Hierarchical representations of naturalistic social interactions in the lateral visual pathway

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Motivation

- Recent work has found that social interactions are represented in the posterior superior temporal sulcus (pSTS) [1, 2, 5]
- Recently Pitcher & Ungerleider[4] theorized that there is a lateral visual pathway specialized for social processing
- We aimed to determine whether the features of social interactions are hierarchically organized in the lateral pathway

Conclusions

- We present a novel, high-quality, condition-rich, social fMRI dataset that will soon be publicly available
- Communicative actions are represented more anteriorly in the STS than social primitives like agent distance. Thus, we find evidence that social features are organized hierarchically along the lateral surface
- What is represented in the pSTS face region has been an open question. We find that communicative actions are represented there after controlling for other sources of variance

Acknowledgements

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References

1. Isik et al (2017) *PNAS*
2. Lee Masson & Isik (2021) *NeuroImage*
3. Monfort et al (2019) *IEEE PAMI*
4. Pitcher & Ungerleider (2020) *TiCS*
5. Walbrin & Koldewyn (2019) *NeuroImage*

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Naturalistic social dataset

fMRI methods

- 4 participants participated in a condition-rich fMRI experiment: four 2-hour scanning sessions
- Each participant had functional localizers for motion, faces, places, objects, social interactions, biological motion, and theory of mind
- Stimulus set was divided into 200 training videos repeated 9 (n = 1) or 10 times (n = 3) and 50 validation videos repeated 18 (n = 1) or 20 times (n = 3)

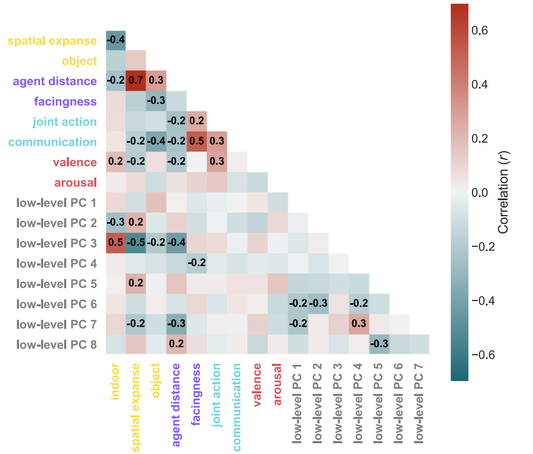
250 3-second, dyadic naturalistic videos curated from Moments in Time[3]

SCENE & OBJECT FEATURES
Indoor
Expanse
Object directedness

SOCIAL FEATURES
Joint action
Communication

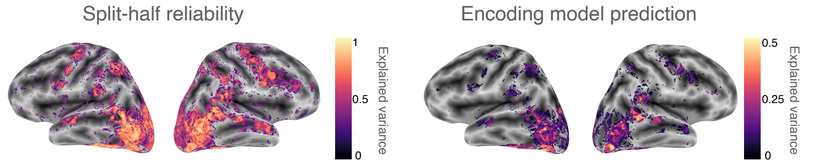
SOCIAL PRIMITIVES
Agent distance
Facingness

AFFECTIVE FEATURES
Valence
Arousal

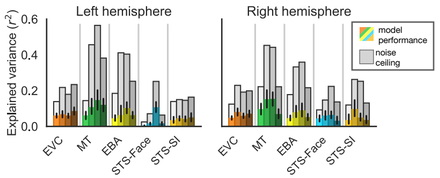


Encoding model results

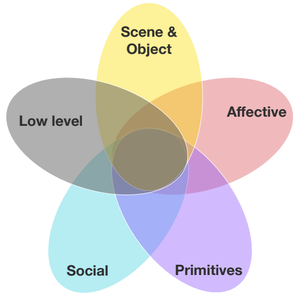
Evaluating data and model quality in a representative subject

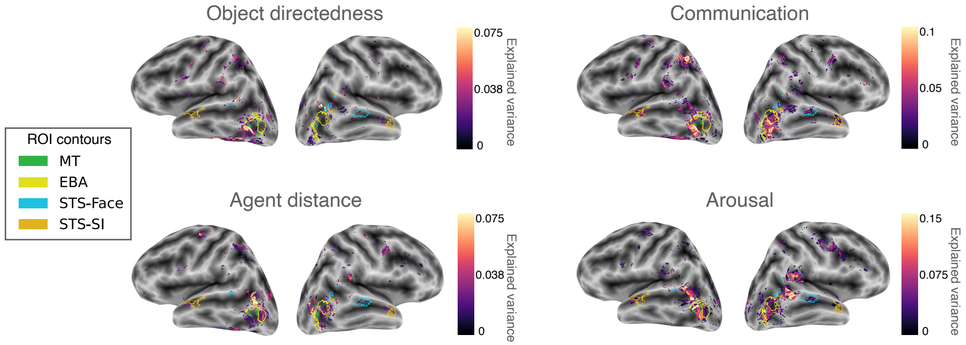


Model performance for each subject



Unique variance explained by select features in a representative subject





Unique variance explained by each feature in select ROIs in each of the four subjects