The intraparietal sulcus may NOT play a domain-specific role in criterion shifting during recognition memory versus visual detection tests

F53

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Background

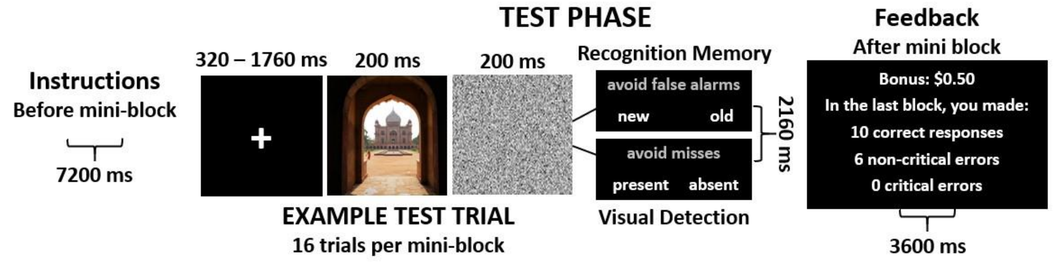
Maintaining a conservative versus liberal decision criterion during recognition memory is associated with widespread frontoparietal activity[1,2]. Within this frontoparietal network is the intraparietal sulcus (IPS), which is implicated in decision-making processes related to both perceptual and memory judgments. However, it is unclear whether the IPS plays a domain-general or domain-specific role when maintaining conservative versus liberal decision criteria. To investigate the role of IPS in criterion shifting across decision domains, participants (N = 30) conducted recognition memory and visual detection tests during fMRI scanning. Both tasks included a criterion and discriminability manipulation. Participants additionally conducted a simple saccade task, which allowed for subject-specific functional localization of the IPS. We examined IPS activity within the target versus nontarget response contrast across task (recognition memory and visual detection), criterion (conservative and liberal), and discriminability (moderate and low) conditions using a linear mixed model.

Tasks

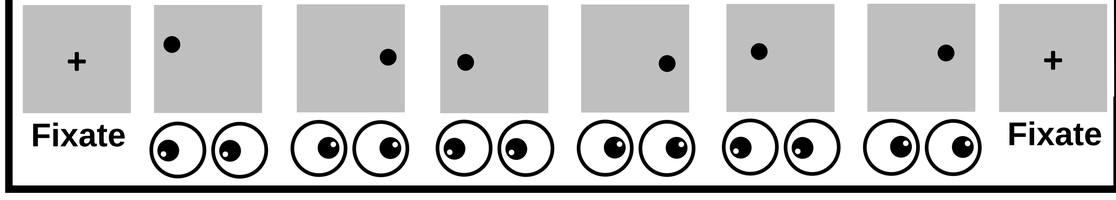
Instructions prior to each mini-block

	Recognition Memory	Visual Detection
Conservative	MEMORY TEST You will be penalized for saying a scene is old when it is actually new. Avoid making false alarms by choosing new.	TARGET DETECTION TEST You will be penalized for saying a person is present when a person is actually absent. Avoid making false alarms by choosing absent.
Liberal	MEMORY TEST You will be penalized for saying a scene is old when it is actually new. Avoid making false alarms by choosing new.	TARGET DETECTION TEST You will be penalized for saying a person is absent when a person is actually present. Avoid missing people by choosing present.

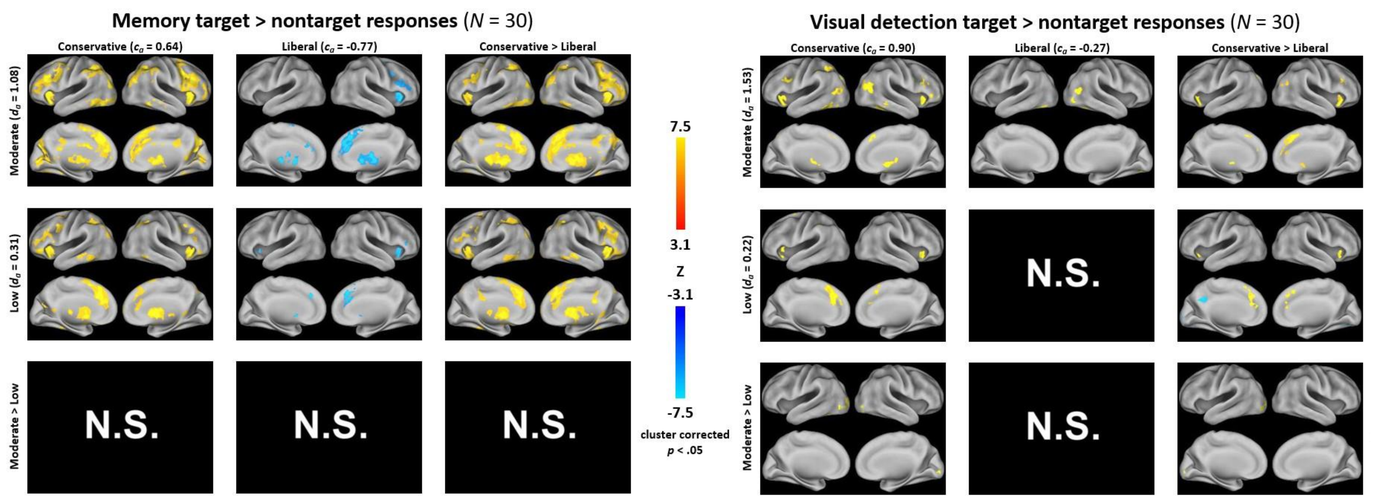
Discriminability
Low: 1x
Moderate: 6x



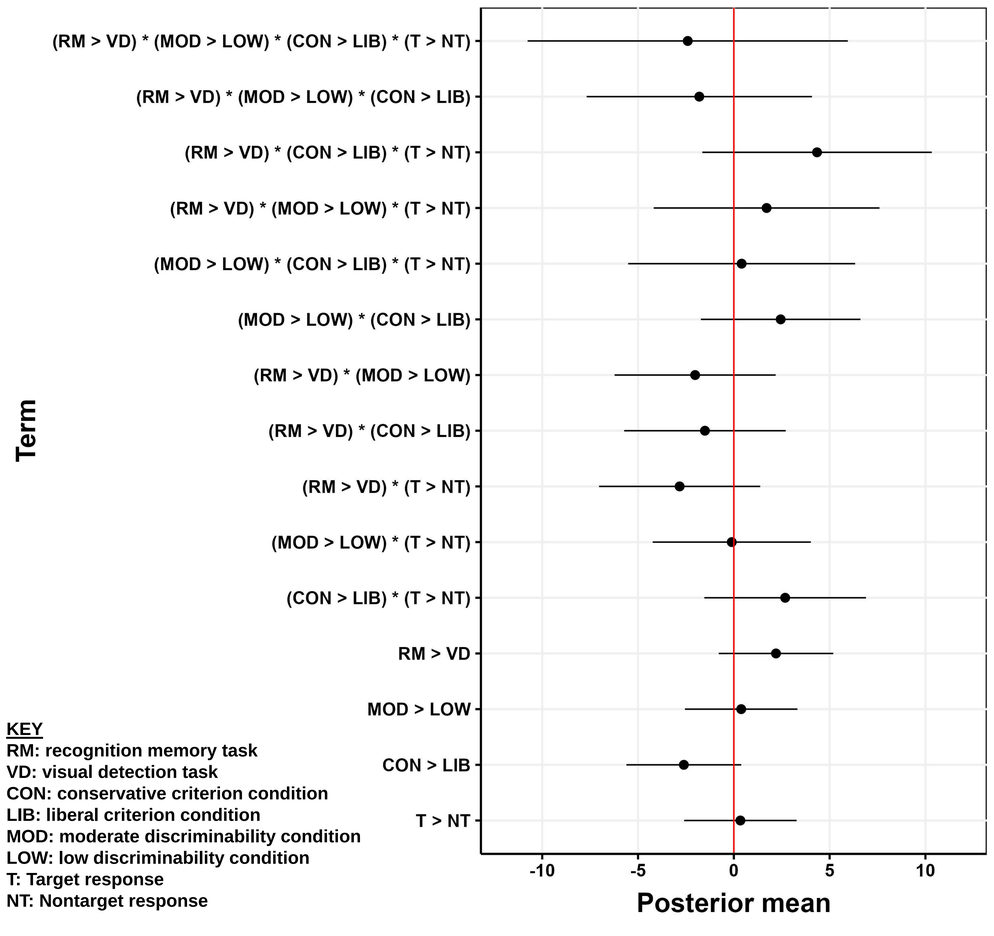
Saccade IPS localizer task (<6 minutes)



Results: Target > Nontarget Response Contrast



IPS PARAMETER ESTIMATES



KEY
RM: recognition memory task
VD: visual detection task
CON: conservative criterion condition
LIB: liberal criterion condition
MOD: moderate discriminability condition
LOW: low discriminability condition
T: Target response
NT: Nontarget response

Conclusion

The IPS does not appear to be significantly modulated by task type across criterion or discriminability manipulations in the T > NT response contrast.

It is possible that the IPS plays a domain-general role in regards to shifting between conservative and liberal decision criteria.

However, there is a trend suggesting that the IPS may exhibit greater activity in the recognition memory vs. visual detection task when comparing across criterion conditions and responses types.

More analyses are needed to better assess the role of the IPS across decision domains

References

[1] Aminoff, E., Freeman, S., Clewett, D., Tipper, C., Frithsen, A., Johnson, A., Grafton, S., & Miller, M. (2015). Maintaining a cautious state of mind during a recognition test: A large-scale fMRI study. *Neuropsychologia, 67*, 132–147. https://doi.org/10.1016/j.neuropsychologia.2014.12.011

[2] Layher E., Santander T., Chakravarthula, P., Marinsek N., Turner, B.O., Eckstein, E. P., Miller, M.B. (*under review*). Widespread frontoparietal fMRI activity is greatly affected by changes in criterion placement, not discriminability, during recognition memory and visual detection tests

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