

Investigating the neural development of social scene perception in young children using naturalistic stimuli

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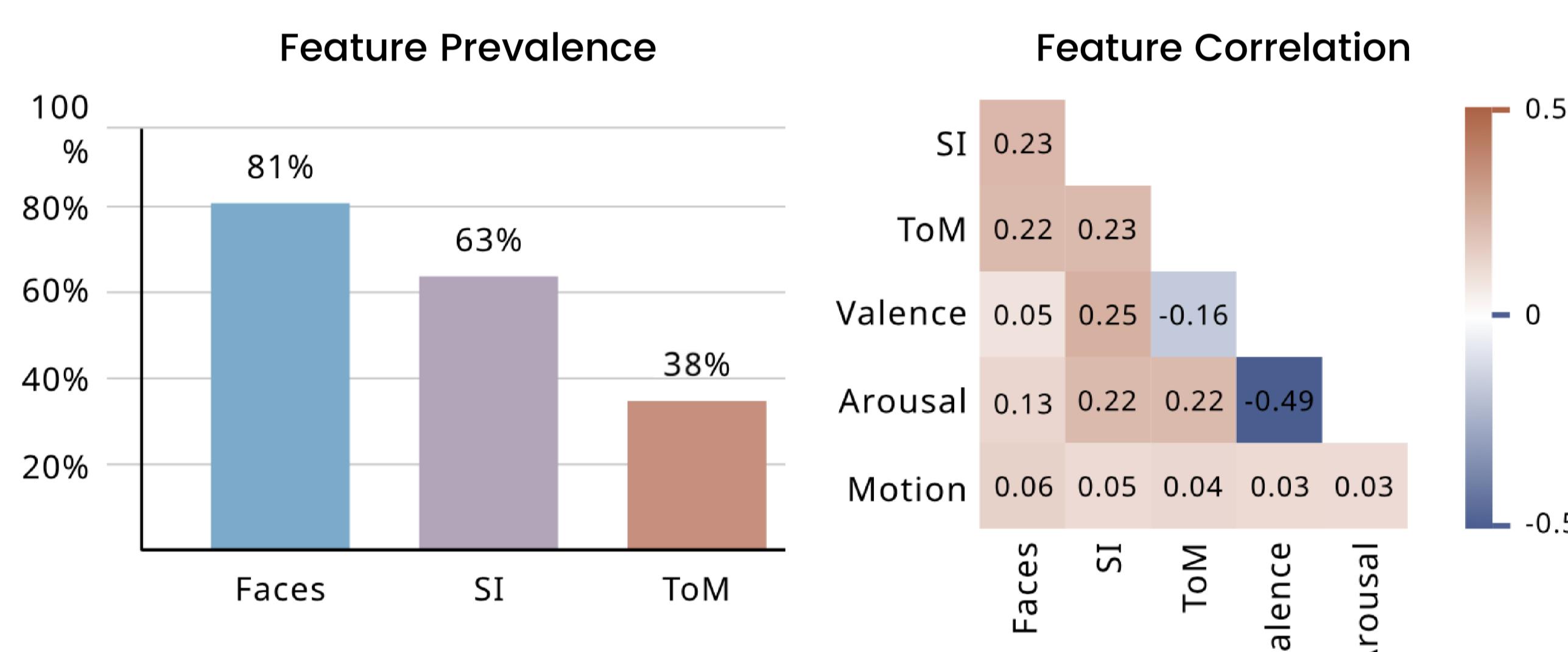
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Introduction

- The neural development of children's social perception is not thoroughly understood, due to the challenges of acquiring child neuroimaging data.
- We use fMRI movie data to study social visual brain responses in children as young as three.
- We label **social** and **motion** features and apply an encoding model to link movie content to neural activity.

Data Collection

3-4 yrs (n=31), 5-yrs (n=34), 7-yrs (n=23), 8-12-yrs (n=34) and Adult (n=33) participants watched a Pixar short film "Partly Cloudy" while undergoing fMRI scan from Richardson et al. 2018

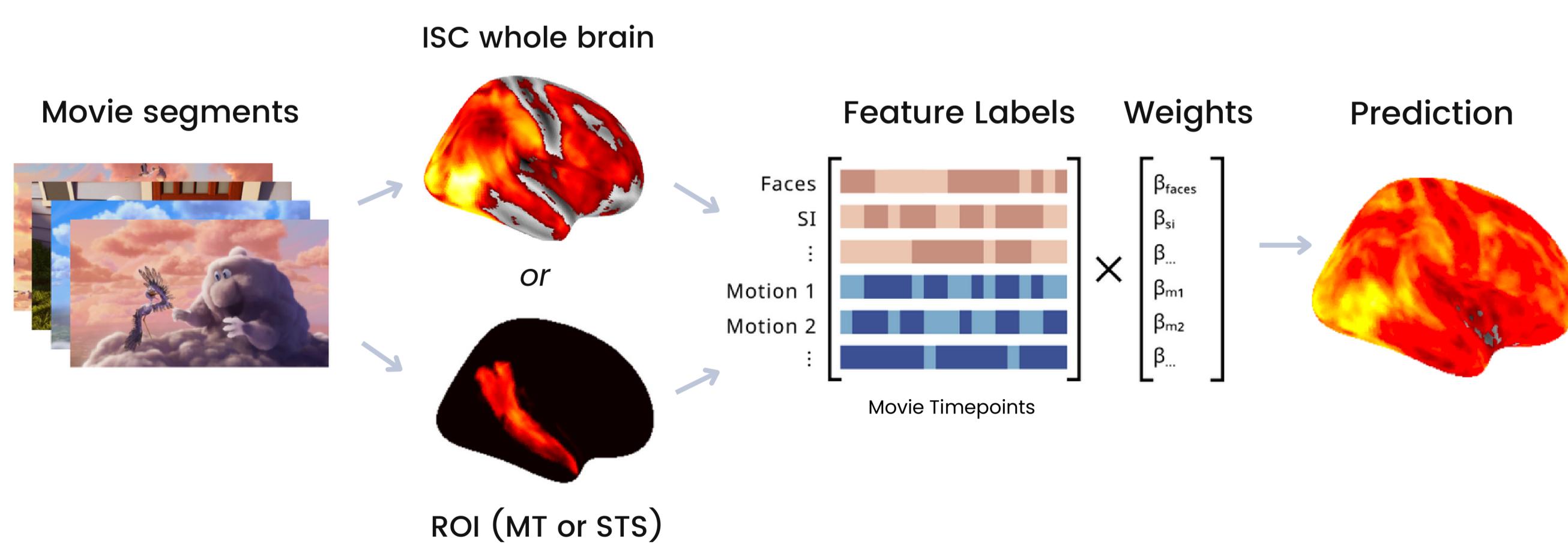


Feature Labeling

Social Model Features: faces, social interaction (SI), theory of mind, valence, arousal (labeled by 3 human raters)

Motion Model Feature: motion energy (extracted from each TR using Pymoten)

Voxelwise Encoding Model

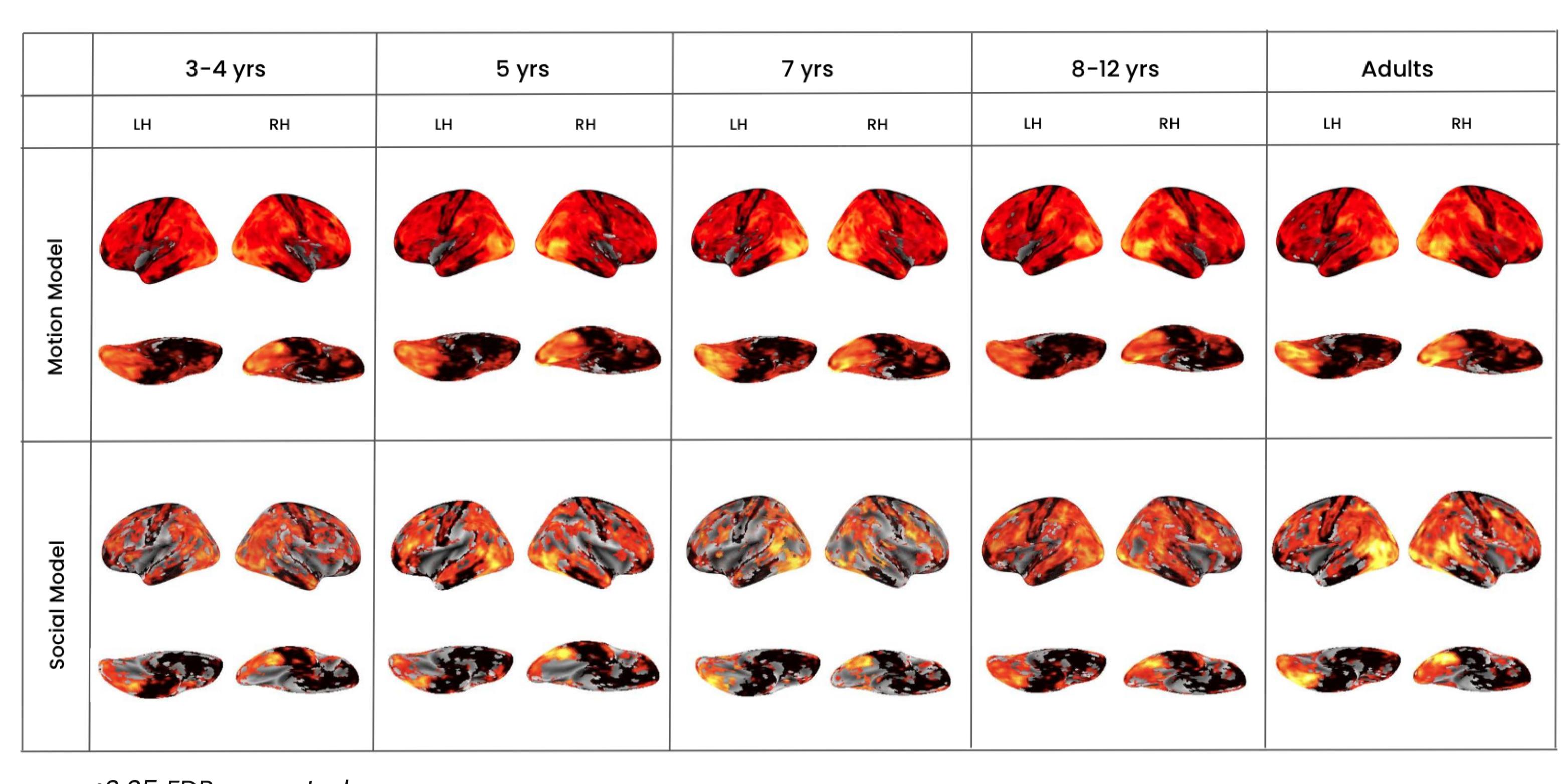


Conclusions

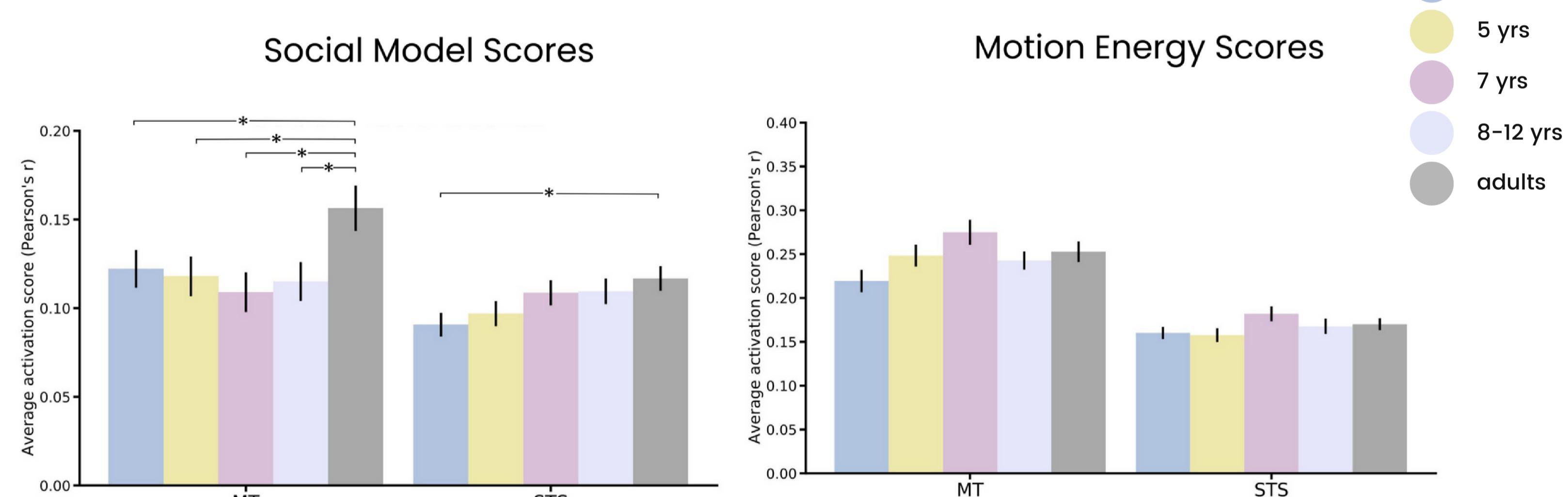
- An encoding model trained on social and motion features of the movie can predict neural activity in children as young as 3-years-old.
- ROI analyses reveal social interaction recognition is a relatively early developing ability, compared to theory of mind
- First time linking social/visual content to brain activity in a natural movie, and first demonstration of neural responses to individual movie features in children

Results

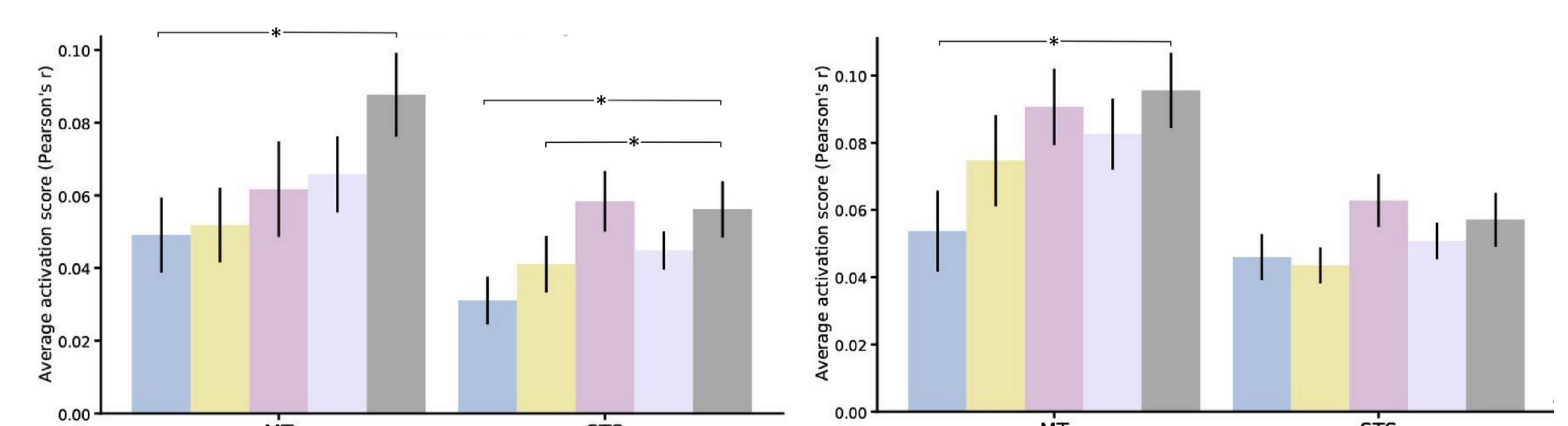
Whole Brain Prediction



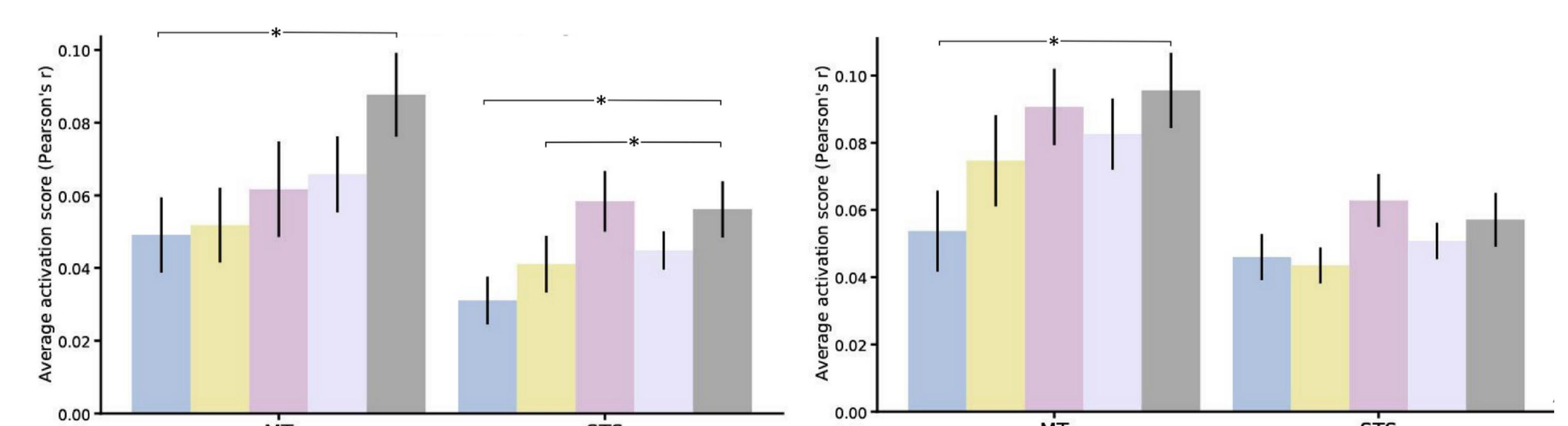
Prediction by ROI



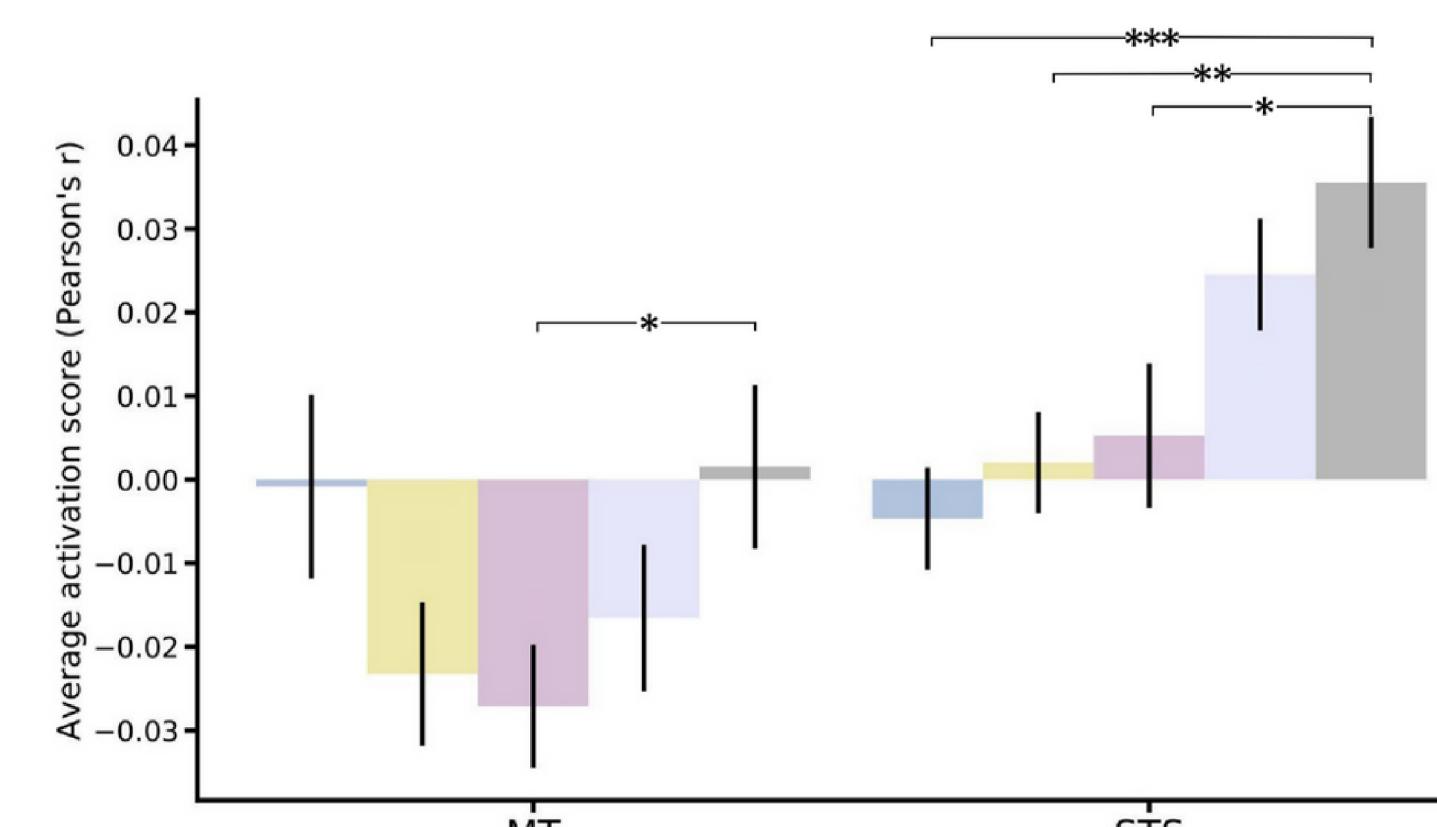
Faces Scores Only



Social Interaction Scores Only



ToM Scores Only



Social interaction features are similarly predictive in STS in all age groups, unlike ToM features which continue developing through adulthood

References

Nunez-Elizalde et al. (2018). NeuroImage.
Lee Masson & Isik (2017). NeuroImage
Richardson et al. (2018). Nature Communications