Human Perception of Gendered Artificial Entities

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The CASA Debate

What’s CASA?
CASA (computers as social actors) theory states that humans treat machines like other humans. This effect has been verified in multiple human-robot interaction studies (2, 7, 9, 10).

Does voice gender affect human perception?
YES: An evaluation of voice gender in human-robot interaction (HRI) research concluded that “choosing which robotic voice gender is one of the most important design decisions that can be made” (15).

NO: After conducting a web survey by way of CASA (computer- assisted self-interviewing) technology, several investigators boldly stated the gender of the voice is unimportant (13, p. 466).

Research Objectives

1. Does the CASA effect exist?
2. If so, does the effect become more pronounced if...
   - the situation is more interactive?
   - we increase the entity’s level of physical embodiment?
3. Does human perception change with entity gender?

What’s unique?
Because few investigations have focused on task-specific HRI, the objective of the present study is to determine if more specific judgments about entity personality and capability are made on the basis of a perceived gender through a voice cue during a task-oriented scenario. The analysis is also considered unique to this study (see results).

Approach

Equipment
I developed a task-specific artificial intelligence engine exclusively for the project. In addition, I created several Java, Python, and RobotFfics programs to connect the engine with a computer terminal and a Robonova robot.

How it works
In the study, male and female subjects interacted with a male- or female-voiced computer or the robot. The interaction includes a Marlowe-Crone survey (a standard assessment of social desirability) and a cooperative task between the subject and the machine. Their reactions to the entity in each situation were recorded to determine if physical embodiment or voice gender induce the CASA effect.

Results

Analysis includes Spearman coefficient matrices and median response
This experimental procedure was virtually identical to one performed and published in 2009 (Cowell et al.), wherein ANOVA and ANCOVA tests were used to conclude that the CASA effect exists. However, because our data do not represent a normal distribution, we could not logically use ANOVA or ANCOVA (or many other statistical) tests. Instead, we examined the medians (to some extent) and Spearman coefficient matrices, which may be used with skewed distributions.

Entity gender and embodiment do not appear to affect median response
Figure 2 shows the medians of the degree to which students applied humanized characteristics to the entity. The results suggest the subjects do not mind applying characteristics to the entity. However, note that the gender of the entity does not significantly affect responses. In terms of the median rating, embodiment similarly did not appear to influence subject response.

Results (cont.)

Entity gender and embodiment significantly affects response correlations
Tables 1 and 2 display a number of significant Spearman correlation ranks for ratings the entity received when it was (1) gendered male or female and (2) embodied as a terminal or a robot. There were significant differences in each of these pairings that may be interpreted as results of social constructs.

Discussion

Results point towards confounding variables
Computational neuroscience is a rapidly expanding field, and it is expected that true humanoid robots will soon become available for manufacture. If we are truly entering an age where robotic intelligence is no longer merely a product of fiction, we must carefully consider how humans will perceive robots and how we wish to represent them to provide society with the greatest benefit.

The fact that statistical, interpretable significance associated with voice gender exists suggest that gender is an important feature in robot design. However, the presence of conflicting data indicates that there are unconsidered confounding variables that, at the moment, limit our understanding.

Future research must isolate these variables and construct a detailed map of how the gender of an entity influences perception. Only when these variables are identified will we have a solid grasp of how we view artificial entities, social constructs, and ourselves.

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References: