THE IMPACT OF GESTURES ON PERCEPTIONS OF A HUMANOID ROBOT

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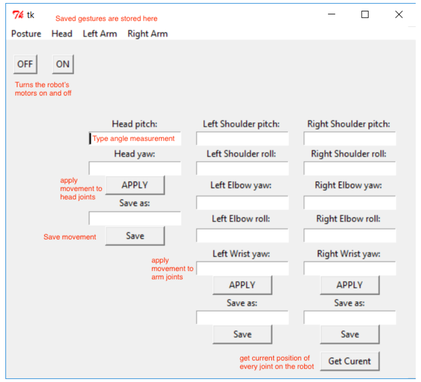
Research questions: Does changing the style of gestures performed by a humanoid robot result in different perceptions of the robot's friendliness and humanlike qualities? Does the perceived gender of the robot impact those perceptions?

Motivation

The public has mixed views on the usefulness and likeability of humanoid robots. Can people's negative perceptions of a humanoid robot be mitigated by tailoring its nonverbal communication? And do certain styles of movement convey friendliness and humanlike qualities better than others?

Gesture Implementation

- Python application
- TKinter GUI
- NAO API allows for angle interpolation using degrees or radians in every joint



The current functionality allows for users to create, test, and save simple gestures composed of one or several joints moving in tandem. I used it to prototype, but I created the final gestures by coding directly in Python.

In the future, I'd like to expand this applet to support the creation of multi-phase gestures like the ones I used in my study.

Emblematic Gestures

These are the final gestures included in the study.

NAME	PURPOSE	DIALOG EXAMPLE
Hands on Hips	making a point	"I think I get it now"
Shrug	confusion	"I don't understand"
Cheer	happiness, excitement	"We did it!"
Hands on Head	frustration	"This is really confusing"
Hands out	make a point	"She moved 6 kilometers"
Stretch	boredom, get someone to answer	"Yawn!"
Look (L/R)	direct attention	"Look at the tablet here"
Can't Hear (L/R)	make someone repeat	"Could you please repeat that?"
Nod (yes)	agree, understand, show listening	"I agree!"
Shake (no)	disagree, don't understand	"I don't understand"
Hand out (L/R)	make a point	"I know she ran for 10 minutes"
Look at Nails (L/R)	boredom, get someone to answer	"Yawn!"
Wave (L/R)	greeting	"Hello, nice to meet you!"
Hand on Chest (L/R)	refer to self	"I think..."
Facepalm (L/R)	embarrassment, understanding	"I can't believe I didn't see that before!"

Hypotheses

H1: Participants who reported feeling comfortable interacting with humanoid robots will like the robot more than those who didn't.
H2: Participants who reported finding humanoid robots creepy will like the robot less than those who didn't.
H3: There will be no significant difference between male and female participants' perceptions of the robot.
H4: Participants who saw the cartoonish gestures will find the robot more friendly than participants who saw the realistic gestures or null case.
H5: Participants who saw the null case will find the robot more elegant than participants who saw the realistic gestures or cartoonish gestures.
H6: Participants who saw the realistic gestures will find the robot more humanlike than participants who saw the null case or cartoonish gestures.

Mechanical Turk Study

I asked participants to rate their opinions on humanoid robots, then watch a short video of the NAO performing some gestures. They then rated the robot on 5 scales: Like - Dislike, Friendly - Unfriendly, Lifelike - Cartoonish, Elegant - Rigid, and Humanlike – Machinelike.

	Male Robot	Female Robot
Male Human	**Category** / **Participants** No Gestures 12 Realistic Gestures 13 Cartoonish Gestures 10	**Category** / **Participants** No Gestures 13 Realistic Gestures 13 Cartoonish Gestures 11
Female Human	**Category** / **Participants** No Gestures 14 Realistic Gestures 11 Cartoonish Gestures 15	**Category** / **Participants** No Gestures 14 Realistic Gestures 14 Cartoonish Gestures 16

Preliminary Results and Contributions

At this point only the results for the first 155 participants are available for analysis.

H1:

Correlations

		useful	like
useful	Pearson Correlation	1	.222
	Sig. (1-tailed)		.137
	N	26	26
like	Pearson Correlation	.222	1
	Sig. (1-tailed)	.137	
	N	26	26

H2:

Correlations

		creepy	like
creepy	Pearson Correlation	1	-.336*
	Sig. (1-tailed)		.047
	N	26	26
like	Pearson Correlation	-.336*	1
	Sig. (1-tailed)	.047	
	N	26	26

*. Correlation is significant at the 0.05 level (1-tailed).

This study will inform the style of gestures chosen for future NAO robot pilots and studies. The gestures that cause the robot to be received the most positively can be reused for future studies using the NAO robot at ASU and the Python tool will be useful for further gesture development.

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