Mind perception modulates within-subjects neural encoding of communicative gaze.

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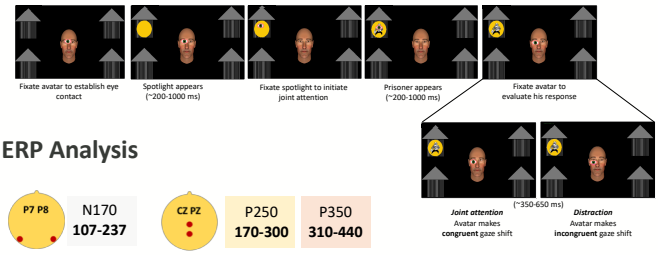
BACKGROUND

- Modern VR and robotics can be used to simulate realistic social interactions, providing ecologically-valid methods for social-neuroscience research **(Caruana et al., 2017)** and the investigation of social challenges in autism and schizophrenia **(Schilbach, 2016)**.
- Adopting an 'intentional stance' towards a virtual agent (or robot) impacts subjective experiences, social behaviour and the neural processing of social cues in the context of gaze-cued joint attention **(Caruana, Spirou & Brock, 2017; Caruana, de Lissa & McArthur, 2017)**.
- However, evidence for the influence of mind perception on gaze evaluation has either been indirect **(Pfeiffer et al., 2014; Wiese et al., 2017)** or utilized between-subjects designs which cannot dismiss the potential impact of individual differences **(Caruana, de Lissa & McArthur, 2015; 2017)**.

METHOD

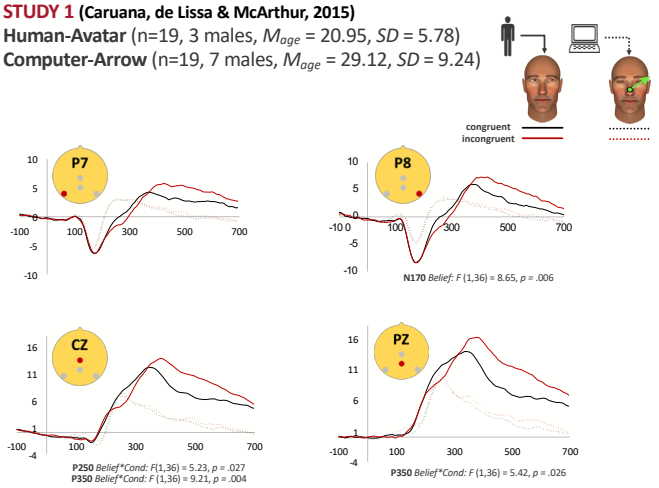
Experimental Task – Cooperative joint attention game



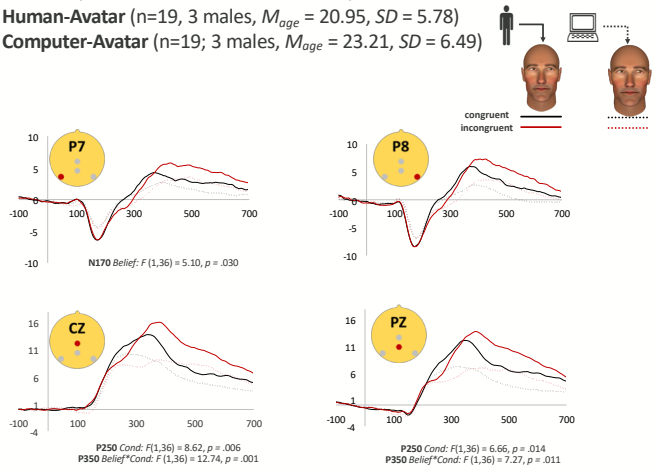
ERP Analysis

PREVIOUS FINDINGS

STUDY 1 (Caruana, de Lissa & McArthur, 2015)
Human-Avatar (n=19, 3 males, M_{age} = 20.95, SD = 5.78)
Computer-Arrow (n=19, 7 males, M_{age} = 29.12, SD = 9.24)

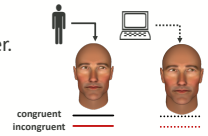


STUDY 2 (Caruana, de Lissa & McArthur, 2017)
Human-Avatar (n=19, 3 males, M_{age} = 20.95, SD = 5.78)
Computer-Avatar (n=19; 3 males, M_{age} = 23.21, SD = 6.49)



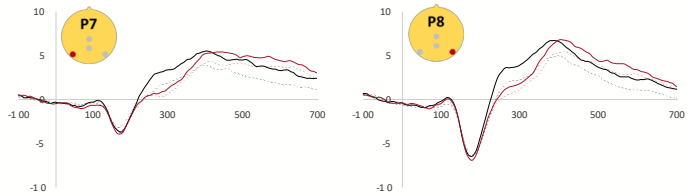
CURRENT STUDY

Belief manipulated within-subjects with counterbalanced order.
(n=20, 5 males, M_{age} = 24.70, SD = 9.05)

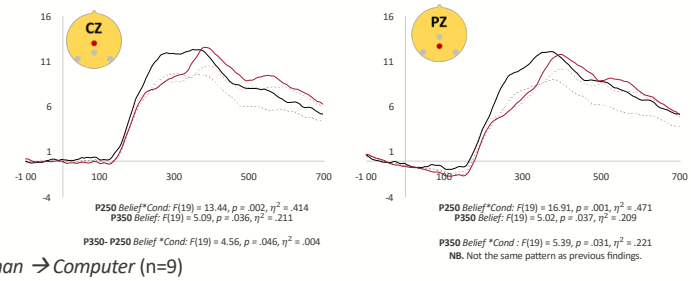


RESULTS

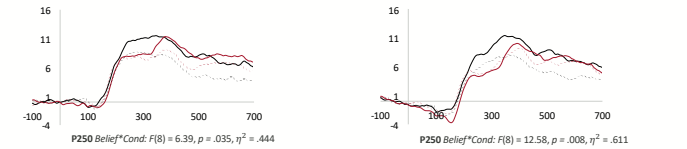
Occipitotemporal N170



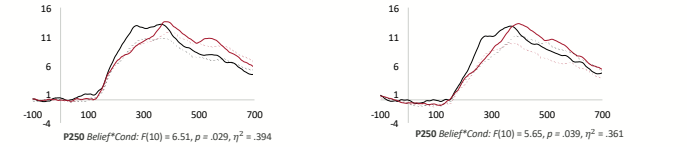
Centro-parietal P250 & P350



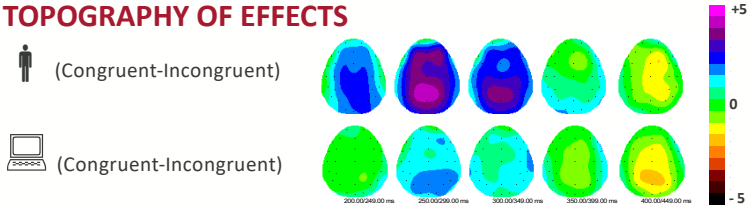
Human → Computer (n=9)



Computer → Human (n=11)



TOPOGRAPHY OF EFFECTS



CONCLUSIONS & IMPLICATIONS

- Whether one perceives a simulated agent as having a mind, capable of attention and intentions, significantly influences the neural evaluation of social cues.
- The centro-parietal P250 response reliably indexes the achievement of joint attention – which is unique to interactions where one adopts an intentional stance.
- The P250 may be a promising neural marker for adopting an intentional stance, which may support the evaluation of virtual and robotic agent design for consumer applications **(see Weise et al., 2017 for review)**.

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