Network Acuity: Social Perceptions in a Small-World Experiment

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Problem and Research Questions

Some individuals are clearly better than others at perceiving social connections (who knows whom and who knows who knows whom).

These individuals with a high Network Acuity can help organizations like the US Army and NASA effectively and efficiently route or retrieve information.

Is the ability to perceive social connections an individual trait or is it a function of their position in the network?

If it is an individual trait, what could be possible predictors of a high Network Acuity?

Methodology

Web-based platform uses algorithms that requires participants to route messages to other participants at pre-specified degrees of separation in the network.

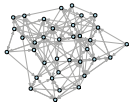
"Six Degrees of Separation"

We can use the platform to compute the Network Acuity of individuals

4 Number of games

36 Number of participants

329 Number of Messages



Network Graph for Game 1

Network Acuity

This is the ability of an individual to accurately perceive social connections (who knows whom). The measure below takes into account how the individual performed compared to the best possible performance and also takes into account how difficult it was to make the right choice. It averages this over all the messages relayed by the individual.

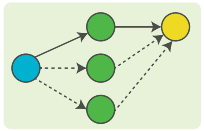
$$A_i = \frac{1}{|FS'(i)|} \sum_{(i,k)\in FS'(i)} \left[\left(1 - \frac{X - min(X)}{max(X) - min(X)}\right) \right]$$

1. Averages the trials and excludes deadends and ideal scenarios when all contacts are on the shortest path

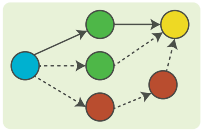
2. **Measure of performance** – how well did the participant perform compared to the best possible performance

3. **Measure of difficulty** – what's the difference between choosing the best possible path and the worst possible path

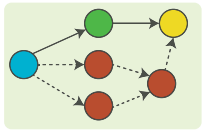
Example Scenarios



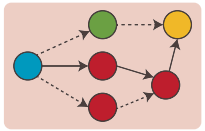
a: Exclude this trial



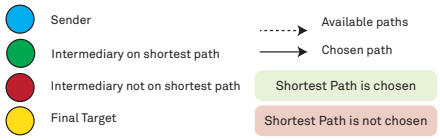
b: Medium acuity score



c: High acuity score



d: Very low score



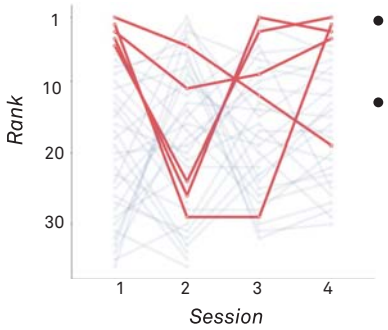
Key Takeaways

Network Acuity, or the ability to perceive social connections, is an individual trait.

Most significant predictor of a high Network Acuity is Openness (to new ideas and experiences) in first session, but is better predicted by Conscientiousness (carefulness or vigilance) in later sessions.

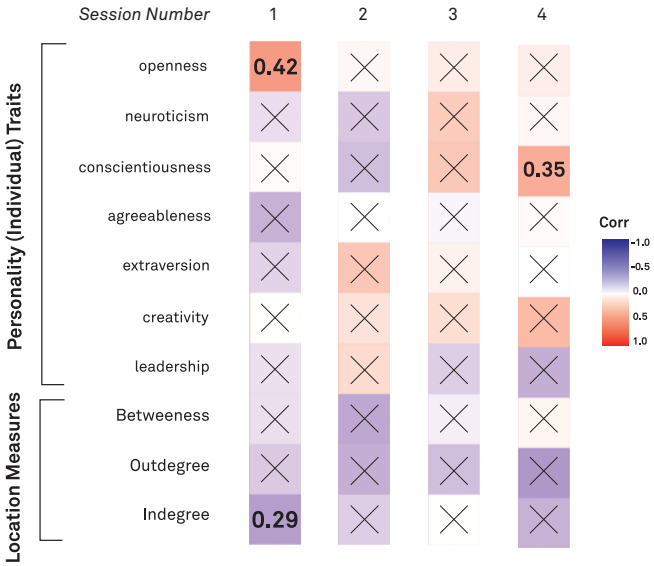
Results & Analysis

Change in the rank of participants with top 5 Network Acuity



- Rankings fluctuate across sessions.
- People who are good in the first session are different from those are better in later sessions.

Correlation of Individual and Location Measures with Network Acuity



Conclusion

Conscientiousness becomes more important as the individuals participate in more sessions. Part of this can be attributed to a learning curve.

Future Directions

- Future steps include validating and generalizing findings by analyzing more sessions with the same individuals.
- Futhermore, we need to continue to refine our Network Acuity measure including incorporating the strategy aspect of choosing direct contacts.

Acknowledgements

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