Neural detection of socially valued community members

Yuan Chang Leong
Stanford University

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Social decision-making as value-based decision-making
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Trust Game
(Phan et al., 2010)

Prisoner’s Dilemma Game
(Rilling et al., 2002)

Stag Hunt Game
(Yoshida et al., 2010)

Ultimatum Game
(Sanfey et al., 2003)
Social decision-making as value-based decision-making

Trust Game
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Prisoner’s Dilemma Game
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Stag Hunt Game
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Ultimatum Game
(Sanfey et al., 2003)
Social value “in the wild”

- Real-world social relationships

"I know exactly how you feel."
Social value “in the wild”

- Real-world social relationships
- Social networks
- Reflexive computation of social value
- Valuation based on what others value
Measuring social value

Nomination Question

1. Who are your closest friends?
2. Whom do you spend the most time with?
3. Whom have you asked for advice?
4. Who do you turn to when something bad happens?
5. Whom do you share good news with?
6. Who makes you feel supported and cared for?
7. Who is the most empathetic?
8. Who usually makes you feel positive?

* 97 undergraduate students from 2 freshman-only dorms
Identifying Hubs

Dorm A

Dorm B

Size of node = number of nominations received by an individual
50 of the participants (25 from each dorm) underwent fMRI scanning while passively viewing photographs of their dormmates.

- Viewed 30 of their dorm mates
- Each face was randomly presented twice
- 10 randomly-presented oddball trials w/button press
Predicting Social Value Hubs

1. Define ROI using Neurosynth
2. Extract brain activity from n – 1 participants
3. Train Regression Weights (LASSO-PCR)
4. Test weights on held-out participant

Repeat n times
Predicting Social Value Hubs

Define ROI using Neurosynth

Extract brain activity from n – 1 participants

Train Regression Weights (LASSO-PCR)

Test weights on held-out participant

Controlling for each participant’s own nominations and closeness ratings
Forced-Choice Accuracy

High Value > or < Low Value

High Value > or < Mid Value

Mid Value > or < Low Value
Predicted Results

Forced Choice Accuracy

Low vs. Mid
Mid vs. High
Low vs. High

50%
Predicted Results

Forced Choice Accuracy

- Low vs. Mid: 50%
- Mid vs. High: 50%
- Low vs. High: 100%
Predicted Results

Forced Choice Accuracy

- Low vs. Mid: 50%
- Mid vs. High: 50%
- Low vs. High: 50%
Prediction Results

Forced Choice Accuracy

- VMPFC
- Striatum
- MPFC
- PMC
- RTPJ
- TP
- V1
- FFA

Legend:
- Low vs. Mid
- Mid vs. High
- Low vs. High

Significance levels:
- *: p < 0.05
- **: p < 0.01
Prediction Results

**Average Activity**

Forced Choice Accuracy

- VMPFC
- Striatum
- MPFC
- PMC
- RTPJ
- TP
- V1
- FFA

Legend:
- Low vs. Mid
- Mid vs. High
- Low vs. High
Prediction Results

![Bar chart showing comparison between Average Activity and Multivariate Pattern with RMSE values for different brain regions: VMPFC, Striatum, MPFC, PMC, TPJ, TP, V1, FFA.](chart)

* and ** indicate statistical significance.
Summary

• Participants neurally tracked sociometric value during passive viewing of faces

• Sociometric value was associated with patterns of activity in value-encoding and mentalizing regions

• Sociometric properties can be predicted from the brain activity of single individuals
Next Steps

Does the representation of sociometric value affect social decisions, both in the real world and in economic games?
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