Conversational Linguistic Features That Inform Social Network Learning

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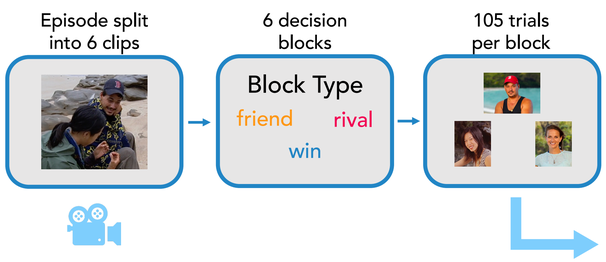
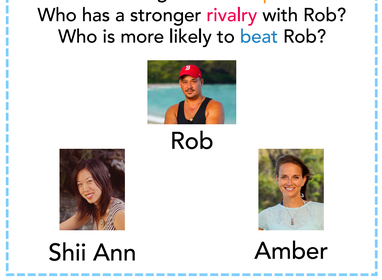
Introduction

- We know that social networks exist[1], but we don't fully understand how people learn about these networks. People use social features like club membership and shared hobbies[2], as well as traits[3], to make inferences about a social network, but it is still unclear how communication between members contributes to passive learning about these social networks.
- Dialogue contains a wealth of information that can reveal the social structure between speakers. We can leverage tools like **natural language processing**[4,5,6,7] to quantitatively represent this information and show how people differentially use linguistic elements to make inferences and decisions about social networks.

Method

Behavioral Task *n = 57*





Natural Language Processing on Transcribed Dialogue

similarity — Dimensional analysis measurement of correlation between two speakers' dialogue
One score calculated per speaker – recipient pair

sentiment — Assessment of positive and negative emotional tone in dialogue
One score calculated per sentence

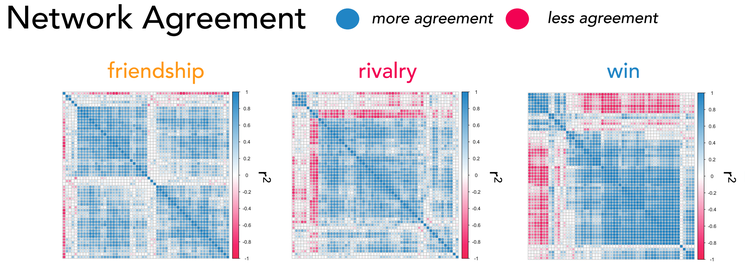
confidence — Assessment of high and low self-assurance in dialogue
One score calculated per sentence

Speaker	Recipient	Dialogue	Similarity	Sentiment	Confidence
Shii Ann	Rob	*If you make it to the final two, I'd be shocked.*	0.1607	-0.1508	50
Rob	Shii Ann	*I know.*	0.1607	0	1
Shii Ann	Rob	*With your strategy, current strategy.*	0.1607	0	99
Shii Ann	Rob	*And I hope you do well, but, you know.*	0.1607	0.4333	98.62
Shii Ann	Rob	*I'm wishing myself luck in the next immunity challenge.*	0.1607	0.4333	1.38

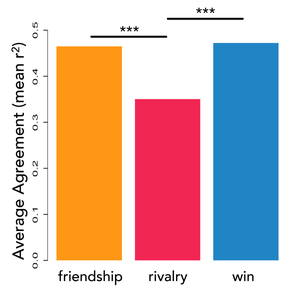
Similarity scores calculated using the Universal Sentence Encoder[6], sentiment scores calculated using SentimentR package[5], and confidence scores calculated using LIWC software[7].

Results

Network Agreement



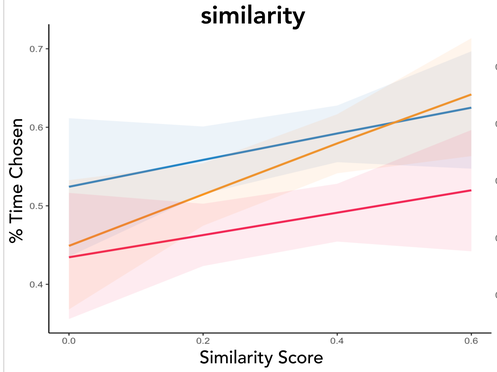
Participants showed high levels of network agreement for all relationship choices



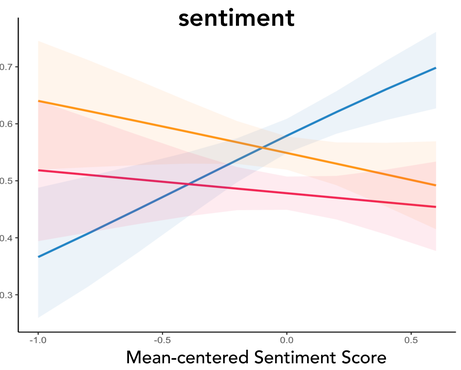
Participants showed significantly higher average agreement for both friendship and winning decisions than for rivalry decisions (*ps* < .001)

Linguistic Features Inform Social Network Decisions

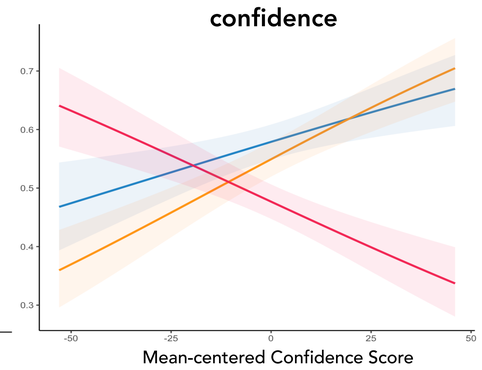
friendship | rivalry | win



As dialogue **similarity increases** between two contestants, participants are more likely to decide those contestants are friends and less likely to decide they are rivals.



As **sentiment becomes more positive**, participants are less likely to decide that contestants are friends and less likely to decide they are rivals.



As **confidence increases**, participants are more likely to decide that contestants are friends and less likely to decide they are rivals.

Summary

- Overall, participants showed high agreement about friendships, rivalries, and likelihood of winning within the social network
- Participants were more likely to infer friendship with greater similarity, more negative sentiment, and higher confidence
- Meanwhile, participants were more likely to infer rivalry with reduced similarity, more negative sentiment, and lower confidence

Future Directions

- Repeat the behavioral task while participants undergo fMRI to investigate the neural basis of social network learning. We expect to see interactions between social areas (dorsomedial PFC, precuneus) and memory regions (hippocampus, amygdala, perirhinal cortex) during social network learning.
- Repeat natural language processing analyses on dialogue from all episodes in the season that preceded this current episode to assess if language predicts social relationship changes over time.

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