INVESTIGATING THE USE OF ATTENTIONAL BEHAVIOURS BY A SOCIAL ROBOT RECEPTIONIST: EFFECTS ON USER PERCEPTIONS

DEBORAH L. JOHANSON[1], HO SEOK AHN[2], BRUCE A. MACDONALD[2], BYEONG KYU AHN[2], JONG YOON LIM[2], EDDIE HWANG[2], CRAIG J. SUTHERLAND[2,] AND ELIZABETH BROADBENT[1]

1. Department of Psychological Medicine, Faculty of Medical and Health Sciences, University of Auckland, New Zealand
2. Department of Electrical and Computer Engineering, Faculty of Engineering, University of Auckland, New Zealand

INTRODUCTION…

Attention - a fundamental aspect of human interaction and critical in achieving successful human-robot interactions
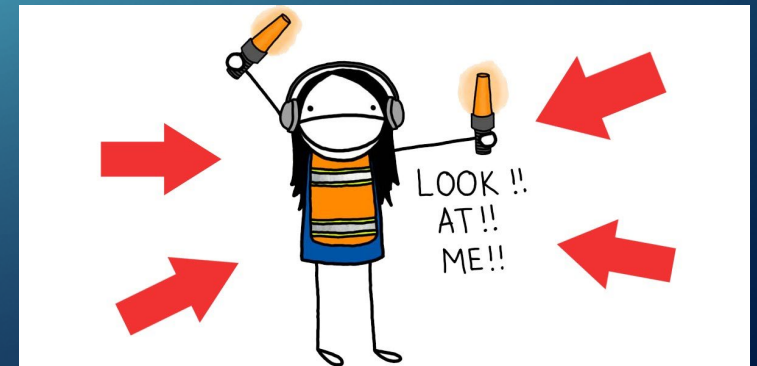
Many human attentional behaviours have been explored in the context of human-robot interactions

Yet to be explored are important social human behaviours including:
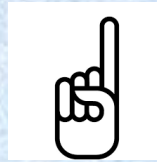
Self Disclosure

Voice Pitch Changes

Forward lean

SELF DISCLOSURE

☝ Mutual eye gaze

☝ Smiling

☝ Perceived friendliness

☝ Rapport

- **Central to developing closeness in human relationships [1,2]**

1. Zhao, R., Papangelis, A., & Cassell, J. (2014, September). *Towards a dyadic computational model of rapport management for human-virtual agent interaction.* Paper presented at the International Conference on Intelligent Virtual Agents, Boston, MA.
2. Bronstein, I., Nelson, N., Livnat, Z., & Ben-Ari, R. (2012). Rapport in negotiation: The contribution of the verbal channel. *Journal of Conflict Resolution, 56*(6), 1089-1115.

VOICE PITCH

- Important in attracting and sustaining attention

- Facilitating Understanding

- Conveys emotion

FORWARD LEAN

- Used by clinicians as a way of demonstrating attention or 'active listening' to patients [4]

- Has been found to be associated with increased patient perceptions of physician empathy when used by a physician during patient consultations [5]

To investigate whether certain robot social behaviours (i.e. self-disclosure, forward lean, voice pitch changes) would facilitate participant attention and positively influence perceptions of robot empathy and robot attention.

METHODOLOGY

- A between subjects design
- Scripted interacted with a 'medical receptionist robot' (Nao)
- Participants were randomised to one of four conditions:

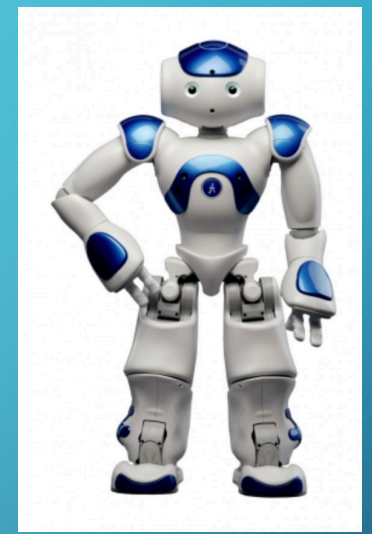**Self-disclosure**
Voice Pitch
Forward Lean
Neutral

- Measured:
Participant Engagement (Likert scale and pair-choice items)
Perceived Robot Empathy (Likert scale)
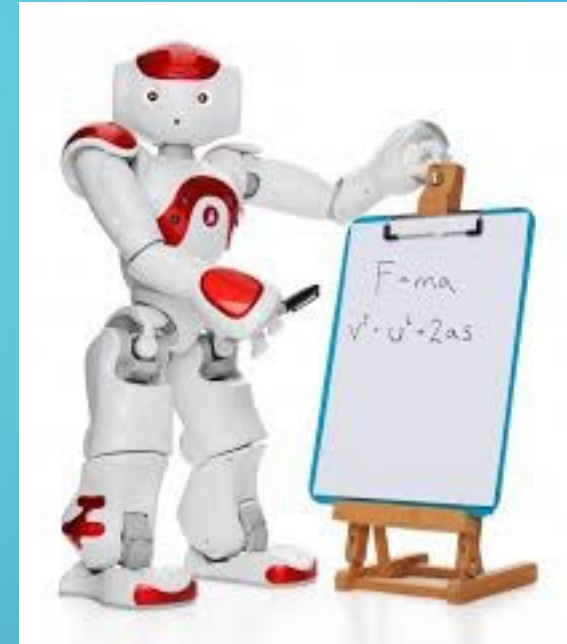Perceived Robot Attention (Likert scale)

SCRIPT…

PARTICIPANTS

- 181 participants

- Female (n=112, 61.9%)

- NZ European (n=57), Chinese (n=37), Indian (n=29), Korean (n=5), Maori (n=4), Samoan (n=3), Tongan (n=1), and 'other' (n=49).

- Education ranged from PhD or Masters level (n=26) to secondary school level (n=93).

- Students (n=139), Part-time employees (n=20), Full time employees (n=19), and unemployed (n=4).

A one-way ANOVA found no significant differences between groups in regards to:

Total Participant Engagement (F (3, 177) = 1.420, p = .239)
Total Perceived Robot Empathy (F (3,175) = 1.889, p =.133)

A Kruskal-Wallis test found no significant differences between the groups in regards to:

Total Perceived Robot Attention (χ^2 (3, n = 181) = 1.081, p = .782)

In regards to pair-choice ratings for participant engagement:

- Participants in the forward lean and self-disclosure conditions rated Nao as more stimulating (compared to unstimulating)

- Participants in the forward lean, self-disclosure, and neutral conditions rated Nao as more interesting (compared to uninteresting)

Difference in Participant Ratings for Pair-Choice Items

Item	n	Test Statistic (χ^2)	p
Boring vs Interesting	179	10.26	.002
Bold vs Cautious	180	5.59	.133
Innovative vs Conservative	180	0.30	.971
Dull vs Absorbing	177	5.52	.138
Unstimulating vs Stimulating	176	8.78	.029
Novel vs Conventional	178	3.39	.341
Unimaginative vs Creative	178	2.37	.542

DISCUSSION

Lack of significant findings may be due to the use of a between-subjects design

Many participants (n=148/181) reported never having interacted with any kind of robot

Participants may have lacked a basis of comparison when completing the study measures

VS

Further Research:

Within Subjects Design comparing forward lean, self-disclosure, and neutral conditions

Research investigating the effect of robot voice-pitch changes during a human-robot interaction may need to focus on using more distinct and frequent voice pitch changes in order to see positive effects