Inhibiting the right temporoparietal junction triggers diametric effects of autism and psychosis traits on mentalizing

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Introduction

- Autism (ASD) and schizophrenia (SSD) spectrum disorders are characterized by impairments in the mentalizing process (i.e. the ability to understand oneself and other's mental states).
- Previous research suggests that autism and psychosis traits diametrically modulate theory of mind, associating undermentalizing with autism and overmentalizing with psychosis (Abu-Akel et al., 2015; Crespi & Badcock, 2008).
- A recent fMRI study (Abu-Akel et al., 2016) showed increased activation of the right ventral posterior temporoparietal junction (rvpTPJ) in individuals prone to psychosis during a social cognition task.
- In this study Transcranial Magnetic Stimulation (TMS) would be used over the rvpTPJ to inhibit its activity during a mentalizing task, and to compare the effects of ASD and SSD traits on task performance.

Does TMS over the rvpTPJ disrupt the mentalizing process?
If so, is this impairment exclusive to psychosis but not autism, as the diametric model proposes?

Methods

Participants

- 30 adults (18+) would complete the Autism-Spectrum Quotient (AQ) and the Community Assessment of Psychic Experiences (CAPE) questionnaires to be assigned to the "ASD group" (high autism-low psychosis) or to the "SSD group" (high psychosis-low autism).

Movie for the Assessment of Social Cognition (MASC) task

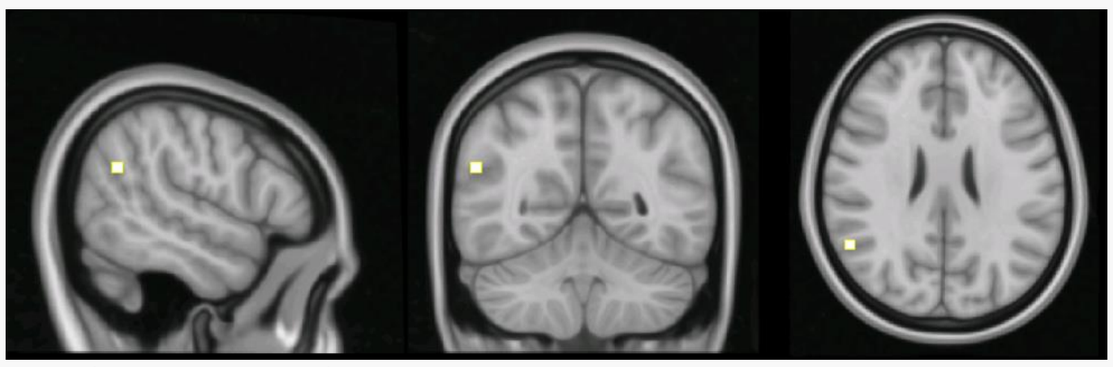
- Mentalizing would be assessed with a TMS adapted version of the MASC (Dziobek et al., 2006).

Every question has only one correct answer (d) and three types of errors: undermentalizing (b), overmentalizing (c) and absence of mentalizing (a).

rTMS

Repetitive transcranial magnetic stimulation (rTMS) would be applied over the rvpTPJ and Cz (control).

- 1 Hz for 10 minutes immediately before task performance.
- Intensity: 60% of the stimulator's maximum output.
- Two sessions (within participants)

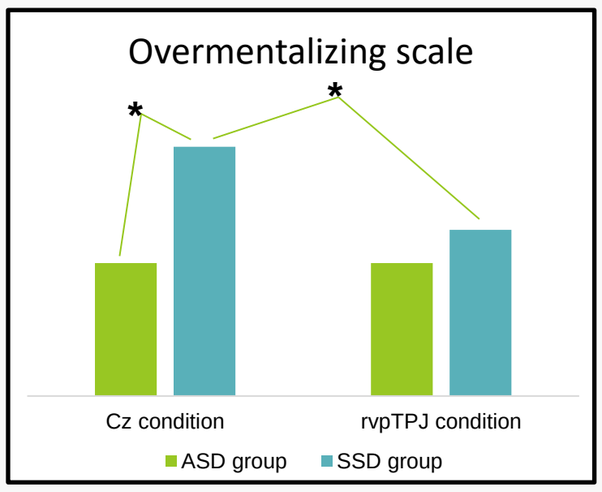


rvpTPJ (x =54, y =-55, z=26)

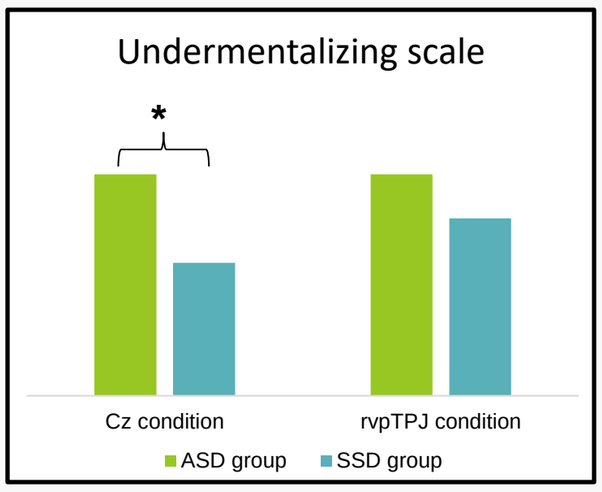
Stimulation sites:

- Cz: coil would be positioned using the 10/20 electrode system.
- rvpTPJ: coordinates were reported in Mars et al. (2012) and coil would be positioned using neuronavigation (Brainsight).

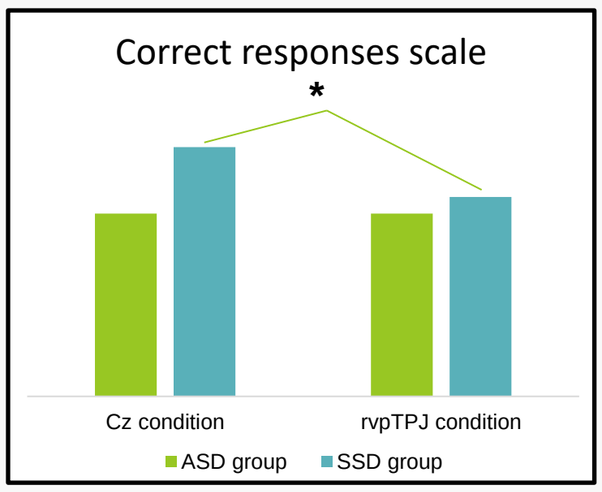
Predicted results



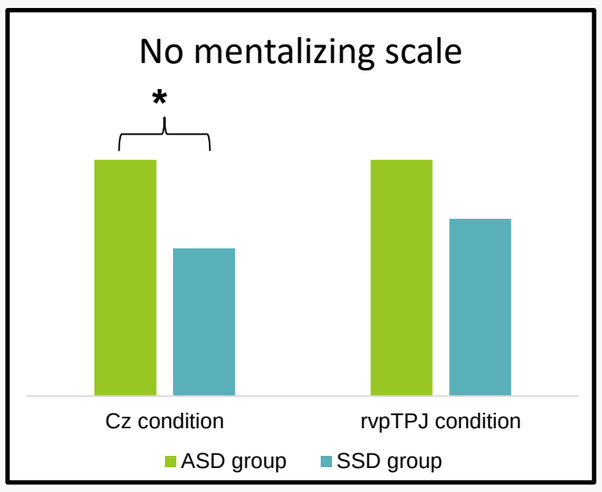
Scores on the overmentalizing scale are significantly higher for the SSD group under normal conditions. The diametric effect is represented by a decrease **only** for the SSD group after rvpTPJ stimulation.



Scores on the undermentalizing scale of the MASC are significantly higher for the ASD group under normal conditions.



Correct responses are expected to be high in both groups because participants are neurotypical. Scores will significantly decrease **only** for the SSD group after rvpTPJ stimulation (diametric effect).



Scores on the absence of mentalizing scale of the MASC are significantly higher for the ASD group under normal conditions.

Conclusion

- Inhibiting the rvpTPJ would lead to an impairment in the mentalizing performance of the SSD group compared to the ASD group, in line with the diametric model. Findings would have important implications for understanding and treatment of these mental disorders.
- Findings would also contribute to the current literature on the neural bases of mentalizing, which remains controversial, and specifically the role of the rvpTPJ within the mentalizing network.
- This study would open the door to a new line of research into possible treatments to enhance mentalizing by using neurostimulation to excite the rvpTPJ in ASD and to inhibit it in SSD.

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