EEG and behavioral effects of delay-period rTMS

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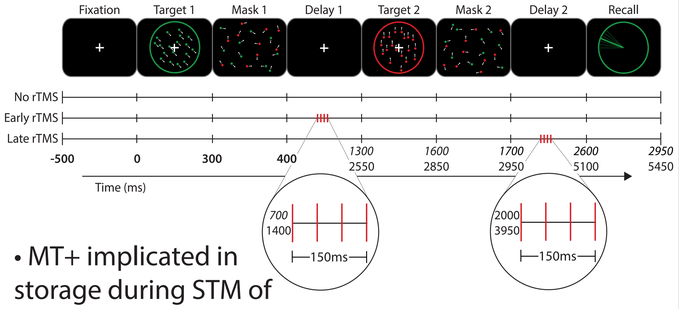
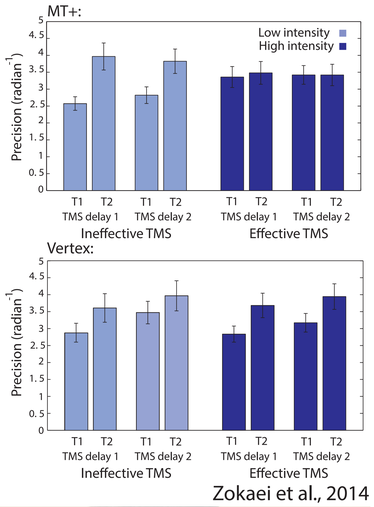
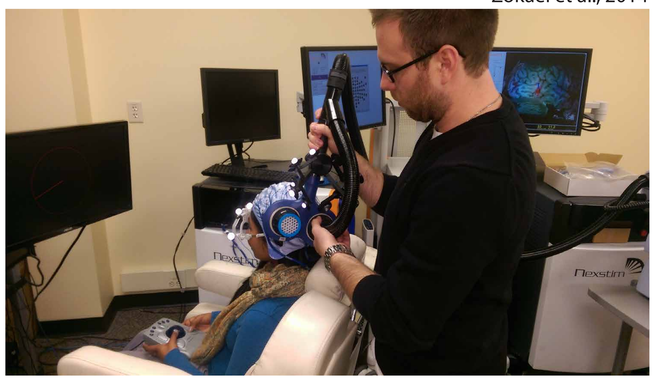
Introduction



- MT+ implicated in storage during STM of motion (Riggall and Postle, 2012; Emrich et al., 2013)
- rTMS alters motion recall precision; abolishes attentional privilege (Zokaei et al, 2014)



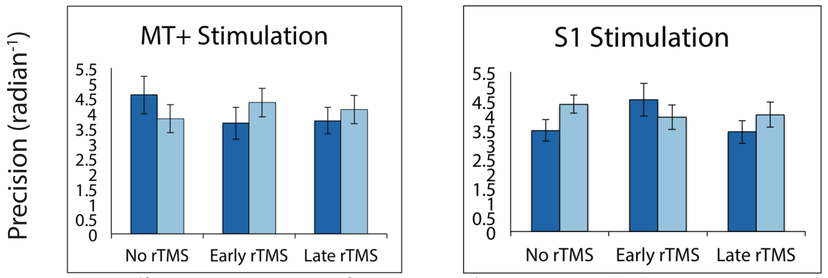
Zokaei et al., 2014



Replicated procedure with TMS compatible EEG

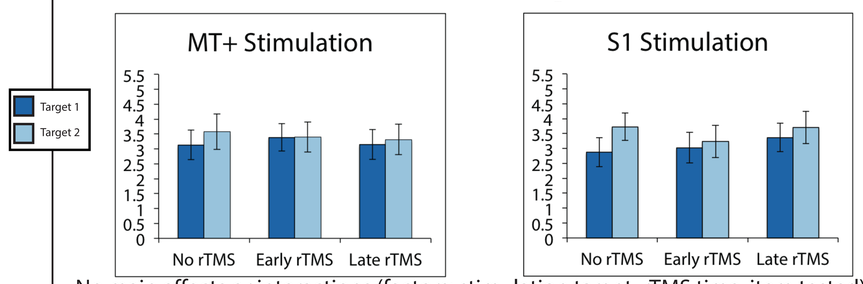
- Are the neural mechanisms of early and late rTMS different?
- Does behavior reflect enhanced retention of item 1, or compromised encoding and/or retention of item 2?

Behavioral Results: Exp 1 (N=9)



- No main effects or interactions (factors: stimulation target, rTMS time, item tested)
- For S1 no TMS condition, precision for item 2 is greater than precision for item 1 (t=2.13,p<.05)

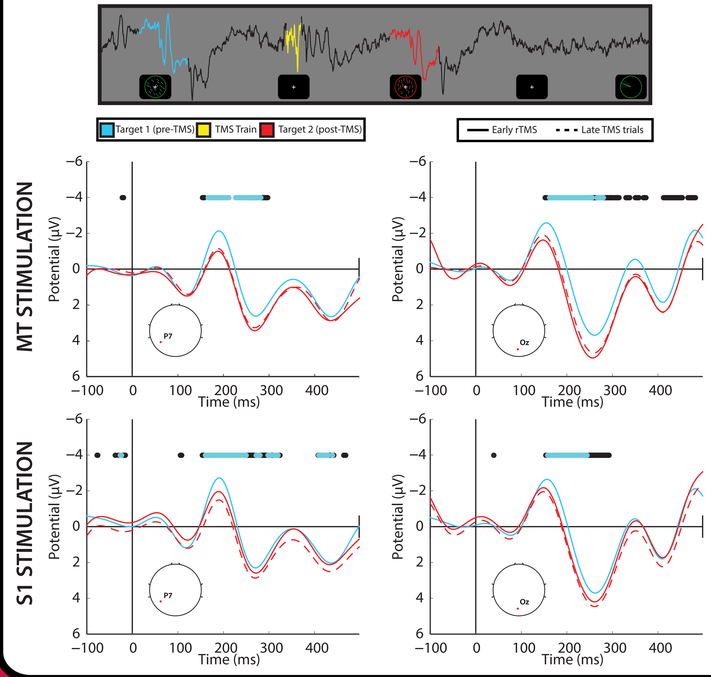
Behavioral Results: Exp 2 (N=9)

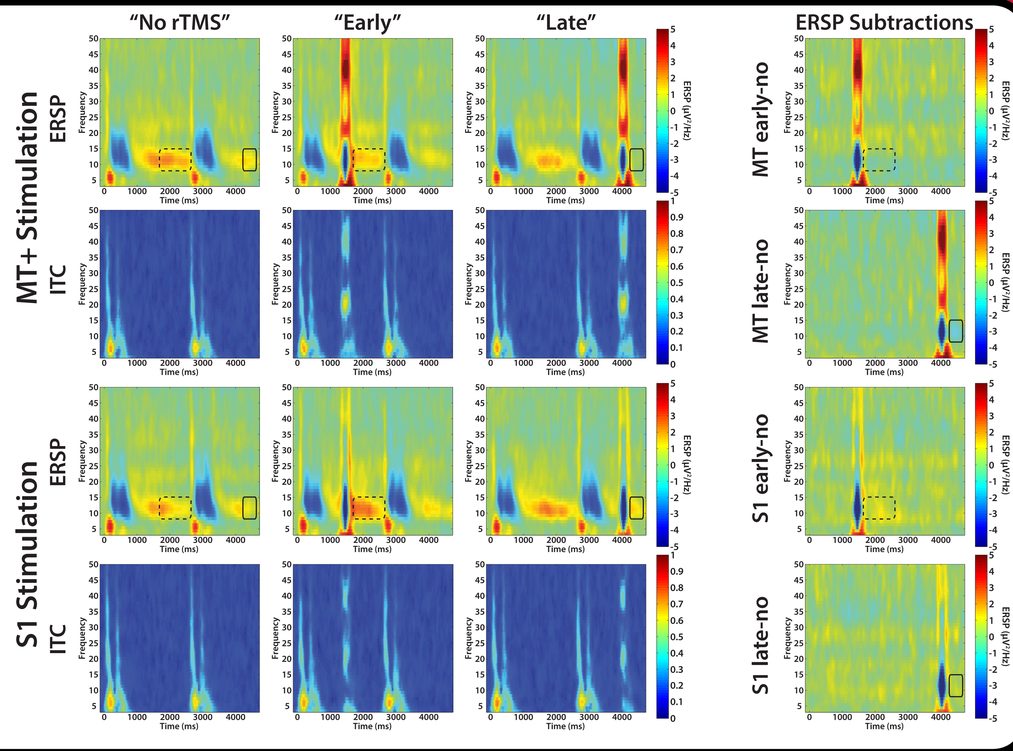


- No main effects or interactions (factors: stimulation target, rTMS time, item tested)
- Across stimulation site, for no rTMS, precision for item 2 is greater than precision for item 1 (t=1.79, p<.05)
- Lower overall precision in Exp 2

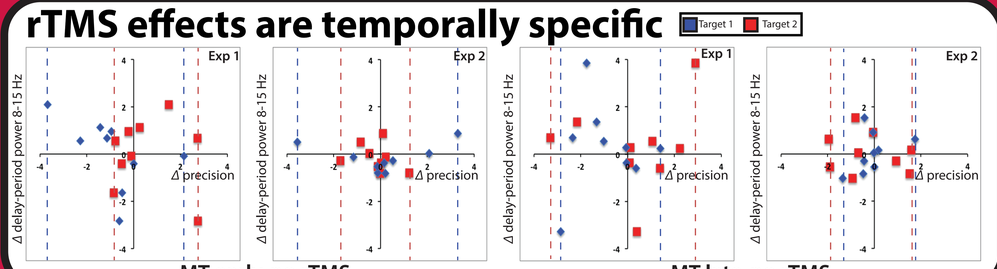
Neural Results

**Note: ERPs are averaged across experiments (N=18). ERSPs show data from experiment 2 only (N=9).





rTMS effects are temporally specific



Conclusions

- rTMS does not appear to affect encoding of subsequent items
- rTMS influences delay-period activity in alpha and low-beta bands
- 20 Hz rTMS has largest effect on retention of most recently presented item
- No evidence for a systematic effect on the focus of attention

References

1. Bays PM, Catalao RFG, & Husain M (2009). The precision of visual working memory is set by allocation of a shared resource. J. Vis., 9(10): 7, 1-11.
2. Emrich SM, Riggall AC, LaRocque JJ, & Postle BR (2013). Distributed patterns of activity in sensory cortex reflect the precision of multiple items maintained in visual short-term memory. *J. Neurosci.*,33(15): 6516-6523.
3. Riggall AC & Postle BR (2012). The relationship between working memory storage and elevated activity, as measured with functional magnetic resonance imaging. *J. Neurosci.*, 32(38): 12990-12998.
4. Zokaei N, Manohar S, Husain M, Feredoes E (2014). Causal evidence for a privileged working memory state in early visual cortex. *J. Neurosci.*, 34(1): 158-162.

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