The Representational Structure of Social Relationship Knowledge

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Introduction

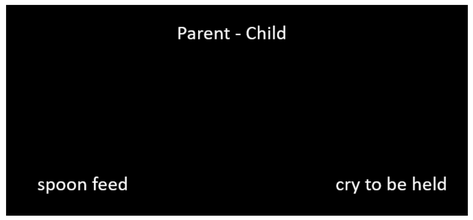
The ability to track the relationships between individuals has allowed humans to live in and benefit from large social groups (Dunbar & Shultz, 2007). Previous work has shown that knowledge about social relationships is multi-dimensional in nature (Wish et. al, 1976; Foa & Foa 2012; Fiske, 1992). *It is unclear which of the numerous dimensions from the literature are most important.*

Aims: To study whether knowledge about social relationships can be captured by principal components, and whether these components are represented in the brain

Methods

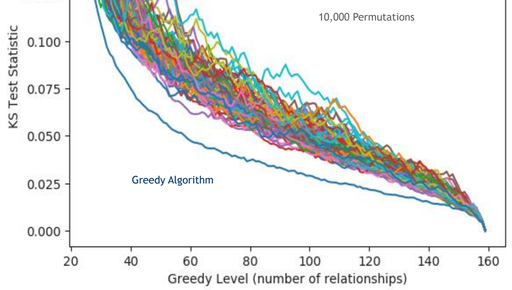
- Behavior: 817 Mturkers rated 159 social relationships on 30 dimensions
- fMRI: 21 diverse young adults

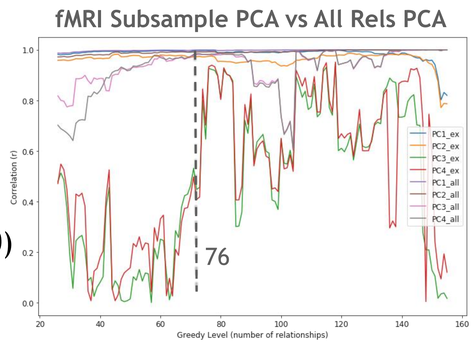
fMRI Task



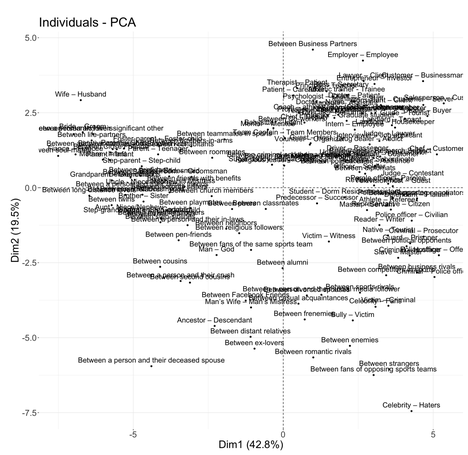
Analyses

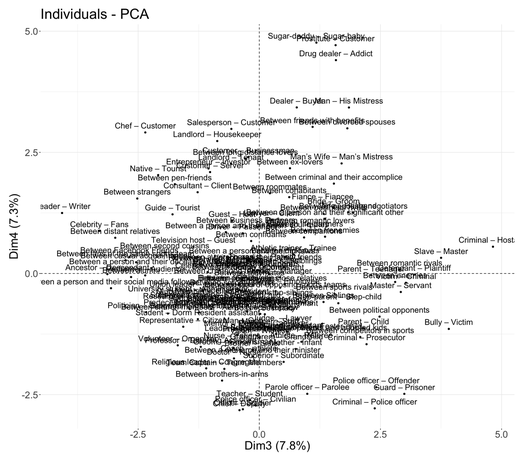
- Principal Component Analysis (PCA)
- Reliability analysis (Tarhan & Konkle, 2020)
- Representational similarity analysis (RSA) (Kriegeskorte et al., 2008)



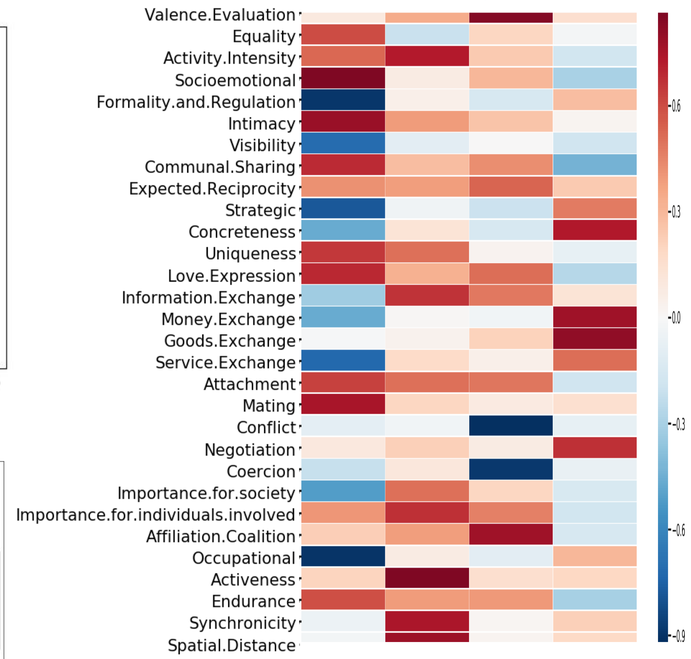


PCA: Relationship-Space



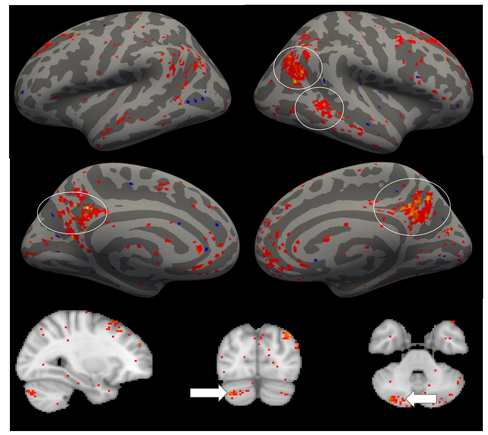


PCA Loadings



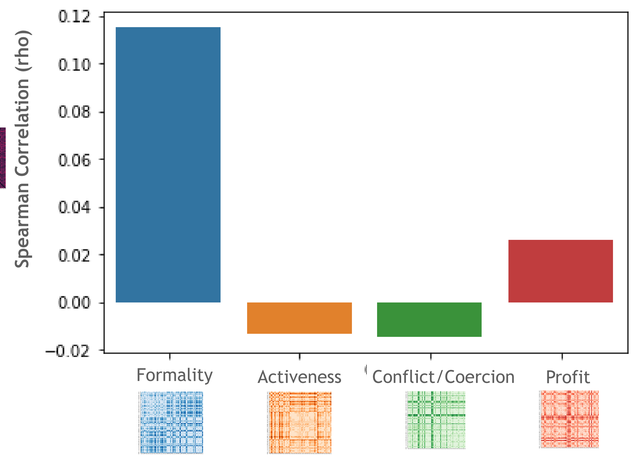
Findings: First 4 components (Formality, Activeness, Conflict/Coercion, and Profit) account for 75% of variance

Neural Reliability Map: Regions of the brain that were reliably activated during the fMRI task



Findings: The"social brain" network were reliably activated, including the TPJ, PCC, vmPFC, MTG (circled) cerebellum (arrows)

RSA: Compare neural RDM to theoretical RDMs



Findings: Neural representations were significantly, but weakly related to categorical and dimensional representations

Conclusion: Behaviorally, social relationships can be represented as four components. RSA shows that only the first component, Formality, is represented in regions of the social network including the TPJ, PCC, vmPFC, MTG, and portions of the cerebellum.