The Role of Intentional Stance & Agent Appearance on Gaze Use during Joint Attention

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1. Background

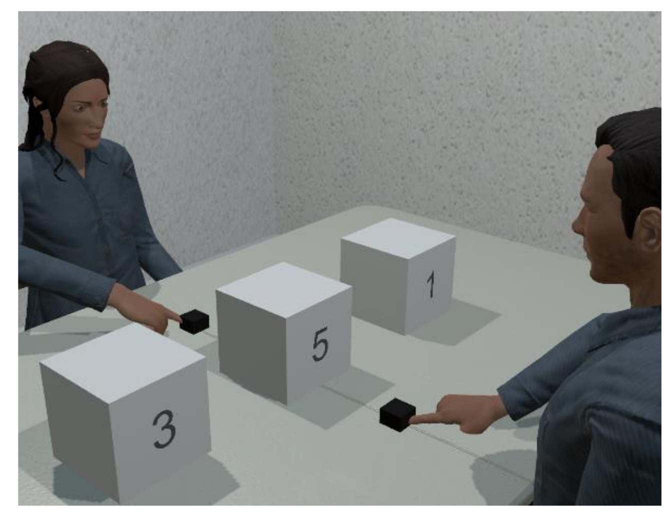
BELIEFs about an agent's sentience shape social affiliation, subjective experience, coordination strategies, & neural processing during gaze-only joint attention (Caruana et al. 2017; 2018; 2019).

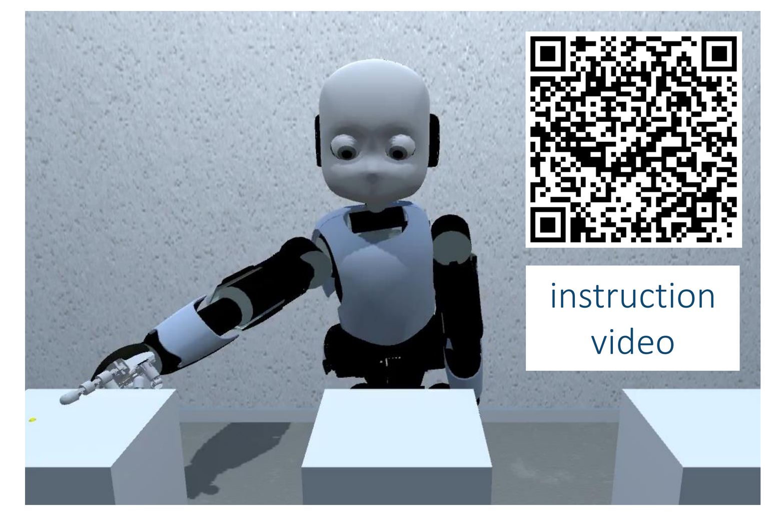
AVATARs appearing humanlike increase empathy (Riek et al., 2009), facilitate social interaction (Duffy, 2003) & activate mentalising (Krach et al., 2008).

How do BELIEFs & AVATAR appearance interact to shape multi-gestural coordination strategies?

(critical for informing artificial agent design)

2. Cooperative Joint Attention Task in VR





- multi-gestural search task (Caruana *et al.*, 2021, 2023) sensitive to differences in gaze use strategies
- congruent gaze-hand initiator behaviour → faster responder joint attention behaviour ("Congruency effect")
- individual variability in face-looking behaviour when responding – index of gaze attention/use

Key Findings

CONGRUENCY effects across measures.

Human BELIEF:

- increases reported gaze-use strategies
- improves task experiences & partner perceptions

Robot AVATAR:

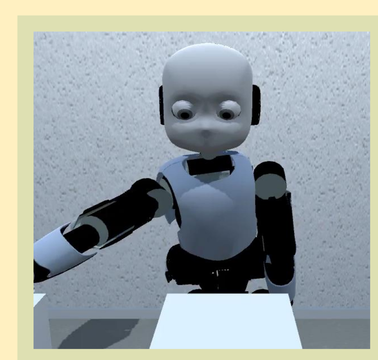
- increases face-looking
- slows down responses

3. Manipulation

BELIEF (between)

AI (n = 28) Human (n = 37)

AVATAR (within)

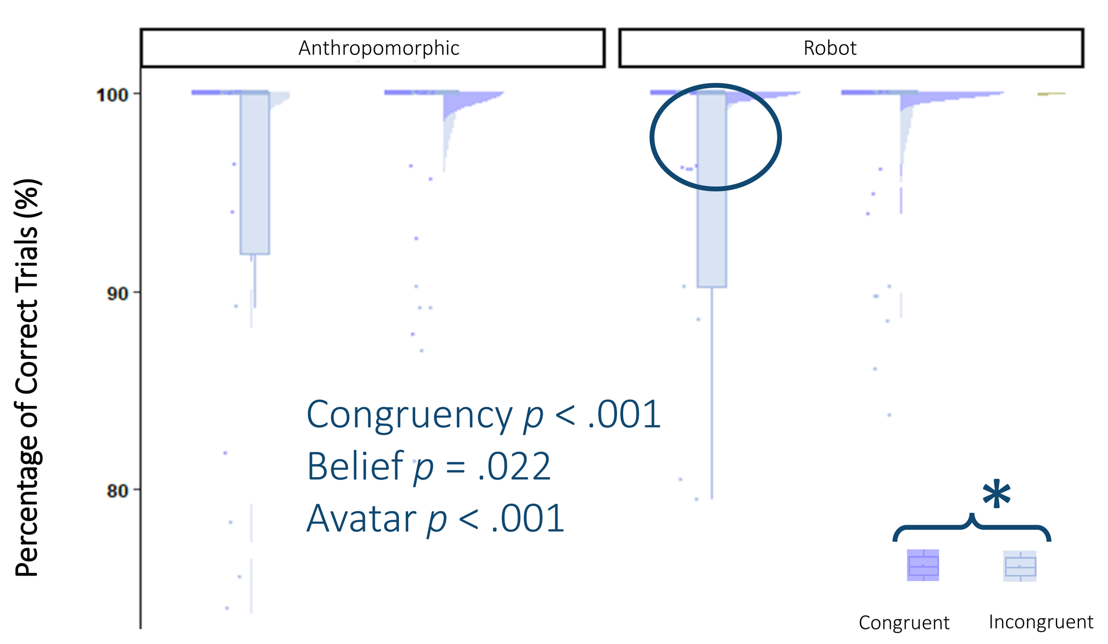


Robot

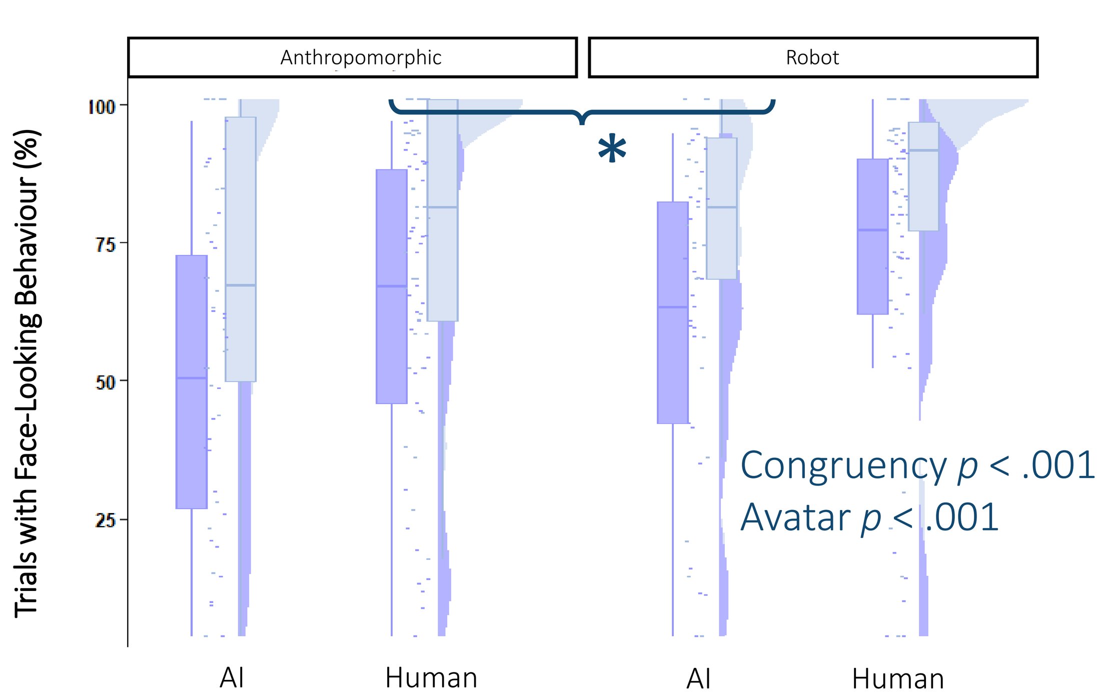
Anthropomorphic

4. Behavioural Data

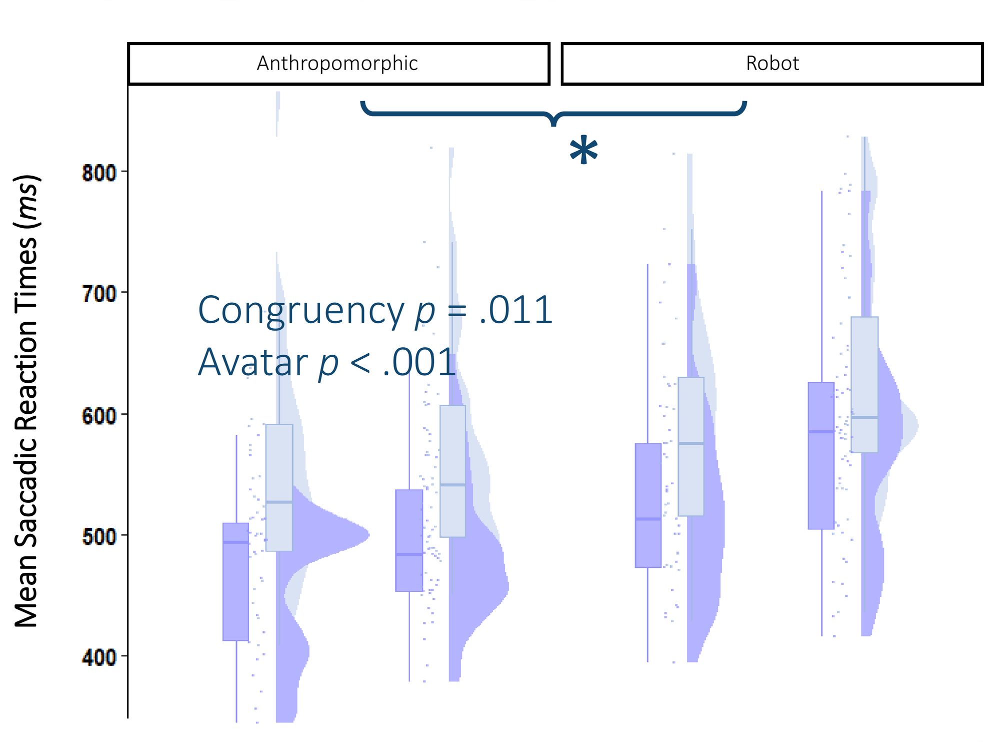
ACCURACY



FACE-LOOKING FREQUENCY

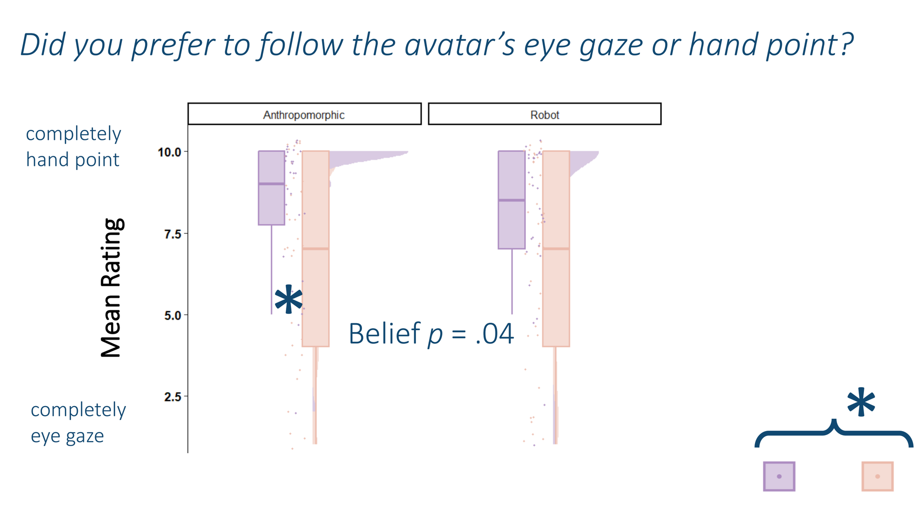


SACCADIC REACTION TIMES

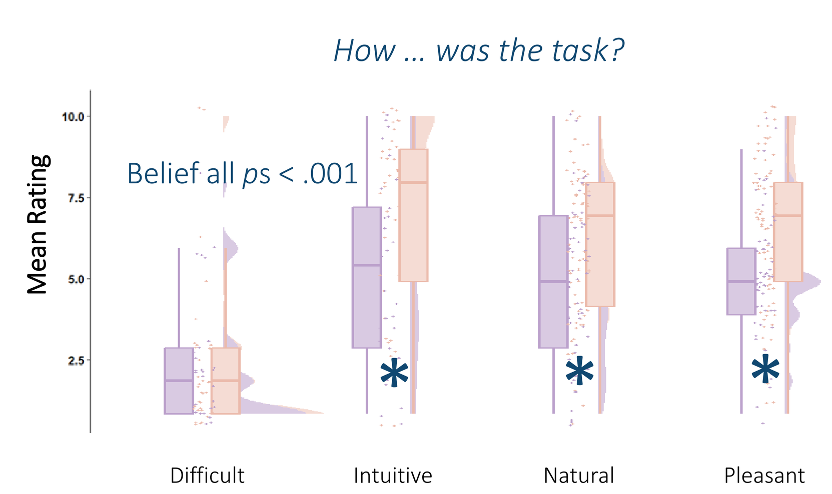


5. Subjective Data

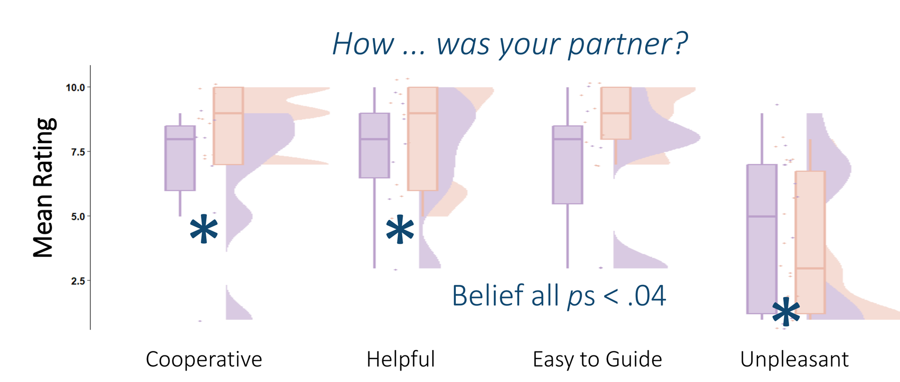
TASK STRATEGIES

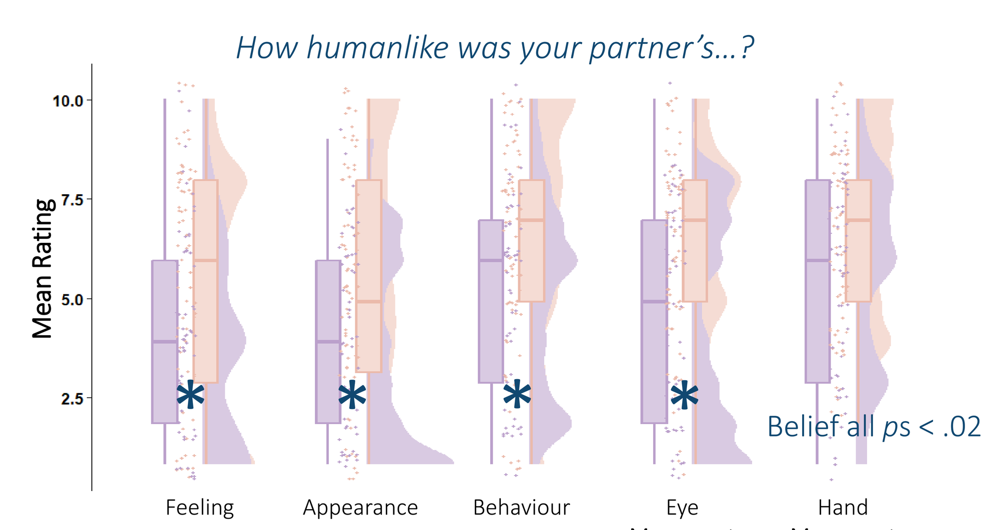


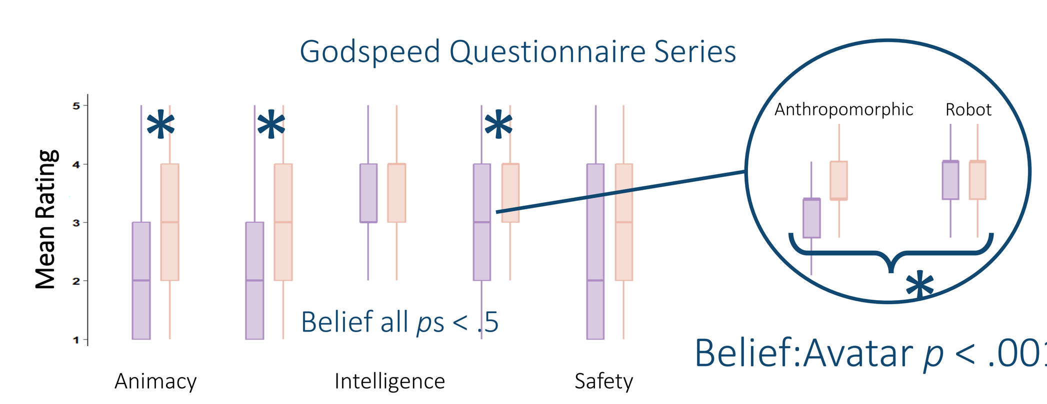
TASK EXPERIENCE



PARTNER PERCEPTION







6. Implications

CONGRUENCY of social cues…
…consistently affects social interactions.

User BELIEF affects…
…reported gaze-following strategies.
…social experiences (interaction & partner).

Complex AVATAR appearance affects…
…frequency of looks at eyes & reaction times.
…social experience (partner).

Implement eye gaze even if users not required to use it!
Ensure cross-modal congruency!

Use labels (e.g., 'human') carefully!

Promote *implicit* intentional stance through naturalistic cues!
Use non-human avatars to reduce social discomfort!

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