Explicit, Neutral, or Implicit: a cross-cultural exploration of communication-style preferences in human robot interaction

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ABSTRACT

Social groups have different rules and preferences for what they consider acceptable behavior and a social behavior that is favorable in a certain cultural context may be unacceptable in another. In this study, we evaluate the effects of robot communication style on how participants from two distinct cultures (Indian and American) perceive them; the robots use or violate cultural norms. We recruited participants from Amazon's Mechanical Turk to watch a short video of three humanoid robots interacting, and explore the impact of this difference on how participants perceive robot appropriateness for a range of tasks. Results indicate an association between participant culture and their preferred robot communication style for the task of older adult care.

KEYWORDS

Cross-cultural differences; culturally aware robots; Social norms; Human-robot interaction

1 INTRODUCTION

Social robots are gaining popularity and promising to enter people's everyday lives, to give us company, provide information and assistance, and even to help with motivation (e.g., for taking one's medicine). As these social entities will work closely with people in their personal spaces, we must consider how they interact with people; the communication strategies employed will impact perceptions of the robot and ultimately impact its acceptance [6].

The impact of robot communication on interaction is mediated by factors such as personal differences and context [7], with culture being important. This includes social norms and dictates how interactions will be perceived: e.g., being direct in one culture may be perceived as being rude or conceitful, while in another culture it may be seen positively as being confident and self-composed. We add to the growing body of HRI work on culturally-appropriate robot language use (e.g., [5]) by investigating the impacts of robot communication style on attitudes toward the robot, comparing between individualist and collectivist cultures.

We created a video of three robots (identical in appearance) having a discussion, each maintaining different communication styles (implicit, neutral and explicit): for instance, they are different in how strongly and directly they express disagreement, i.e. when they are discussing different bands, the implicit robot says, "Aren't they a little loud?" and the explicit robot replies, "Yes, they are loud. I don't like them!". The neutral robot does not express an opinion. Following, we asked users to select the most appropriate robot for specific tasks (e.g., taking care of older adults). The results from our crowdsourced study (n=299) suggest an association between participant culture and their preferred robot
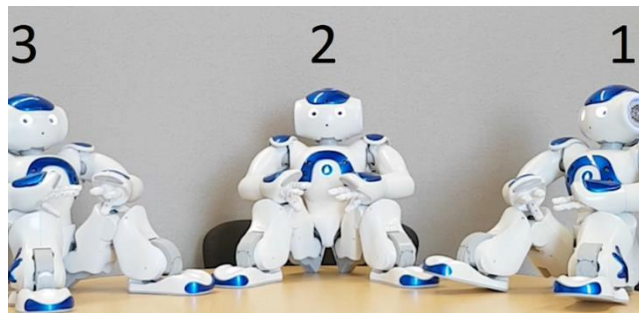

Figure 1: Robots having a discussion (from shown video)

communication style for the task of taking care of older adults. These results provide insight into how a robot's use of language may impact its potential adoption and acceptance by Indian and American societies.

2 CULTURAL DIFFERENCES

Culture is deeply intertwined with all aspects of our social behaviors and impacts how we perceive our day-to-day interactions. As such, social robots can use culturally-appropriate language to improve how they are perceived by human users [5].

One prominent dimension of culture is collectivism, where cultures can be broadly categorized as collectivist or individualist. Generally, in collectivist cultures people integrate into groups and form a mutually supportive relationship with their group [2]. In contrast, in individualist cultures it is more common for a person to act on their own and directly protect their own interests [2].

Individualist cultures often prefer low-context, explicit communication styles that reduce misinterpretation potential; a confrontational approach to conflict is common, and displays of intense emotion and self-expression is valued [1,4]. Additionally, individualist societies tend to have lower "power distance", where unequal distribution of societal power is less accepted and hierarchical behavior is more frowned upon [2].

Inversely, in collectivist cultures implicit and indirect (high-context) language is often favored to avoid conflict (at the cost of clarity), individuals are discouraged from displaying emotion in public, self-control and compromise is valued, power distance is high and people are less likely to challenge authority.

We suggest that robots can also use culturally aware language and action to improve how they are perceived by people.

3 CROWDSOURCED STUDY

In developing our study, we selected USA and India as two exemplar countries with individualist and collectivist cultures, respectively [3], and investigated differences in perceptions of

social robots that exemplified individualist or collectivist behaviors. We recruited 299 participants (via Amazon's Mechanical Turk): 52.2% (n=156) were from USA, and the remaining 47.8% (n=143) were from India.

Participants watched a short video of three identical-looking Softbank Nao humanoid robots having a discussion while maintaining communication styles appropriate for individualist (*explicit* robot) or collectivist (*implicit* robot) cultures, or a *neutral* robot that avoided strong cultural styles. These robots differed in the strength and directness of opinion, challenge of hierarchy, and low- versus high-context communication. For example, at one point the implicit robot shows regret for expressing discontent to their boss, simply "because he is their boss", to which the explicit robot replies "he is just one of us", and then the neutral robot would finish the discussion by saying "You are both over thinking it, let's move on!". We balanced the video in terms of compromise, opposing views, disagreements, use of gestures, etc.

Following the video, participants answered questionnaires on demographics, and selected which robot they would prefer for tasks including taking care of older adults, being a co-worker, taking care of children, and doing domestic chores. Participants also rated which robot they felt was most expensive.

4 RESULTS AND DISCUSSION

Pearson's Chi-Squared tests on participants' favored robot choices (implicit, neutral, or explicit) for specific tasks, grouped by culture (Indian or American) indicated an association between culture and preferred robot for the task of taking care of elderly ($\chi^2_2 = 6.4$, $p<.05$); all other tests were not significant. Post-hoc tests (with Bonferroni Correction) indicated a difference between preferences for the explicit robot ($\chi^2_1 = 5.8$, $p<.05$, 19.2% preference for India, 9.8% USA, Figure 2). We found no other effects of participant gender, age, or previous interaction with robots.

To gain further insight into reasons behind participant choice of robot for taking care of elderly, we performed an initial analysis on written comments using open coding with a single coder.

The main findings suggest that American participants valued the explicit robot's rationale more than Indian participants: 12 American participants described the robot as 'mature', 'logical', 'rational', 'sensible', 'reasonable' and 'smart', while only 3 Indian participants used these terms:

"... Robot number 3 [Explicit] seemed a little more reasonable" [P201-US]

"They [Explicit and Neutral] were more intelligent-sounding. They seemed more logical." [P285-US]

"[Explicit] Most honest == way more fun" (sic) [P4-US]

In contrast, Indian participants valued implicit robot's attitudes more than American participants. 11 Indian participants described the robot as 'polite', 'obedient', 'wise', 'respectful' and 'modest', while only 1 American participant used such terms:

"It's [implicit] simply a yes boss type robot and it can perform works obediently." [P139-INDIA]

"[implicit] Seems meek and so will be good at taking orders" [P39-INDIA]

"It [implicit] make wise decisions and respect to the authority" (sic) [P290-INDIA]

"He [implicit] sounded more my age." [P85-INDIA, 65 or older]

These results suggest that our robot designs were successful in projecting the culturally-aligned personalities and eliciting the reactions we expected. However, these qualitative results contradict our quantitative results, where Indian participants were more likely to select the explicit robot than American robots. Taking a step back, Figure 2 summarizes that for the task of taking care of the elderly, by far both cultures preferred the more neutral robot to either the explicit or implicit.

Further qualitative inquiry found that 14 American participants valued the neutral robot as being "level headed" or "balanced", where only 1 Indian participant used such terms. In comparison, 17 Indian participants (only 3 US), described the neutral robot as "calm" and "smart":

"This robot [Neutral] seems more level-headed and the voice of reason in the group." [P12-US]

"It [Neutral] was calm and acted as peacemaker between the other two." [P159-INDIA]

5 CONCLUSION

The study if culture in HRI is an ongoing topic of interest and import to the community. In this paper, we present initial results from a crowdsourced (n=299) exploration between Indian and American cultures, and their opinions of robots that act in archetypical implicit, explicit, or more neutral ways. Our results suggest that neutral robots may be preferred over more culturally aligned ones, and point to the need for future work on this question.

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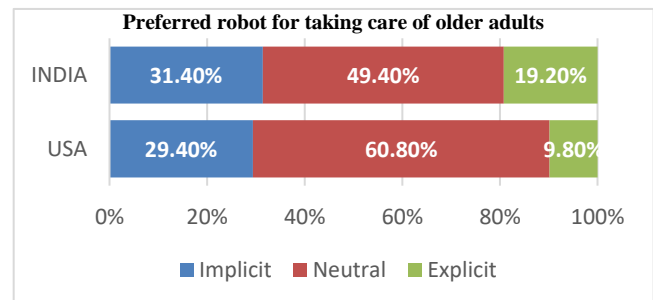
Figure 2: Percentage of the most preferred robot for taking care of older adults, within culture