Bolts and Brains: Uncovering the Factors that Underlie the Perceived Social Intelligence Scales

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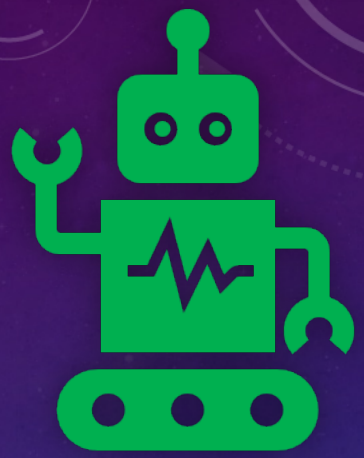
ROBOTS

INTRODUCTION

- Some robots are highly advanced, but their social intelligence is still quite low
- Research is needed to improve their social intelligence

THE PERCEIVED SOCIAL INTELLIGENCE SCALES

- The Perceived Social Intelligence (PSI) Scales (Barchard, Lapping-Carr, Westfall, Banisetty, & Feil-Seifer, 2018) were developed in order to measure humans' perception of social intelligence in robots.
- Individual Scales Vs. Factors
- 20 individual scales.
- Factors: narrower than the total of all scales and broader than the individual scales



OUR RESEARCH IDENTIFIES THE FACTORS THAT UNDERLIE THE PERCEIVED SOCIAL INTELLIGENCE SCALES.

PARTICIPANTS

- 296 Mturk Workers (150 males, 145 females, and 1 unidentified)
- Mean age of 37.4 (Ages 19 to 72 years old, *SD* = 11.5).
- Participants identified as White (80.4%), African American (7.1%), Asian (5.1%), Hispanic (4.1%), Other (3.0%), and Native American (0.3%).
- Completed a minimum of 500 tasks and had at least a 95% acceptance rate.

MEASURE: PERCEIVED SOCIAL INTELLIGENCE SCALES

Recognizes Human Cognitions
Predicts Human Cognitions
Adapts to Human Cognitions
Recognizes Human Emotions
Predicts Human Emotions
Adapts to Human Emotions
Recognizes Human Behaviors
Predicts Human Behaviors
Adapts to Human Behaviors

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Identifies Individuals
Identifies Social Groups

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Social Presentation
- Friendly
- Helpful
- Caring
- Trustworthy
- Rude
- Conceited
- Hostile

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Overall Social Intelligence

MEASURE: PERCEIVED SOCIAL INTELLIGENCE SCALES

- Each scale contains four items
- Rated using a five-point agreement scale.

  1 = *Strongly Disagree*

  2 = *Disagree*

  3 = *Neutral*

  4 = *Agree*

  5 = *Strongly Agree*

PROCEDURES

- One session (2hrs)
  - Five videos (1-3 mins) in which a robot interacted with people

NAO

- Caught shoplifting batteries = sentenced to community service
- Later steals the batteries out his friends' bike

PR2

- PR2 and two different people stack blocks in specific patterns.
- Adjusting its behavior based upon unexpected human behaviors

ROBOVIE

- Robovie is giving a women a tour around a research lab
- It then asks the women to lie about seeing the aquarium
- Doesn’t like being around the aquarium.
- The women agrees and lies to robot's supervisor

DRAGONBOT

- Takes turns telling stories with children and creating visual depictions of the stories on an iPad.

ROBOTIC OTTOMAN

- It moved around the room, apparently by itself.
- Encouraged people to put their feet up and cues them that it wants to leave

PROCEDURES

- Participants rated that robot on the 20 scales
- Participants debriefed and compensated $15

DATA ANALYSIS

- Number and nature of factors underlying PSI Scales
- Principal components analysis with multiple factors.
- We used four criteria to determine the number of factors:
    - Kaiser-Guttman rule
    - Scree test
    - Parallel analysis
    - Minimum average partial test

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    - Parallel analysis 3
    - Minimum average partial test 4
- There are three factors

Results

THREE FACTORS UNDERLIE THE PSI SCALES

THOUGHTS AND FEELINGS

- Recognizes Human Cognitions
- Predicts Human Cognitions
- Adapts to Human Cognitions
- Recognizes Human Emotions
- Predicts Human Emotions
- Adapts to Human Emotions
- Predicts Human Behaviors
- Identifies Individuals
- Identifies Social Groups
- Socially Competent
- Friendly
- Caring

*We interpret this as the robot's apparent ability to understand people's minds.

BENEVOLENCE

Positive coefficients:	Negative coefficients:
• Friendly	• Rude
• Helpful	• Conceited
• Caring	• Hostile
• Trustworthy	

*We interpret this as the robot's apparent ability to be a desirable social partner

BEHAVIOR

- Recognizes Human Behaviors
- Predicts Human Behaviors
- Adapts to Human Behaviors
- Identifies Humans
- Helpful

*We interpret this as the robot's apparent ability to coordinate its behaviors with humans in a helpful manner

DISCUSSION

- Previously examine the total of all scales or on individual scales
- Now, examine the effect of robotic changes on factor scores
- Future research should examine how these three factors are outwardly exhibited in robots.
- We hope these factors will allow roboticists to design more socially intelligence robots, which leads to better human-robot interactions

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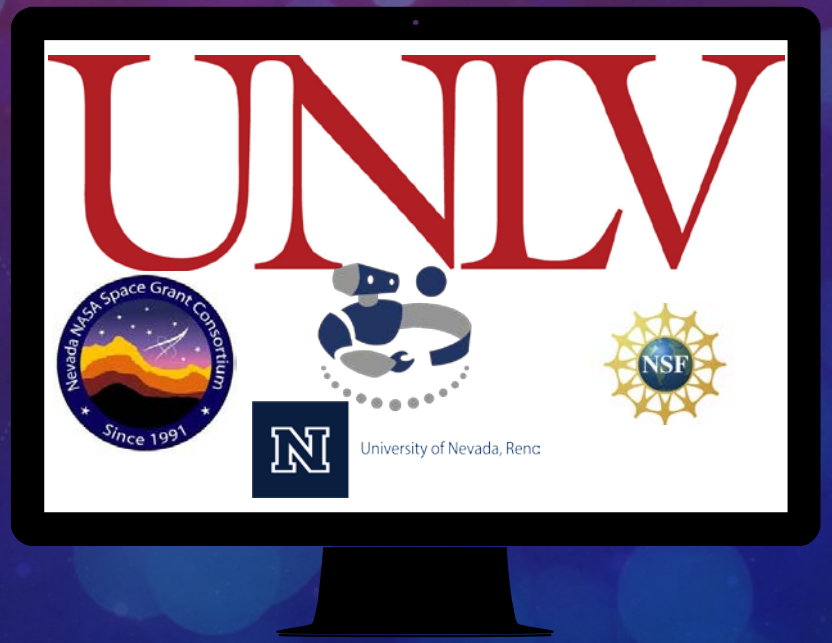

HOW TO GET THE PSI SCALES

https://ipip.ori.org/newMultipleconstructs.htm

Thank You!

Questions?