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AI

# Sex Differences

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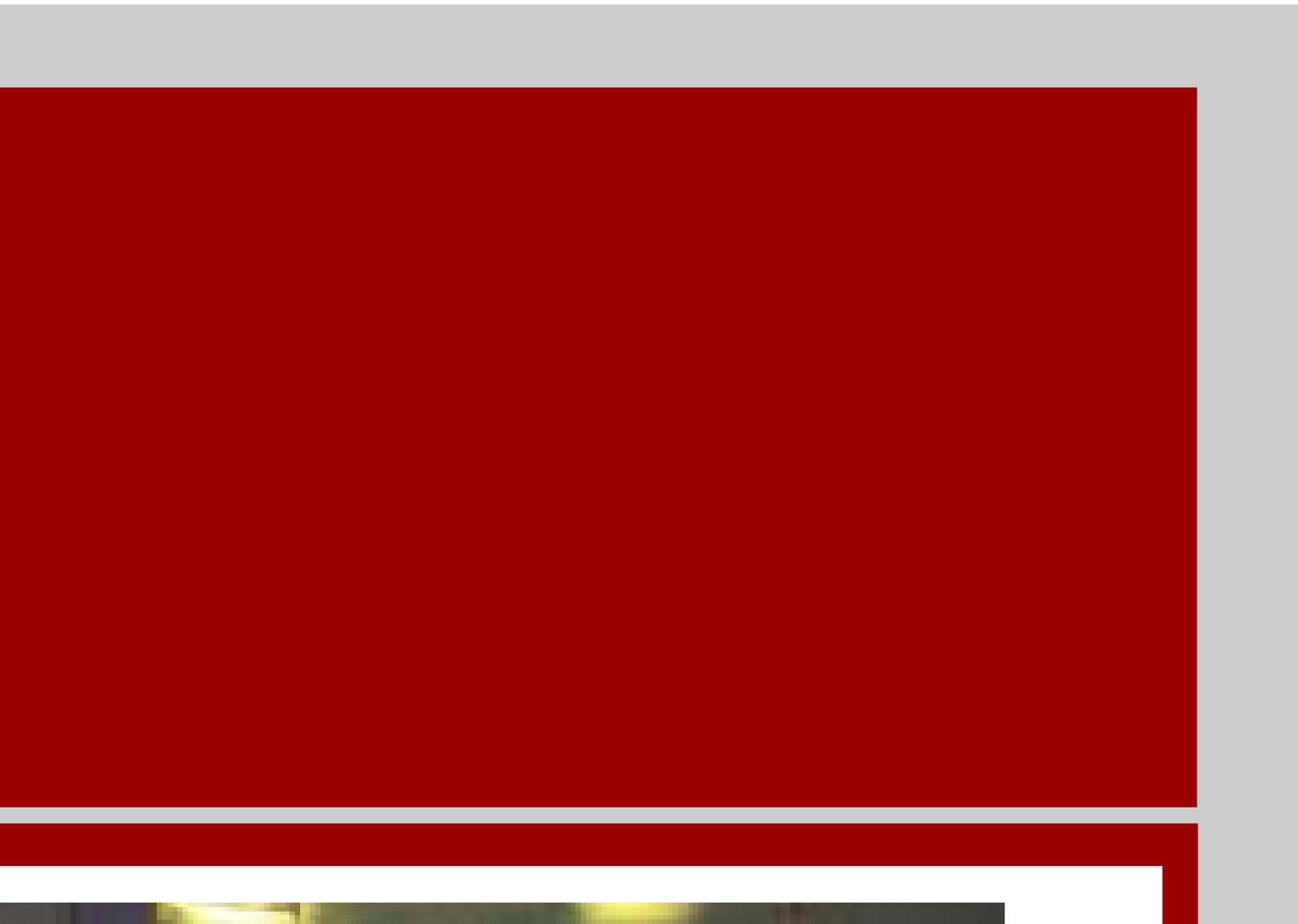
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# in Perceptions of Social I

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# Intelligence in Robots

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As robots have become more common, these interactions do not go smoothly, people as socially intelligent, this may improve vary in how they perceive robots. The participants women's perceptions of the social intelligence each paid \$15 via MTurk to complete the rating humans interacting with robots and the Perceived Social Intelligence scales. Women Humans scale, while men scored significantly Rude scales. Future research could examine these perceptions and how these differ

As technology has advanced, it has be

# Abstract

In general, humans interact with them more frequently. If people may reject robots. If robots are perceived as having low social intelligence. However, people may have different perceptions of human-robot interactions. The purpose of this study was to compare men's and women's perceptions of the social intelligence of robots. A total of 296 participants were recruited for this study online. They watched five videos showing robots' social intelligence using the 20-item Social Intelligence Scale. Women scored significantly higher on the Identifies Hostile Intent subscale ( $p < .016$ ), and men scored significantly higher on the Hostile, Conceited, and Insecure subscales. The study aims to determine how changes in robot behaviors change human perceptions and how these perceptions are related to robot acceptance.

# Introduction

As robots become significantly more sophisticated and func-

Men and women  
Identifies Hostile  
higher on the  
nificantly higher  
( $p = .016$ ), and  
differences between

We attend to  
particular traits  
of robots' behavior  
PSI scores were  
Men scored

# Results

Women showed statistically significant differences in four different PSI scales: Identifies Humans, Hostile, Conceited, and Rude (Table 1). Women scored significantly lower on the Identifies Humans scale ( $t(1414) = -4.69, p < .001$ ), while men scored significantly higher on the Hostile ( $t(1407) = 2.94, p = .003$ ), Conceited ( $t(1444) = 2.14, p = .033$ ) and Rude ( $t(1395) = 2.14, p = .033$ ) scales. We did not find any significant differences between sexes on the remaining scales.

# Discussion

We attempted to examine the sex differences in PSI of robots. We found that, overall, there were significant differences between men's and women's PSI behaviors. Cultural, gender stereotypes appear to have an influence on men's PSI scores while barely influencing, if any, of the women's PSI scores. Men scored higher on three scales: Hostile, Conceited, and Rude. These th

PSI scales:  
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tional in our everyday lives. Artificial intelligence describes the knowledge that these machines have. However, many of these machines lack one's cognitive capacity to appropriately use this knowledge. This inadequacy is what sets these machines apart from other machines. Developing machines to have SI would open new opportunities. Because this technology is so new and unexplored, it is important to study how the different sexes would perceive these machines.

Given the importance of integrating SI into our lives, it is important to compare the differences and similarities between human and machine intelligence) of robots. Perhaps, differences in the way humans perceive robots are differentially intelligent by men and women. It is important to study how humans perceive robots because it is an indicator as to how humans perceive robots. This study could impact the way robots are perceived and used in the future.

Intelligence (AI) is a term that was developed to describe machines that have acquired through vigorous programming. Robots lack social intelligence (SI), the ability to use language to interact and cooperate within a social setting. This distinguishes them apart from humans in a major way. Developing AI opens many more avenues for the world of technology. In a nonconventional, it may be important to consider these advancements.

To study SI in robots for successful HRI, our group compared the responses between men's and women's PSI (perceived social intelligence). The different robot behaviors will be seen as more or less socially intelligent. It is notable to interpret how humans perceive robots. How AI can be incorporated into our lives. Thus, this study was programmed and marketed in the future based on

can potentially be used in many ways, such as being used in various traits in robots. If robots were better at social interaction, they would be able to be used in a wide range of general.

Culturally, there are differences in social intelligence and social skills between men and women. Studies have considered female robots in both sexes. It is noted that female robots are perceived to be feminine.

The results of the study show that the reading level of the participants was higher than the reading level of the control group. The distribution of scores on the scales in every scale does not differ significantly.

The implications of this study are

method

ally be seen as “manly” traits. Culturally, men’s SI favor masculine traits such as being assertive and competitive (Ran, 2018). They could seek these connections leading to higher scores on said scales. It has also been found that men are better at recognizing expressions of anger (Ran, 2018). Perhaps men are more threatened by robots or more likely to be sensitive to threatening behaviors.

Women, on the other hand, are to have positive social traits favoring femininity, such as empathy (Ran, 2018). Women scored higher on only one scale: Identity. Surprisingly, women did not score higher than men on traits that would be considered feminine such as Helpful, Caring, and Friendly. Perhaps, these traits are not as emphasized with no significant differences, but the gender norms exaggerate the traits, prohibiting men from freely expressing their emotions.

Researchers should keep in mind that, just because one gender scored significantly higher than the other, there is more overlap than difference when comparing traits. This has been a consistent finding in other research done on sex differences in every domain. Just because men scored higher than women on hostile traits does not mean that all men possess more negative traits in terms of SI than women.

The importance of developed SI in AI will lead to better HRI as technology advances.

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**Table 1**

*Comparing Men and Women on Perceived Social Interaction*

	Mean (Standard Deviation)	
PSI Scale	Men	Women
Recognizes Human Emotions	2.88 (1.04)	2.88 (.94)
Recognizes Human Behaviors	3.88 (.74)	3.90 (.74)
Recognizes Human Cognitions	2.87 (.94)	2.87 (.94)
Adapts to Human Emotions	2.72 (.97)	2.72 (.97)

## *ocial Intelligence Scales*

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eviation)

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Women

t-test

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9 (1.03)  $t(1440) = -.108, p = .914$

04 (.73)  $t(1424) = -1.539, p = .124$

39 (.95)  $t(1459) = -.479, p = .632$

71 (.95)  $t(1425) = .173, p = .862$

## **Participants**

There were 296 participants in this study. They ranged in age from 19 to 72 years-old ( $M = 38.5$ ,  $SD = 18.5$ ) and were recruited via MTurk and were compensated \$15 for their participation.

## **Procedures**

Participants provided informed consent before interacting with humans. They rated each robot on a scale of 1 to 5 for one robot before moving on to the next robot.

## **Measures**

Using Perceive Social Intelligence (PSI) based on their responses to survey questions. The questions were modelled off of the Interpersonal Reactivity Index (IRI). IPIP is a public domain set of 3000+ items. However, IPIP scales are written in a first person perspective. To address this, we modified the verbs and pronouns of the scales so that the first person would require the robots to perform the actions. New scales were developed in order to identify the abilities the robot actually had. The new scales were developed in order to identify the abilities the robot actually had. The new scales were developed in order to identify the abilities the robot actually had.

udy, 150 male and 145 female. The participants ( $M = 37.4, SD = 11.5$ ). Participants were recruited for completing the study online using Qualtrics.

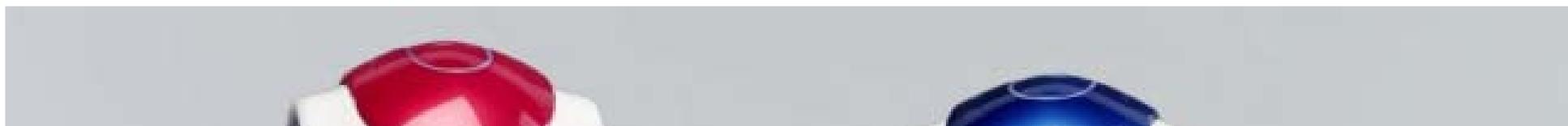
ent. They watched five videos with robots interacting separately. Participants completed all scales next robot.

SI) scales participants' PSI in AI were measured on each robot video they watched. These International Personality Item Pool (IPIP) format. The items designed to measure 250+ characteristics. First-person, declarative statement format. We modified in order the third-person format because using report their own social intelligence. The PSI by the abilities that a robot appeared to have, not names of the scales are listed in Table 1 with

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improve the quality of care received by humans from automated robots. Examples include de-stressor robots present in hospitals and teaching robots. Robots may be able to better assist people on a wider range of activities and chores, helping elders live independently, serving a therapeutic role in hospitals and much more (Breazeal, 2009). If we have a better understanding of women's perceptions of certain behaviors as more or less socially acceptable, robot programmers will be able to build a way for people to adjust settings.

Intelligent robots may be adjusted to have particular traits depending on the people that will be working with it and the environment it will be within. If men are more rude, conceited, and hostile (compared to women's behavior), then it might make sense for robots that are being used with men to be more socially polite and deferential. Robots could be customizable, such that they can be set to be more or less polite, depending on personal preference. Robots involved with children are made to be fuzzy in appearance and character. Inventors designed the robots depending on their targeted audience and the type of interaction.



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Emotions		
Adapts to Human Behaviors	3.57 (.90)	3.6
Adapts to Human Cognitions	3.04 (.90)	3.0
Predicts Human Emotions	2.75 (.99)	2.7
Predicts Human Behaviors	3.10 (.93)	3.1
Predicts Human Cognitions	2.55 (.99)	2.5
<b>Identifies Humans</b>	<b>4.06 (.67)</b>	<b>4.2</b>
Identifies Individuals	3.19 (1.10)	3.1
Identifies Social Groups	2.81 (.90)	2.8
Social Competence	3.09 (1.10)	3.1

50 (.89)  $t(1434) = -.657, p = .511$

08 (.86)  $t(1463) = -1.007, p = .314$

71 (.98)  $t(1444) = .834, p = .404$

5 (.93)  $t(1459) = -.864, p = .388$

53 (.97)  $t(1448) = .358, p = .720$

22 (.62)  $t(1414) = -4.694, p < .001$

8 (1.17)  $t(1419) = .183, p = .855$

33 (.93)  $t(1437) = -.476, p = .634$

2 (1.05)  $t(1445) = -.418, p = .676$

the abilities the robot actually had. The  
each of the scales consisting of four items

Each item was rated using a five-point  
(Disagree), 3 (Neutral), 4 (Agree), and 5  
abilities robots appear to have. Therefore  
answer based upon the impression that the  
ment scale.

**Scoring.** To calculate scores for each of  
four items that comprised that scale. The  
ligence were measured by comparing each  
sample t-tests.

names of the scales are listed in Table 1, with  
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at agreement scale: 1 (Strongly Disagree), 2  
(Strongly Agree). We are trying to measure what  
e, the instructions emphasized that raters should  
they have of the robot, and the items in the agree-

the 20 PSI scales, we averaged the scores on the  
e sexual differences in perceptions of social intel-  
ch sex's mean score per scale using independent



<http://www.brainaryinteractive.com/nao-robot>

Friendly	3.39 (.84)	3.4
Helpful	3.60 (.90)	3.5
Caring	2.98 (.97)	2.9
Trustworthy	3.15 (.97)	3.1
<b>Rude</b>	<b>2.01 (.81)</b>	<b>1.9</b>
<b>Conceited</b>	<b>2.14 (.76)</b>	<b>2.0</b>
<b>Hostile</b>	<b>1.70 (.74)</b>	<b>1.5</b>

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45 (.89)  $t(1458) = -1.247, p = .213$   
59 (.97)  $t(1436) = .052, p = .959$   
96 (.99)  $t(1459) = .301, p = .763$   
3 (1.03)  $t(1452) = .451, p = .652$   
92 (.83)  $t(1395) = 2.136, p = .033$   
94 (.76)  $t(1444) = 2.413, p = .016$   
58 (.69)  $t(1407) = 2.941, p = .003$

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