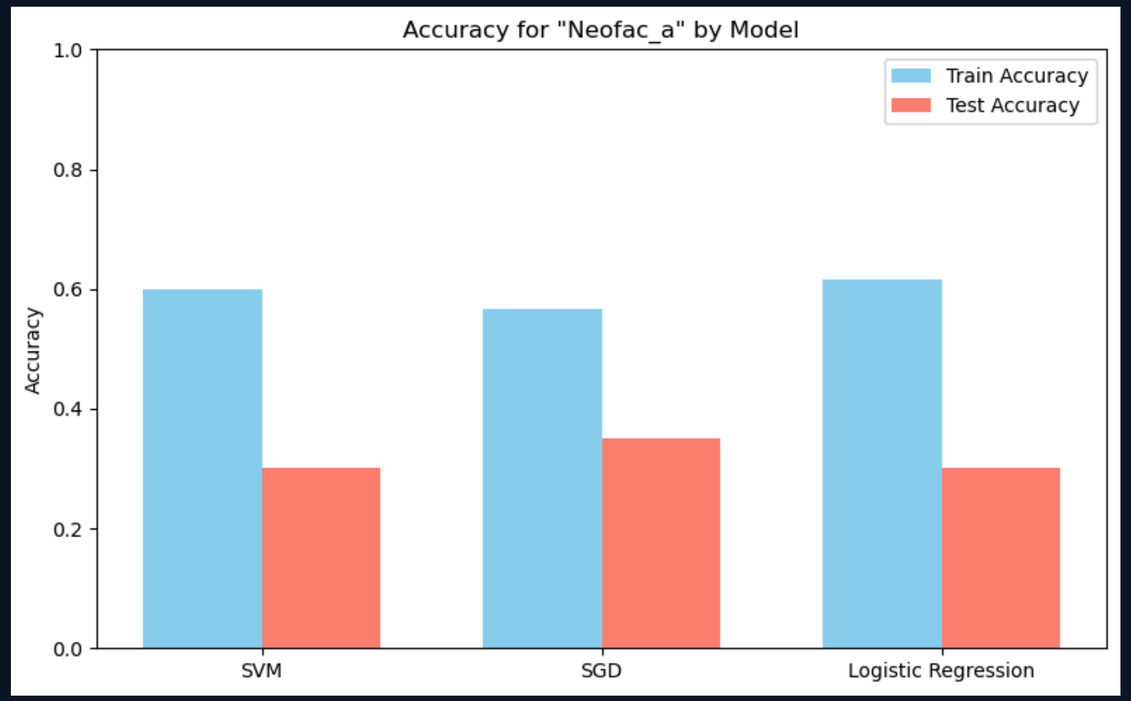
GLM RESULTS

No significant (p<0.05 Bonferroni-corrected) correlation between Agreebleness (and other traits) and Mental>Random fMRI contrast.

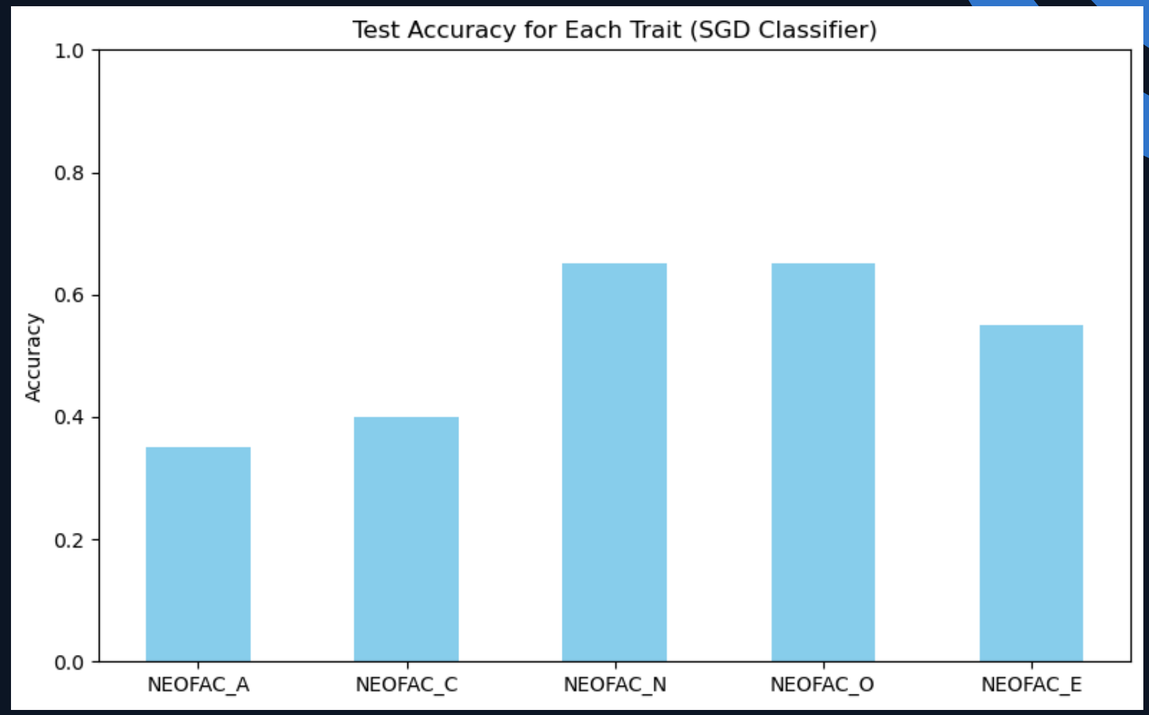
Confounds included: Age, Gender



MACHINE LEARNING RESULTS



<< The results of classification for agreeableness are very low



Promising results were seen only for Openness+ Neurotisim >>>

DISCUSSION

MAIN POINT 1

Agreeableness may not robustly modulate DMN activity during Theory of Mind tasks.

MAIN POINT 2

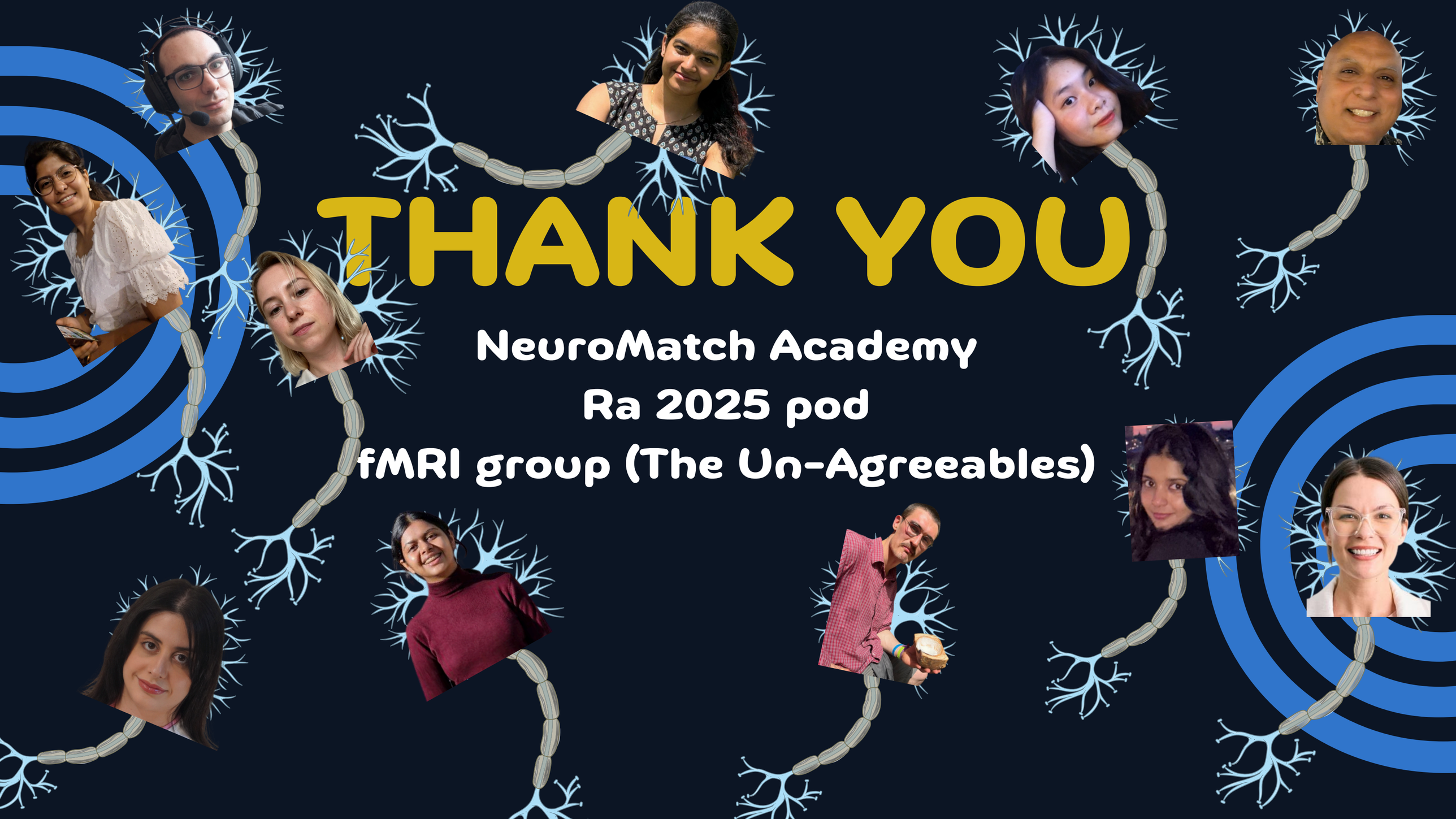
Our ML results were exploratory and informative.

CONCLUSION

Our findings did **not** support the hypothesis that higher Agreeableness scores are associated with increased DMN activation during Theory of Mind tasks. This suggests that Agreeableness alone may not be a reliable predictor of neural activity in these regions during Social Cognition.

LIMITATIONS

- Only 100 subjects (available: 1200)
- We don’t make use of functional connectivity nor resting-state data for DMN


THANK YOU
NeuroMatch Academy
Ra 2025 pod
fMRI group (The Un-Agreeables)

Raichle ME, MacLeod AM, Snyder AZ, Powers WJ, Gusnard DA, Shulman GL. A default mode of brain function. Proc Natl Acad Sci U S A. 2001;98(2):676-682.

Saxe, R., & Kanwisher, N. (2003). People thinking about thinking people: The role of the temporo-parietal junction in “theory of mind.” NeuroImage, 19(4), 1835–1842.

Li, W., Mai, X., & Liu, C. (2014). The default mode network and social understanding of others: what do brain connectivity studies tell us. Frontiers in human neuroscience, 8, 52017

Toschi, N., Riccelli, R., Indovina, I., Terracciano, A., & Passamonti, L. (2018). Functional Connectome of the Five-Factor Model of Personality. Personality Neuroscience, 1, e2.

Glasser MF, Coalson TS, Robinson EC, et al. A multi-modal parcellation of human cerebral cortex. Nature. 2016;536(7615):171-178. doi:10.1038/nature18933