

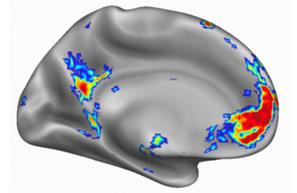


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# Interpersonal Similarity Predicts Shared Neural Representation of Others within Social Groups

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## INTRODUCTION

A history of classic research in social psychology has demonstrated that human social groups are highly homophilous- people tend to associate with others similar to themselves. More recently, researchers showed that the brain shows similar effects of homophily, with close individuals showing greater neural response similarity to naturalistic stimuli than unfamiliar individuals (Parkinson et al., 2018).

It is an open question, however, whether a similar degree of neural homophily exists when close individuals think of other specific members of their social group. The current study investigated this question by recruiting multiple social network groups that consisted of several close-knit individuals. This question was investigated by using a round-robin design in which each participant was both the perceiver and a target for every other participant in the study.

## HYPOTHESIS

Does the similarity between neural representations relate to subjective reports of similarity?

Does the degree to which two subjects agree on how similar a target is to them relate to how similar their neural representations of that target are?

## METHODS

### Subjects

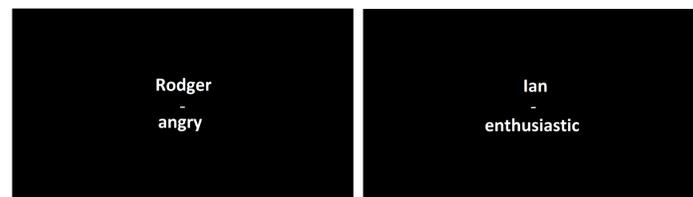
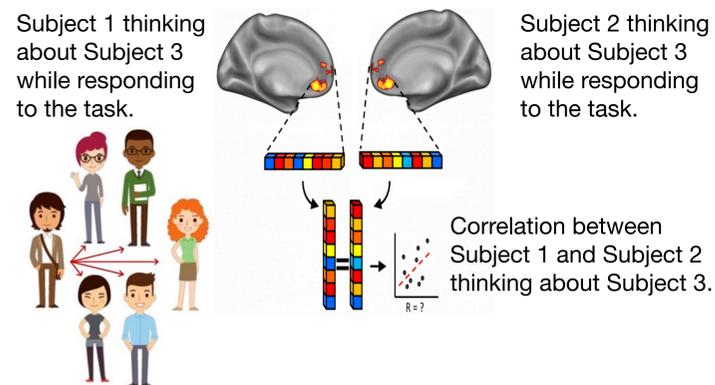
- One hundred and fourteen right-handed subjects (44 female) recruited from multiple close-knit groups within a variety of settings.
- Participants were composed within 20 groups, with 5-6 people per group.
- Compensation consisted of 10 dollars for the behavioral session and 30 dollars for the fMRI session.

### Behavioral Ratings

- Subjects completed a battery personality inventories including measures of Big 5, stereotype content model, and interpersonal attitudes for both themselves and all other people in their social network outside of the scanner.

### fMRI Tasks

- Five runs of a round-robin self/other trait judgment task.
- Yes/no responses to trait words associated with a target.



Subject X rating Subject Y (Rodger) on whether the trait word describes the target via a yes/no response.

Subject X rating Subject Z (Ian) on whether the trait word describes the target via a yes/no response.

## RESULTS

### Similarity between participants in neural representations of the same target.

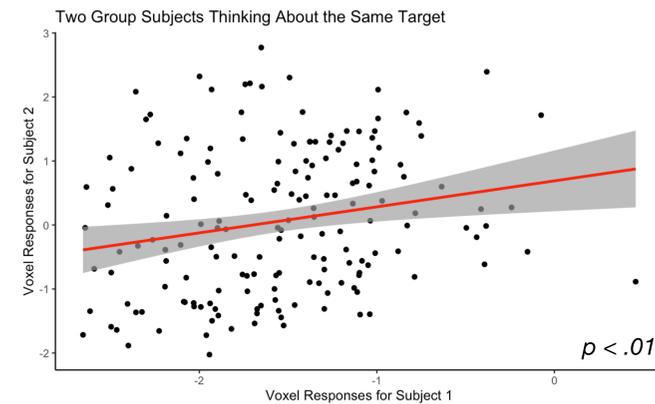


Figure 1. Brain activity of two subjects thinking about the same target within the same social network. The figure illustrates a positive relationship of two subjects thinking about the same target,  $r(170) = 0.21$ ,  $p = .00588$ . This highlights that brain activity in two separate people is similar.

### Neural similarity vs. convergence of behavioral similarity ratings.

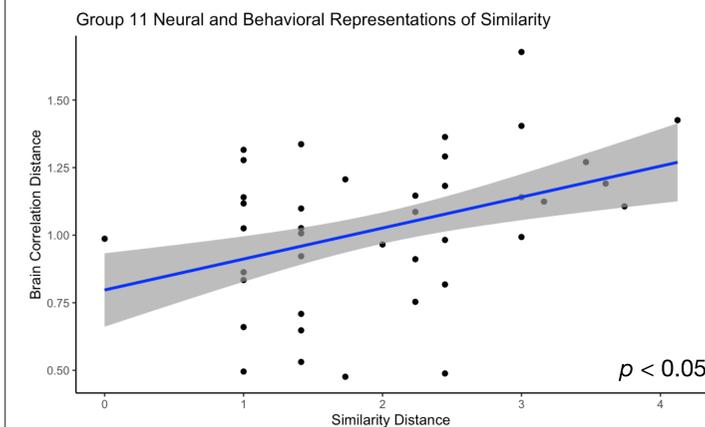


Figure 2. Neural correlation distance is correlated with behavioral ratings of similarity. Larger values indicate a lower similarity rating in brain representation (y-axis) and larger disparity in the ratings of the target (x-axis). The figure illustrates that as subjects agree on rating a subject more similarly, their neural representations of a target are more similar,  $F(1, 1028) = 4.74$ ,  $p = 0.02968$ .

## CONCLUSIONS

Our results indicate that the degree to which two people agree how similar a target is to them may correlate to their neural representations within the medial pre-frontal cortex when thinking about that target.

While the causal effects of the relationship are uncertain, it can be clearly stated that a relationship between our group perception of others and the nature of our relationships within the group exists.

These results provide further context as to the role of the medial pre-frontal cortex and the task it holds in processing our representations of other people.

### References

- Parkinson, C., Kleinbaum, A. M., & Wheatley, T. (2018). Similar neural responses predict friendship. *Nature communications*, 9(1), 1-14.
- Chavez, R. S., & Wagner, D. D. (2019). The neural representation of self is recapitulated in the brains of friends: A round-robin fMRI study. *Journal of personality and social psychology*.