Cultivating Psychological Safety in Human-Robot Teams with Social Robots

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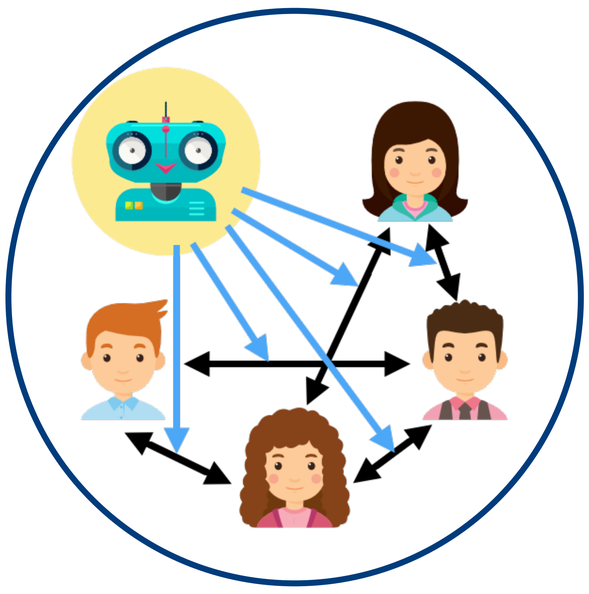
YALE ROBOTICS



Psychological Safety in Human-Robot Teams

- Research in organizational behavior has shown the key components correlated with a group's collective intelligence are predominately **interpersonal skills** like social sensitivity and the distribution of turn taking among group members [9].
- Amy Edmonson has defined **psychological safety** as "a shared belief held by members of a team that the team is safe for interpersonal risk taking" [5].
- Psychological safety has been shown to **predict team performance** when mediated by team learning behavior (e.g. seeking feedback, discussing errors, and learning from mistakes) [5].
- We hypothesize that psychological safety is 'contagious' from one group member to other group members, similar to Barsade's work on emotional contagion showing that the pleasantness of one group member has significant effects on group mood [1].

We seek to design social robot behavior that enhances group psychological safety toward more effective human-robot teaming.

Social Robots in Groups

We are developing an experiment to test the hypothesized influence of social robots on group psychological safety. We plan on having a social robot engage in a group activity, where each member has an individual task that contributes to the group's success.

We plan on conducing a between subjects experiment:
1) The **control group** has a social robot saying neutral phrases
2) The **experimental group** has a social robot saying phrases designed to increase group psychological safety

How do we measure group psychological safety?

- Questionnaires
- Verbal behaviors: admitting errors, asking for help, seeking feedback [5]
- Nonverbal behaviors: leaning away, touching hand/face, crossing arms [4]

IMPROV

Behavior that Promotes Psychological Safety

Our experimental design and research interests converge on the question: **what specific behaviors and utterances can a social robot employ in order to enhance group psychological safety?** We examined literature from three diverse fields in order to help answer this question.

Research		Robot Behavior
Vulnerable Disclosure. Individuals are more likely to **self-disclose** after an interaction partner has revealed personal information (reciprocity effect) [3].	→	**Self disclosure**; utterances like "They reset my memory this morning, so my day has been a little rough" [7]
Cancer Support Groups. The **expression of negative affect** has shown an overall reduction of distress and mood disturbance for group participants [2].	→	Modeling **affective expression** and encouraging it in other group members.
Improv. One core rule in improv is "do not block", always **acting in agreement** with group members [6].	→	**Speaking up in agreement** with group members when opportunities arise.
Improv. Good improvisers not only agree with offers made by team members, but also **advance the scene** by adding additional content [8].	→	**Asking questions** to spur new ideas and discussion and **proposing new content**.
Improv. Improvisers in training are taught to celebrate failure to train a **comfortability with failure** [6].	→	Modeling the **celebration of mistakes** and supporting others when they make mistakes.
Improv. **Supporting** one's fellow improvisers is crucial to improvisational success [8].	→	Acting in the best interest of the group, exhibiting **supportive nonverbal behaviors**.

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This work is supported by the National Science Foundation (Expeditions in Computing IIS-1139148)