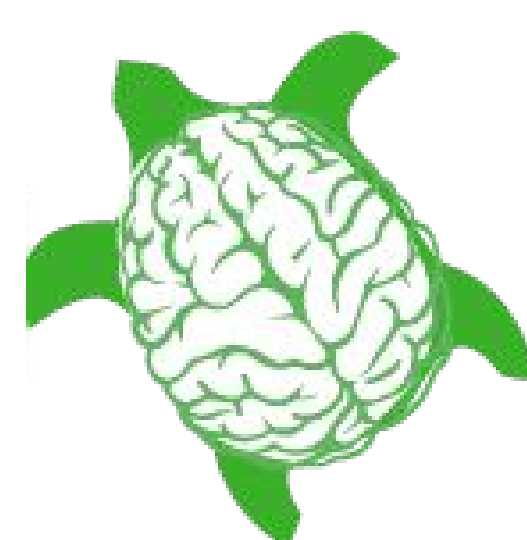


Decoding Emotions:

Using MVPA to explore neural overlap in emotion experience and understanding



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Introduction & hypotheses

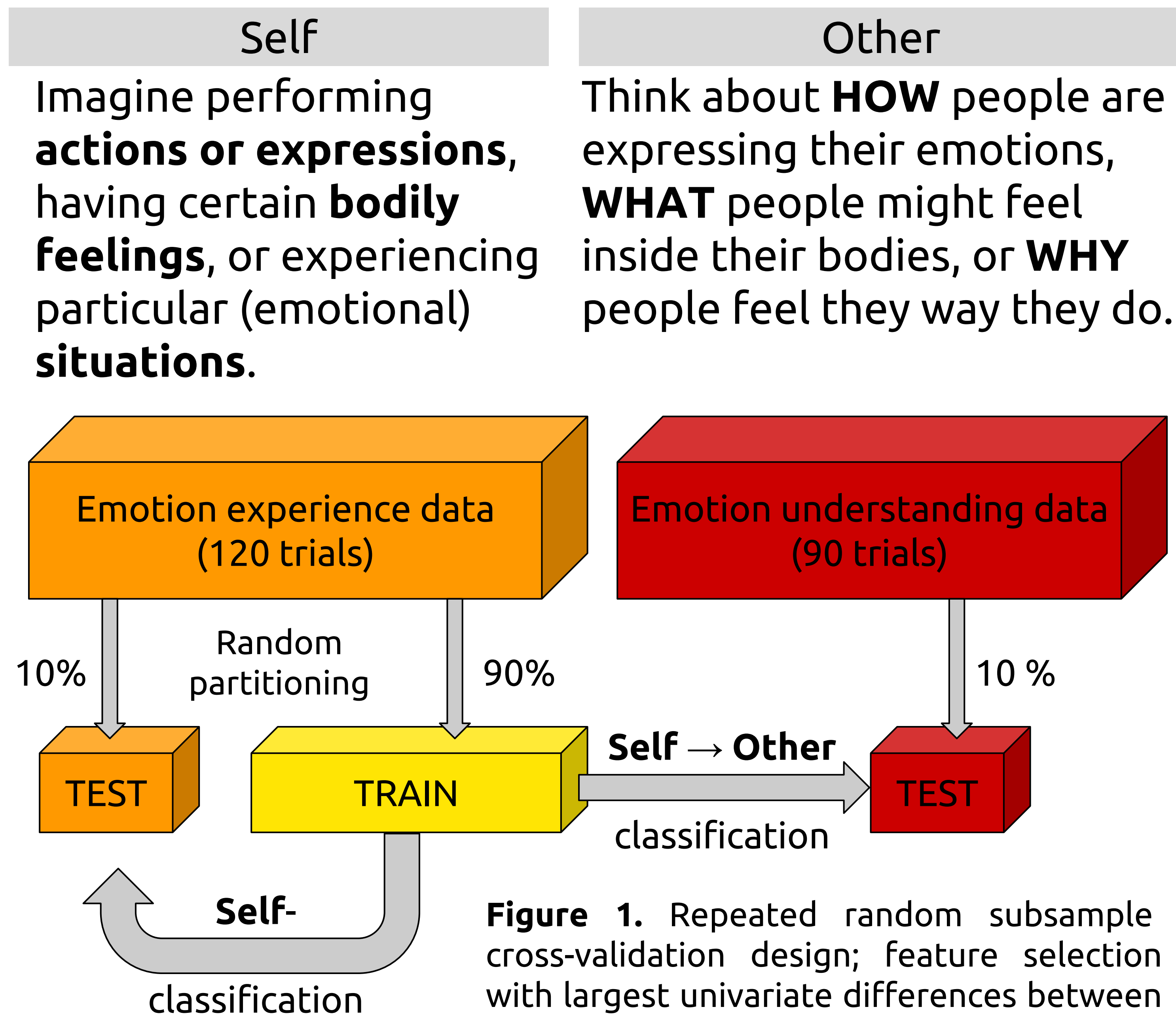
Emotions are constructed when **sensorimotor** and **interoceptive signals** are integrated with **situationally-relevant concepts** and experience -- a process called situated conceptualization (1,2).

We argue that the same constructive process underlies perception and understanding emotional states in others (3). In this project we ask whether these processes capitalize on the same brain networks.

Using Multivariate Pattern Analysis (MVPA) on fMRI data, we hypothesized that:

- 1: We can decode the neural representation of self-imagined emotional **actions, interoceptive sensations** and **situations**.
- 2: Using the neural representations from the **self**-task, we can decode how people understand the emotions of **others**.

Methodology



Results

Classification results

- **Self-classification: 61%**

Predicted class	Situation	0.178	0.126	0.696
	Interoception	0.246	0.606	0.148
	Action	0.554	0.281	0.166
		Action	Interoception	Situation

- **Self → Other: 40 %**

Predicted class	Situation	0.232	0.303	0.465
	Interoception	0.386	0.387	0.227
	Action	0.433	0.35	0.217
		Action	Interoception	Situation

Actual class

> chance*
n.s.
< chance*

Figure 2. Confusion matrices with Positive Predictive Values; * Significance at $\alpha = 0.05$, using permutation-statistics. Note that *chance level* is 33%.

Back-projection of accurately classifying voxels

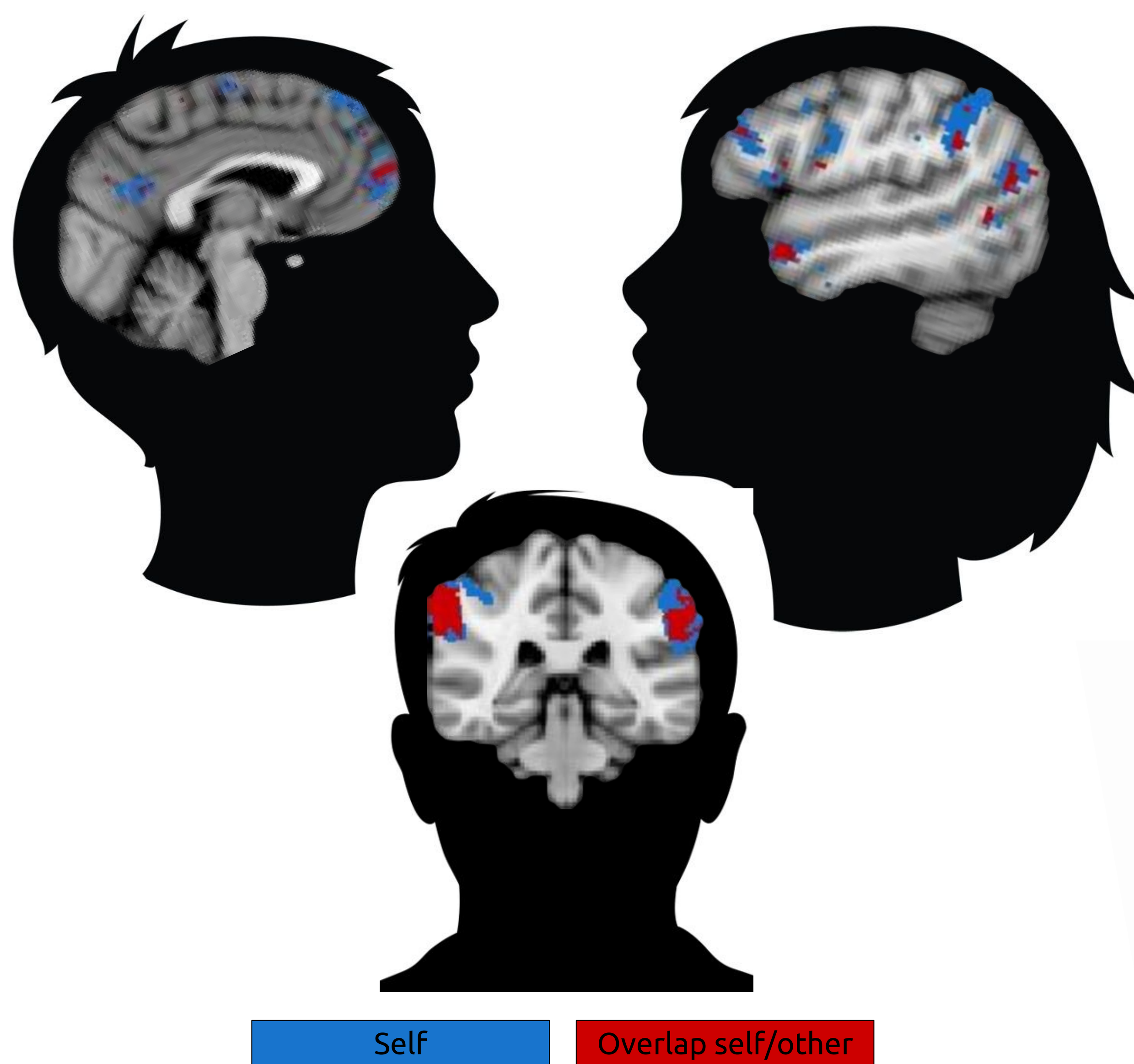


Figure 3. Spatial representation of accurately classifying voxels (>40% correct across iterations) for the *self* and *self → other* classification; on average, 22% of the voxels overlapped between the *self* and *self → other* analysis.

Spatial representations

- mPFC (mentalizing)
- pCC (mentalizing)
- TPJ (mentalizing)
- Precentral gyr. (MNS)
- Temporal pole (concepts)

Representational similarity

Self → Other Self

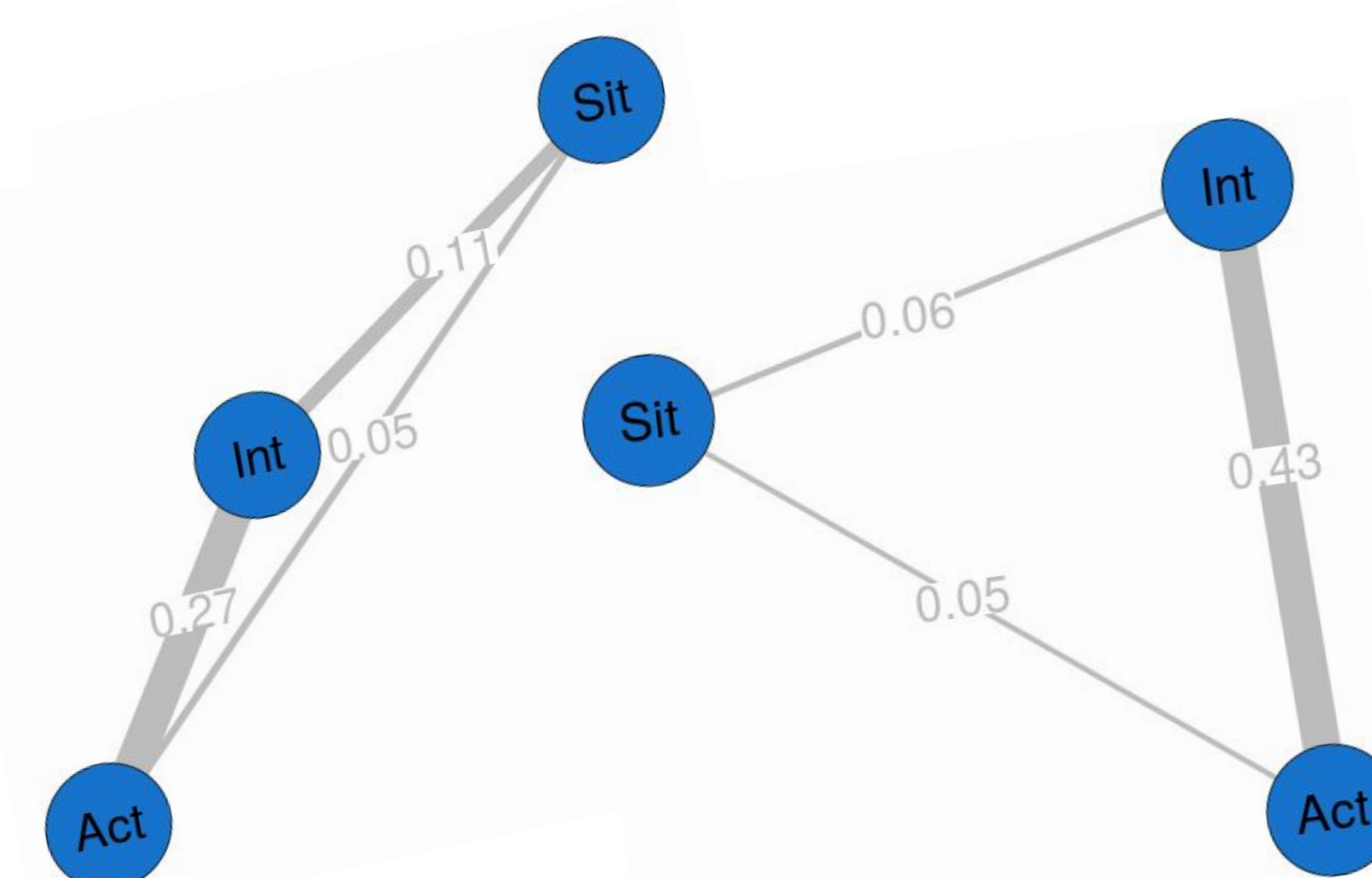


Figure 4. correlations between average patterns of classes, composed of the 100 best-classifying voxels of each class, in a force-directed graph.

Discussion

- Significant classification from self to other suggests that emotion experience (self) and understanding (other) are represented in common networks;
- No neural overlap between self-focused and other-focused interoceptive information processing

Conclusion

This study shows that emotion experience and understanding are mediated by the same global networks involving parts of the sensorimotor and mentalizing network.

References

1. Barrett, L. (2006). *Pers Soc Psychol Rev*, 10, 20-46;
2. Barsalou, L. (2009). *Phil. Trans. R. Soc. B*, 364, 1281-1289.
3. Oosterwijk, S., & Barret, L. (2014). *Routledge Handbook of Embodied Cognition*, Routledge: Oxford.