HRI Reading Group

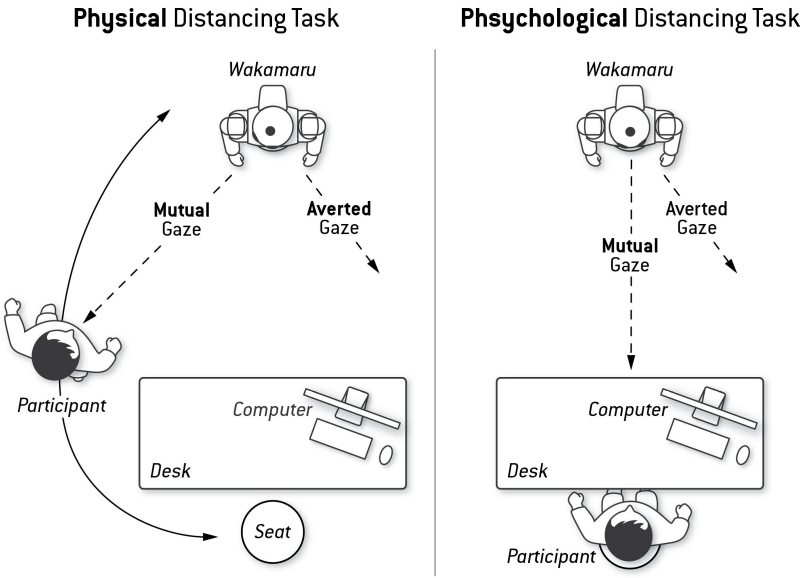
@ Instituto Superior Técnico

Meeting #3 (5 Nov 2018)

Paper

Mumm, J., & Mutlu, B. (2011). **Human-robot proxemics: physical and psychological distancing in human-robot interaction.** In Proceedings of the 6th international conference on Human-robot interaction (pp. 331-338). ACM.

Research goals



Which of the four prominent models of interpersonal distancing best explain human-robot proxemics?

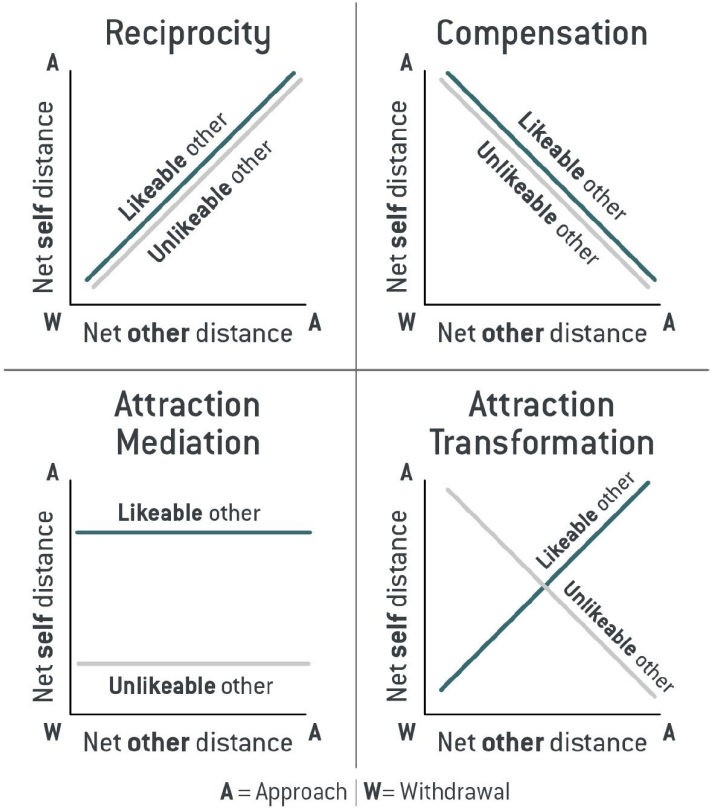


Figure 2. The four models of interpersonal distancing (adapted from Kaplan et al. [15]).

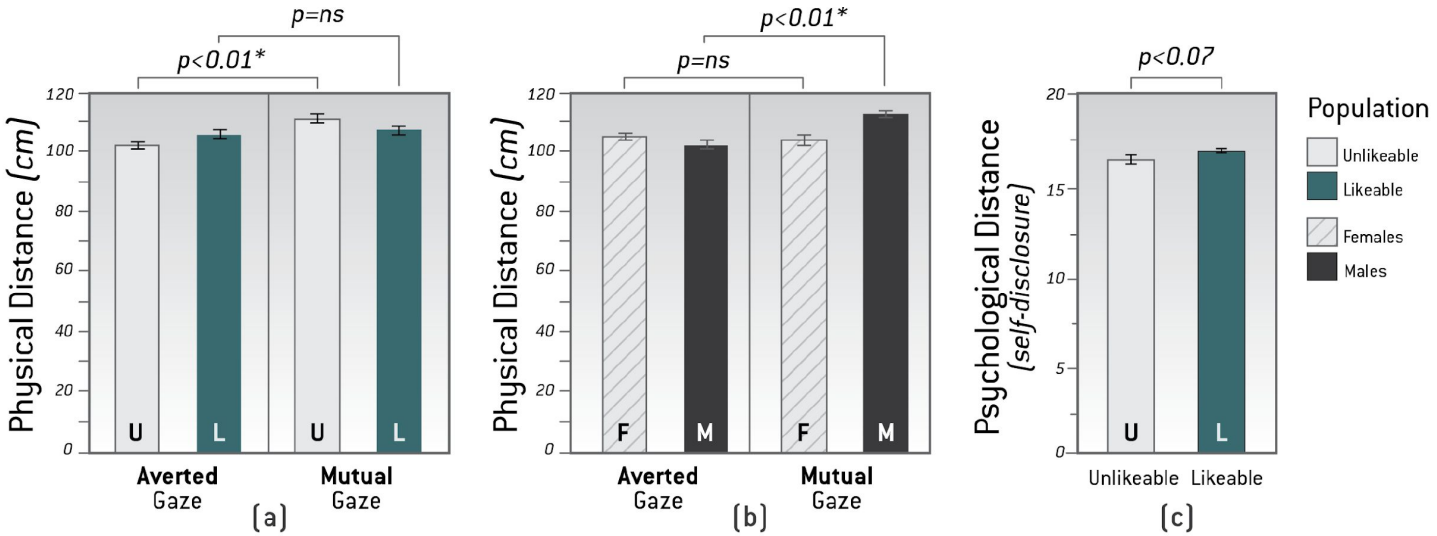
Hypotheses

Hypothesis 1. Following the **compensation model**, derived from nonverbal research, participants will *maintain a greater distance with the robot when the robot maintains eye contact with them than they do when it avoids gaze.*

Hypothesis 2. Following the **attraction-transformation model**, which has been proposed as a bridge to explain verbal and nonverbal cues, how much participants like the robot will affect their distancing behavior with the robot; *they will maintain a greater distance with the disliked robot when the robot maintains eye contact with them than they do when it avoids gaze, while maintaining a smaller distance with the liked robot when the robot maintains eye contact with them than they do when it avoids gaze.*

Hypothesis 3. Following the **compensation model** participants *will disclose less to the robot when the robot maintains eye contact with them than they do when it avoids gaze.*

Results



Our analysis showed a main effect of pet ownership on physical distancing. Pet owners distanced themselves significantly further than non-pet owners, $F(1,586) = 8.13$, $p < .01$. Our analysis also found a significant triple interaction between pet ownership, gaze behavior, and likeability, $F(3,580) = 4.30$, $p < .04$.

Strengths and weaknesses of paper

Strengths	Weaknesses
Theoretical framework	Likeability is dynamic (could be measured before and after the interaction)
Demographics information (e.g, including pet ownership as questions asked)	Results are tightened to that particular robot/embodiment
Modeling and implementing robot behaviors based on the strong theoretical framework	The authors assume decreasing distance is always a positive relational aspect when they generalise and discuss the results
	Convenience sample (only students)
	Lack of measures of people’s expectations

Exercise

- Come up with a user study related to proxemics in HRI

IDEA 1:

- The relation between proxemics and leaning-in behaviour
- Conversational scenario
- H1: Leaning improves the perceptions compared to moving straight
- Moving: straight VS leaning (between-subjects design)

IDEA 2:

- Driving scenario - participant is driving a car behind another car
- The perception of the person driving behind is different according to the framing and level of autonomy of the car
- Variables:
  - Framing (deceptive or not about the car being autonomous)
  - Actual autonomy of the car (autonomous or not)
- H1: human will increase closeness to the car over time

IDEA 3:

- How is the relation between the density of people in a room and the way a robot should approach?
- Train a ML model to predict the optimal distance of approaching a human in a crowded room according to space state of people (positions, etc…)
- Measure: success of establishing the conversation

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Meeting #4 (12 Nov 2018)