

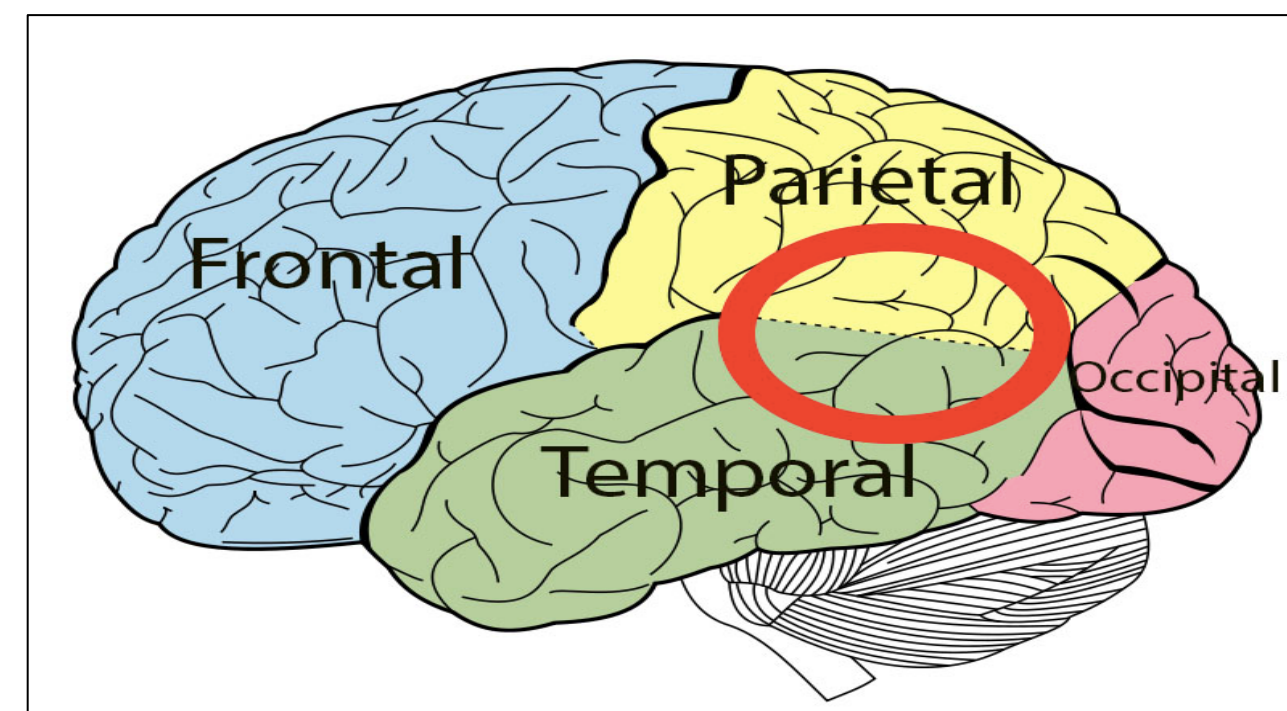
# The temporo-parietal junction – A role in high-level cognition

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## Background

### The Temporo-Parietal Junction (TPJ)

- The region that divides the temporal & parietal lobes
- Believed to support either specifically social functions or non-specific cognitive processes such as attention



**Figure 1.** The location of the temporo-parietal junction on the brain.

### Theory of mind (ToM)

The understanding that the behaviour of others is motivated by internal states such as thoughts, emotions, and beliefs – “mentalizing”

### Gaps in the literature

- The possibility that the TPJ is involved in both ToM and attention reorienting has not been considered extensively
- The validity of the **nexus model** has not been determined

### Nexus Model (Carter & Huettel)

- The overlap of basic processes (e.g. attention) produces novel secondary and higher-order roles (e.g. ToM) that in turn creates a social context for behaviour
- TPJ is broadly involved in social cognition

## Research Goal

- (1) To examine the evidence surrounding the role of the TPJ in attention reorienting and theory of mind.
- (2) To demonstrate that the TPJ is broadly involved in social cognition.

## Abstract

This paper is a critical review of the literature on the role of the temporo-parietal junction (TPJ). Converging evidence demonstrates that the TPJ plays a role in both theory of mind (ToM) and attention reorienting; however, it is unlikely that the TPJ is specialized for either process. Instead, this paper argues that there are areas within the TPJ that functionally dissociate and work together to contribute to the construction of a social context. Specifically, it argues for a more plausible explanation, the "nexus model", which stipulates that the TPJ plays a broader role in social cognition. This makes sense considering that being aware of another person's perceptions, thoughts, and actions - essentially ToM - requires externally directed attention. This area research is still in its infancy and future research should elucidate the nuanced roles that various brain structures and networks play in ToM and attentional reorientation.

## Methodology

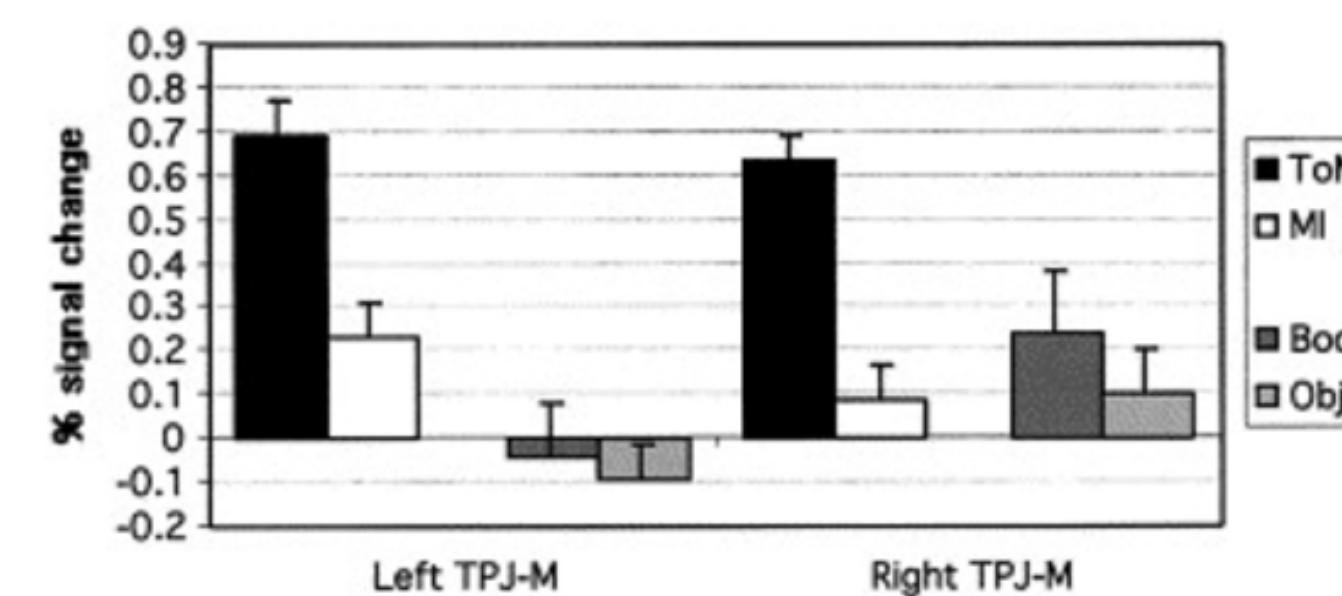


## Results

### TPJ and ToM

- Saxe and colleagues conducted many fMRI studies, all with similar findings: the TPJ was activated more strongly during tasks that required ToM compared to tasks that did not
- Disrupting neural activity in the TPJ using transcranial magnetic stimulation before making a moral judgement leads to participants to rely less on the actor's mental states

**Figure 2.** TPJ responded more significantly to ToM stories than mechanical inference (MI) stories. Retrieved from Saxe & Kanwisher (2003).

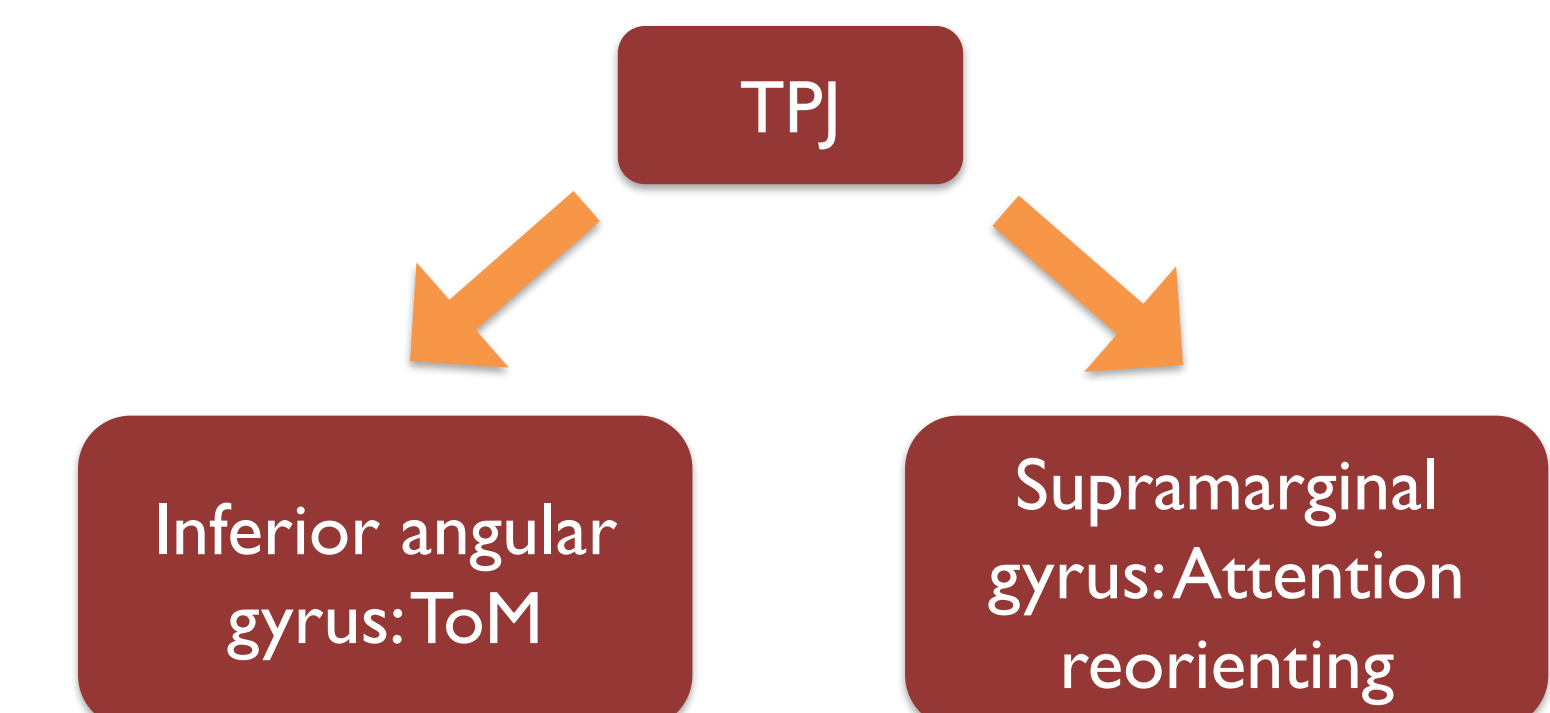


### TPJ and Attention Reorientation

- In spatial cueing tasks, TPJ activity (as measured by fMRI) increased on “invalid” trials and when distracting stimuli were presented
- Lesion studies: Damage to rTPJ is the most common cause of hemifield spatial neglect

### The Nexus Model

- There are similarities between processes involving reorientation of spatial attention and reorienting to another person's point of view
- ToM network – TPJ, precuneus, STS, mPFC
- Developmental psychology: Found that TPJ activity in adults was the same as in children, but the *circumstances* that elicited TPJ activity differed
- Decety & Lamm (2007) found overlapping yet significantly different areas recruited for social & reorienting processes: **Functional dissociation**



## Conclusion

- TPJ plays a broad role in social cognition - specifically, there are areas within the TPJ that functionally dissociate
- Specialized cortical functions are not limited to primary, sensory, and perceptual functions but also exist for very high-level and abstract level of human cognition

## Acknowledgements

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