

# Modulating the cortico-striatal output gate of working memory

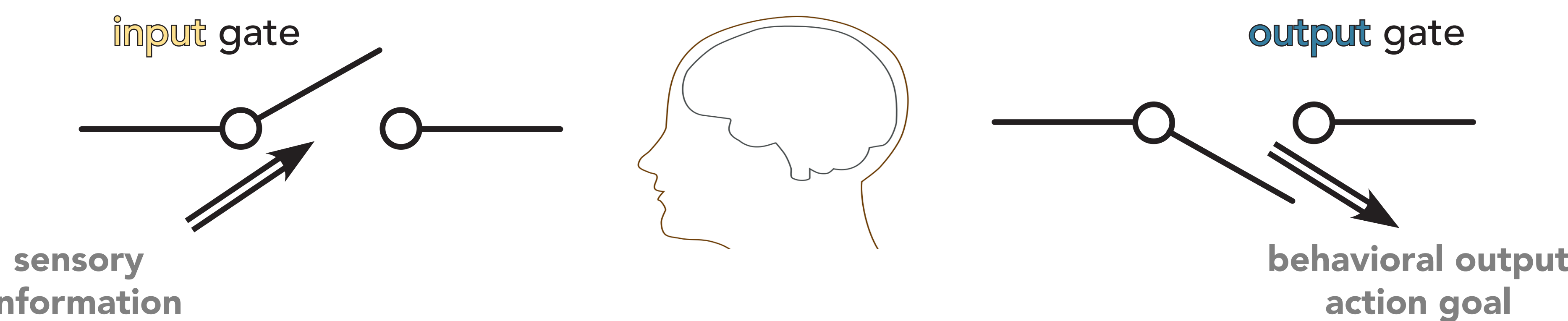
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## Summary

- Working memory (WM) content biases ongoing behavior dependent on task relevance and priority
- TMS targeting of cortico-striatal output gating circuitry alters the impact of WM content on action

## Working memory is a gating process

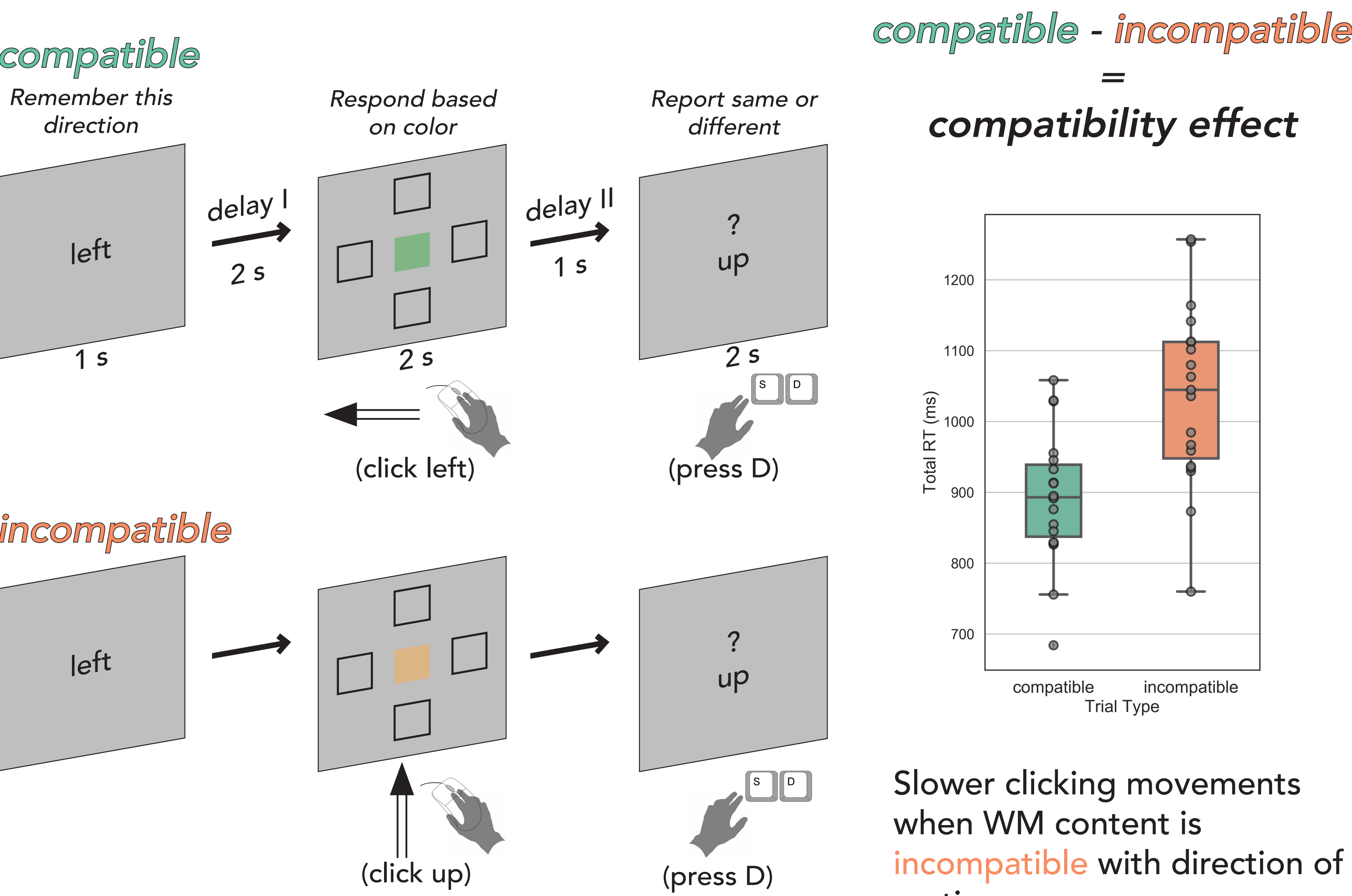
- WM content influences attention toward external stimuli<sup>1</sup>
- A primary goal of WM is to guide future action
- WM content is often maintained for a future goal, during performance of more immediate tasks<sup>2</sup>



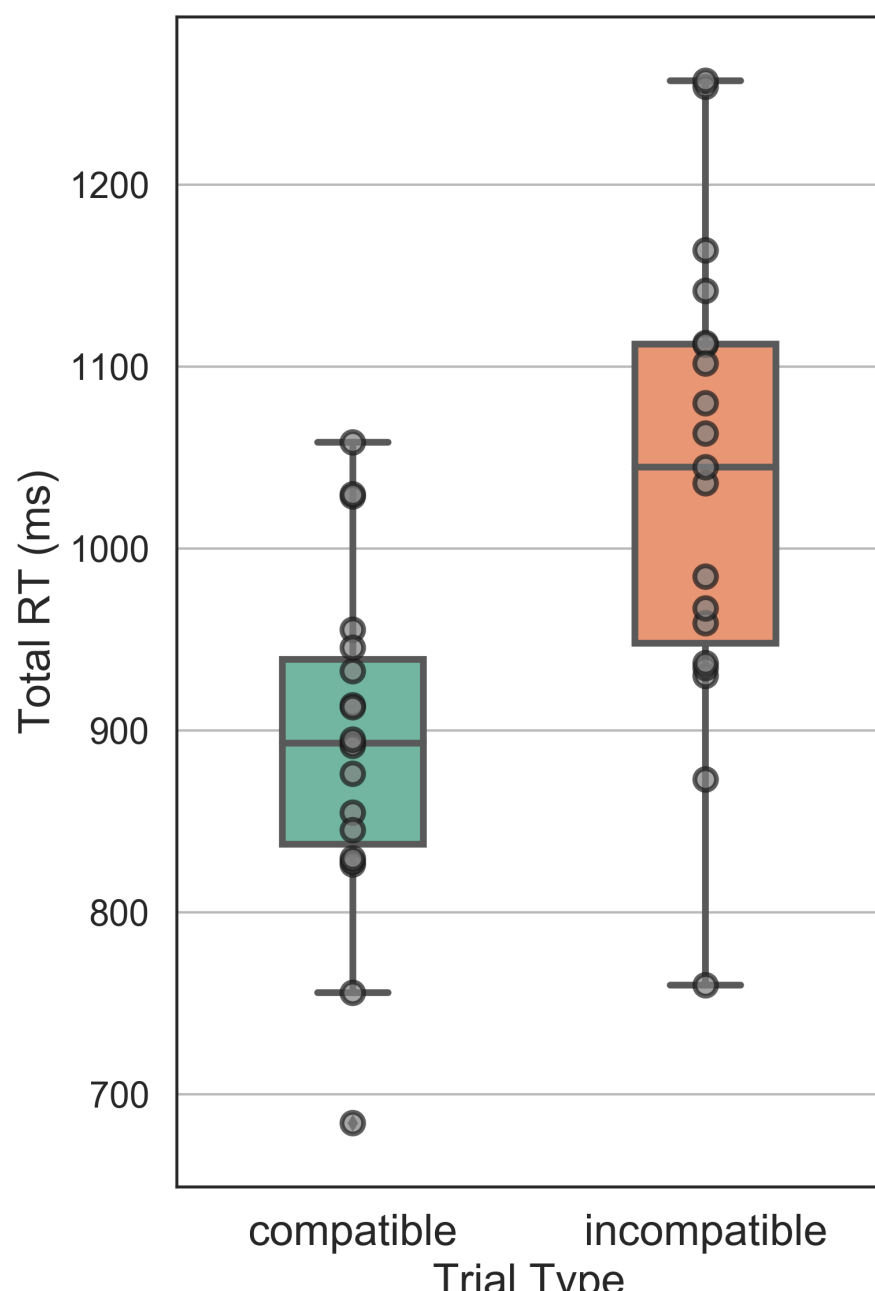
- Does WM content influence ongoing action, and is this influence modulated by WM priority/activation status?
- Can we causally probe the corticostriatal *output gate* to modulate the WM influence?

## Output gating behavioral paradigm

Does verbal WM content impact motor action?



compatible - incompatible  
= compatibility effect

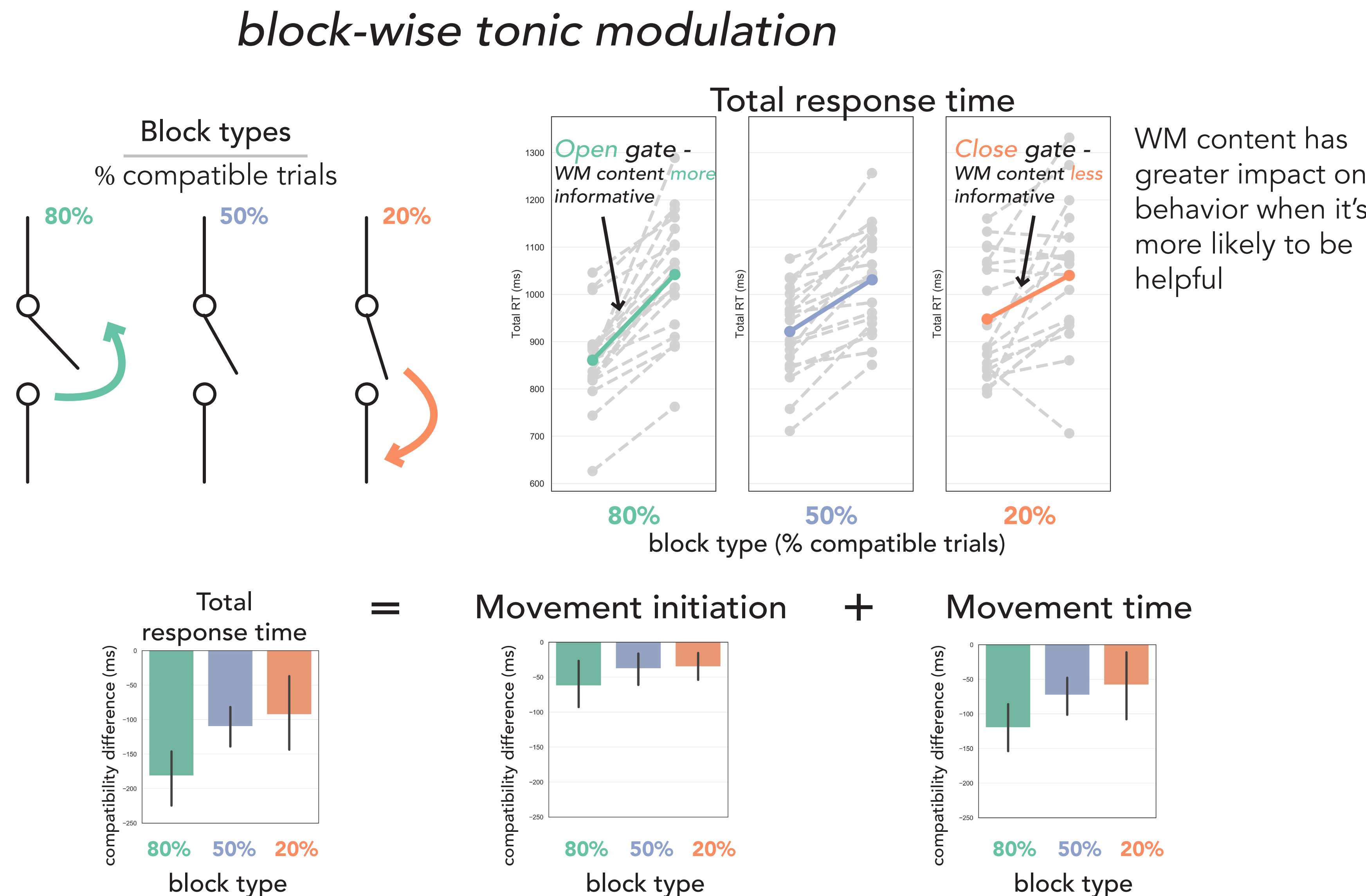


Slower clicking movements when WM content is incompatible with direction of motion

WM content influences ongoing action

## Manipulating the priority status of WM content to modulate output gating onto behavior

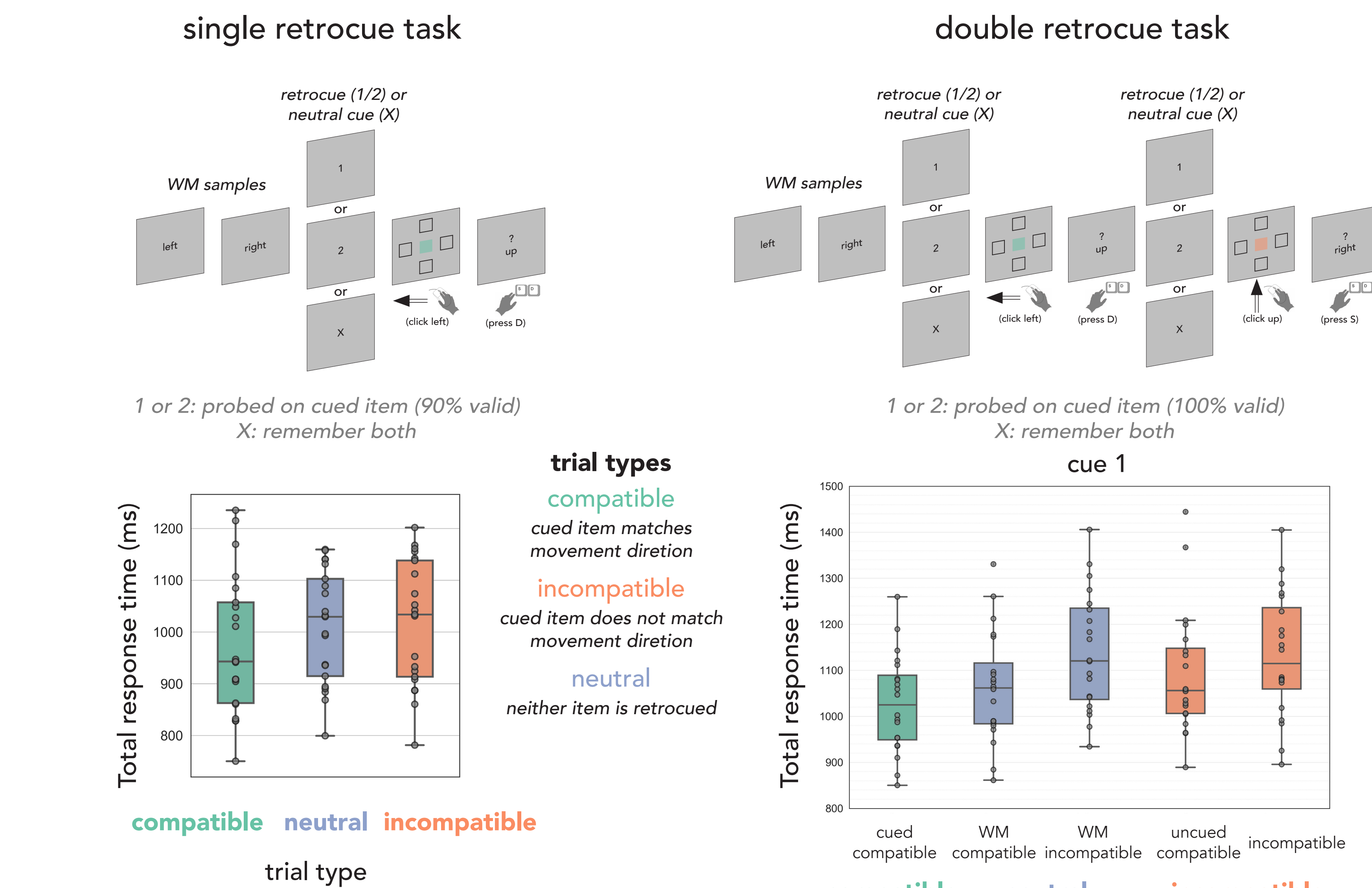
How does the relevance of WM content modulate its impact on behavior? vary proportion of compatible / incompatible trials



Extent of action bias modulated by the likelihood that WM and action goals will overlap  
Bias is specific towards items in WM  
Consistent with idea that WM relevance influences output gating of WM content to control motor behavior

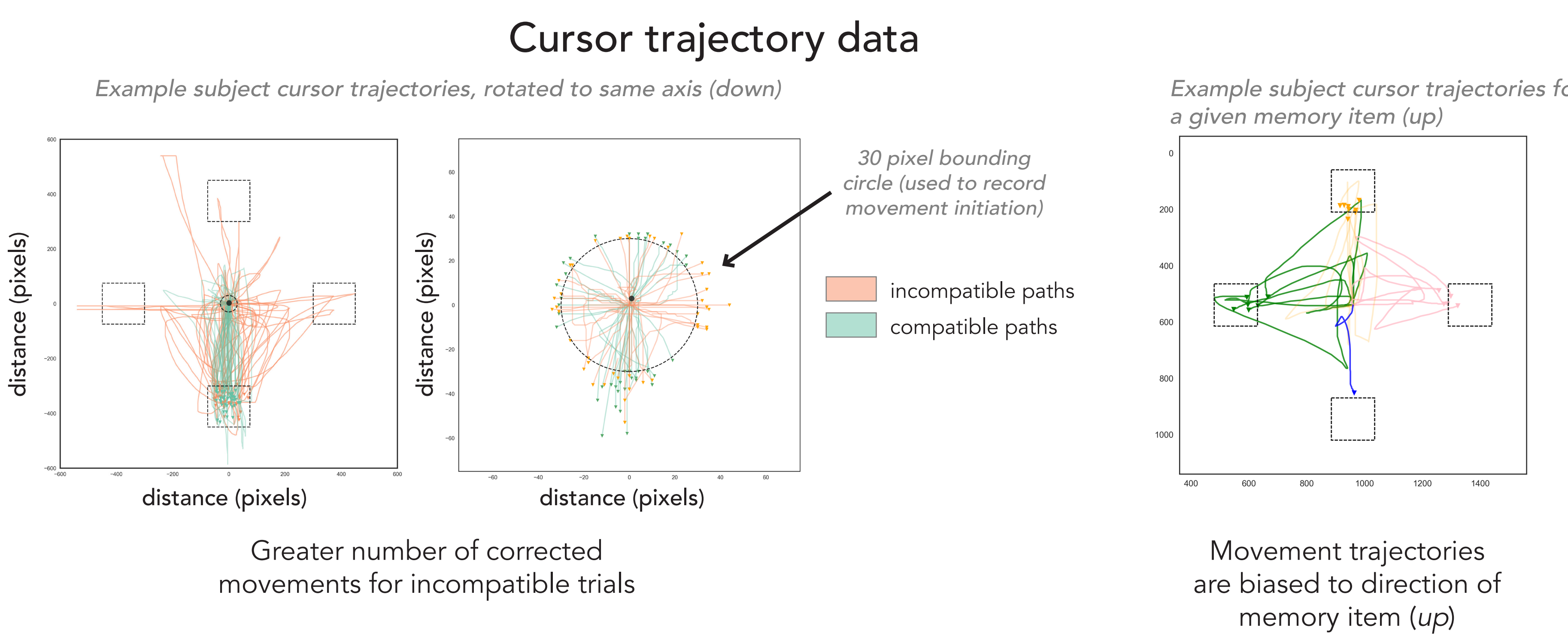
Multiple items in WM - how does priority status of WM items influence ongoing behavior?

## trial-wise retrospective cue manipulation

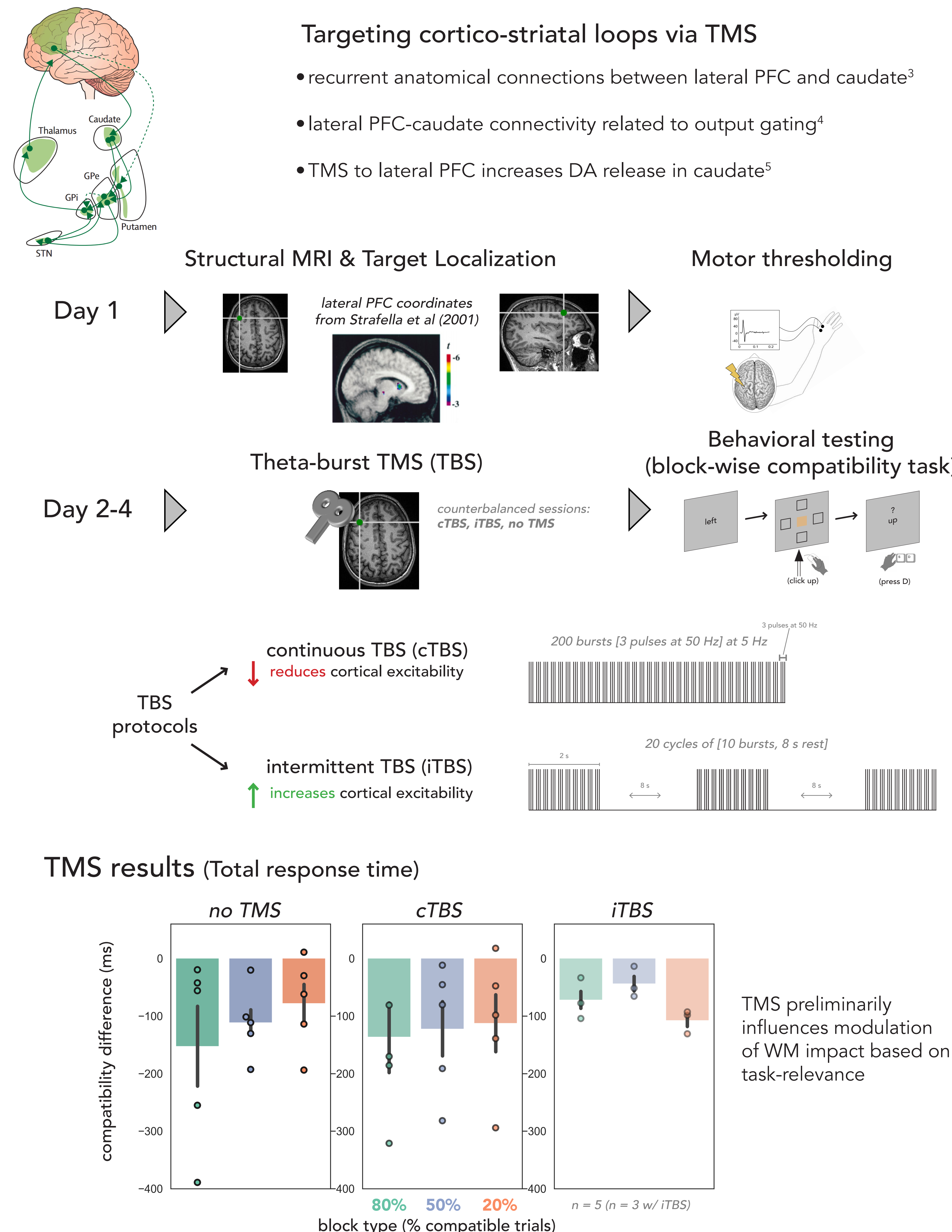


Faster clicking movements when prioritized WM content matches direction of motion

Deprioritized WM item still influences behavior (to a lesser extent as a prioritized one)



## Transcranial Magnetic Stimulation (TMS) procedure



References  
1. Soto et al., JEP: HP & P (2005) 2. D’Esposito & Postle, Annu Rev Psych (2015), 3. Rodriguez-Oroz et al., Lancet: Neurology (2009), 4. Chatham et al., Neuron (2014), 5. Strafella et al., J. Neuro. (2001)