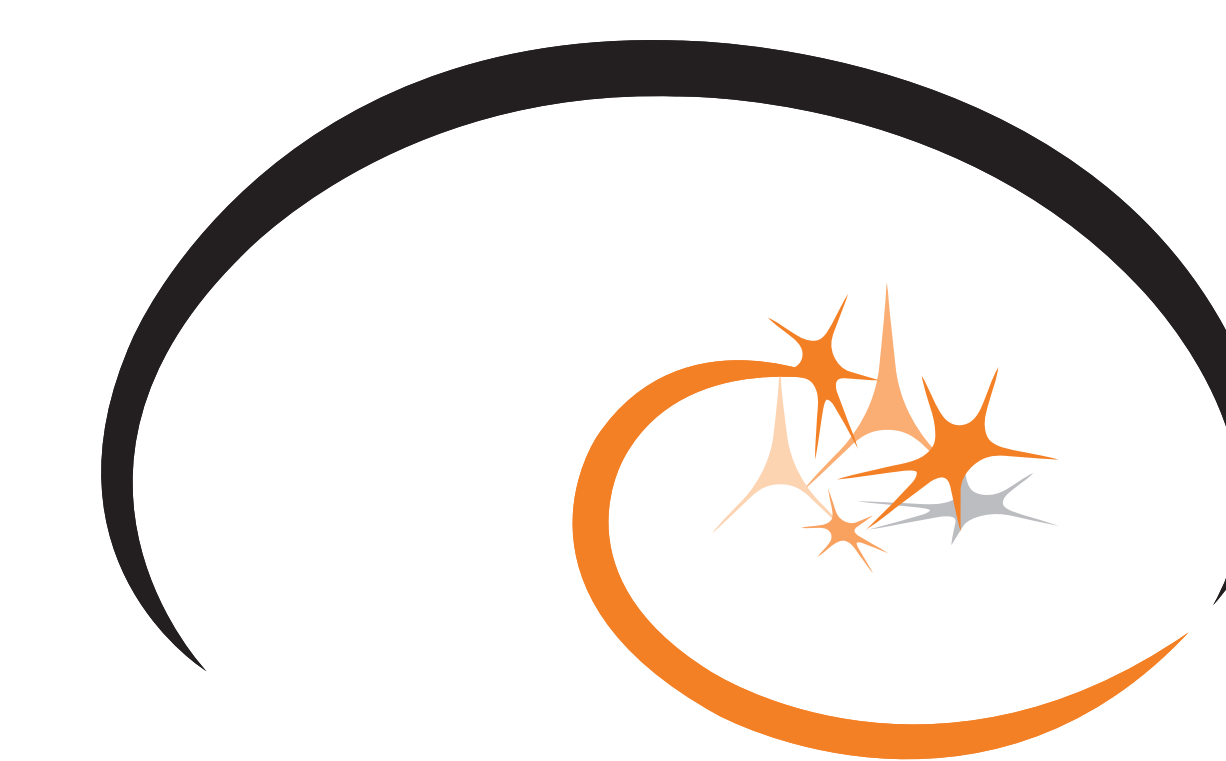




The strategic allocation of working memory and episodic memory in prospective remembering: A neural network model

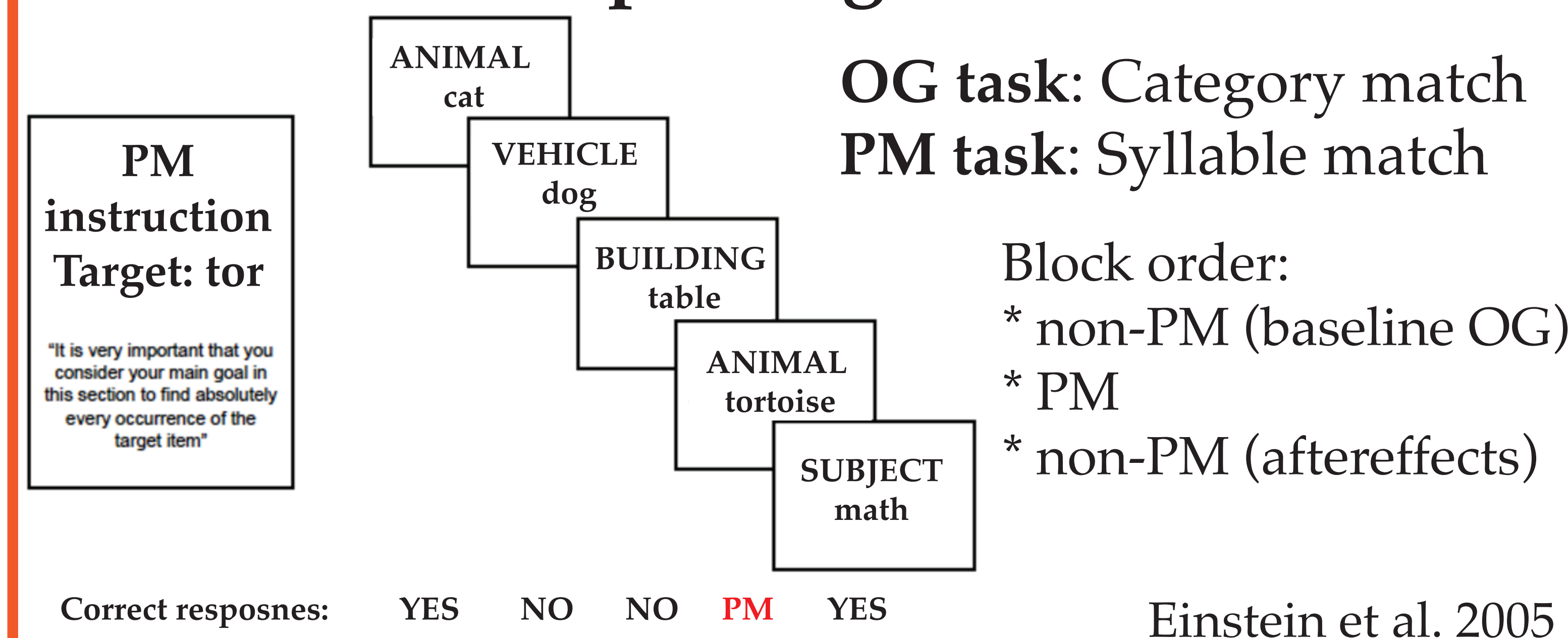
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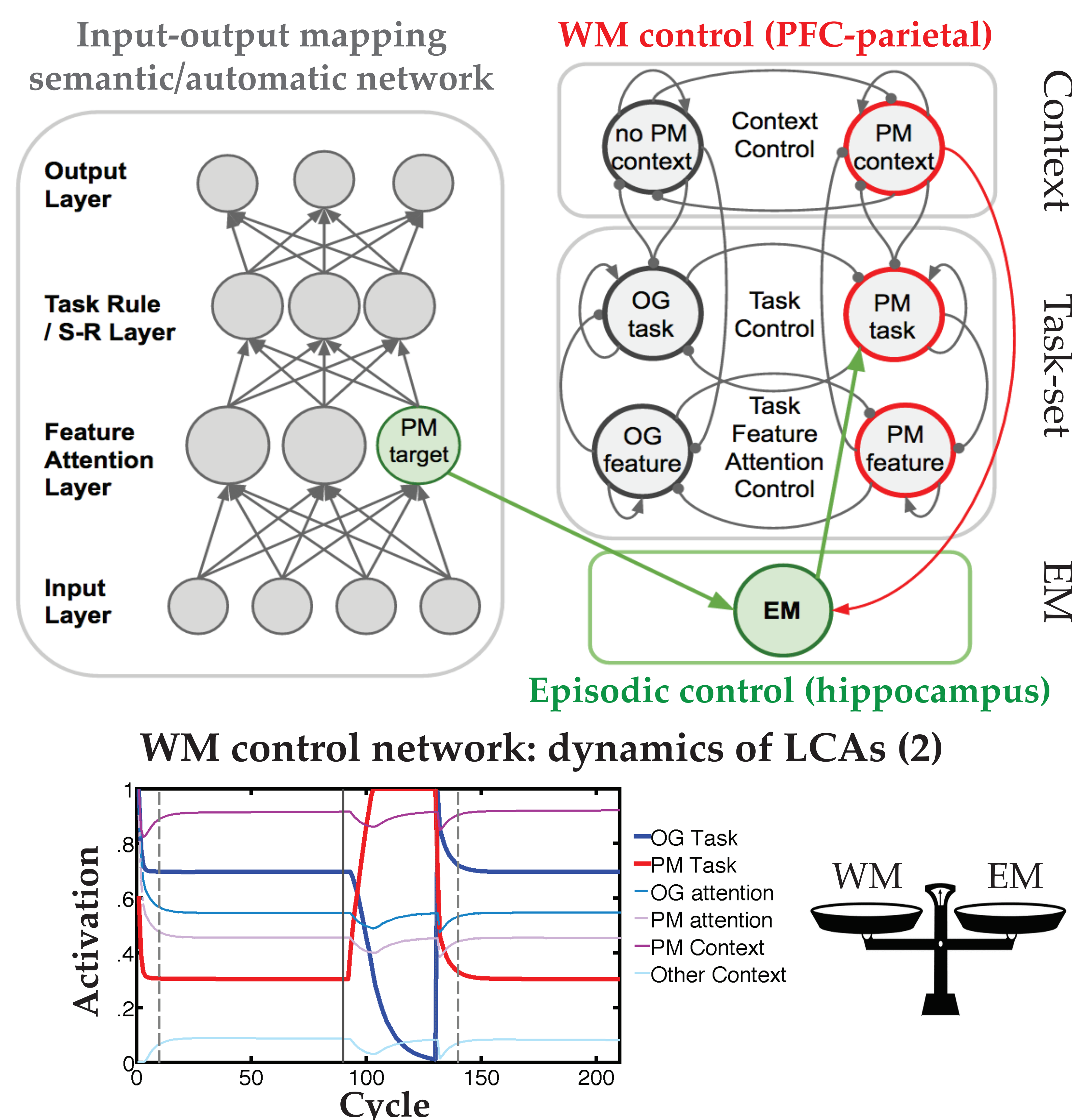
I. Background

The successful realization of future plans, prospective memory or PM, requires the agent to maintain and retrieve a goal for execution at a future time. PM poses a memory problem for periods during which the agent is occupied with other ongoing tasks (OG) while being responsive to target events that demand goal execution. We suggest a mechanistic account of how working memory (WM) and episodic memory (EM) strategies are integrated to strike the right balance between maintenance and retrieval when solving varieties of PM problem.

II. Behavioral paradigm



III. Neural network model



IV. Simulation of major behavioral phenomena

Exp1. Focality X Emphasis

Focal PM:

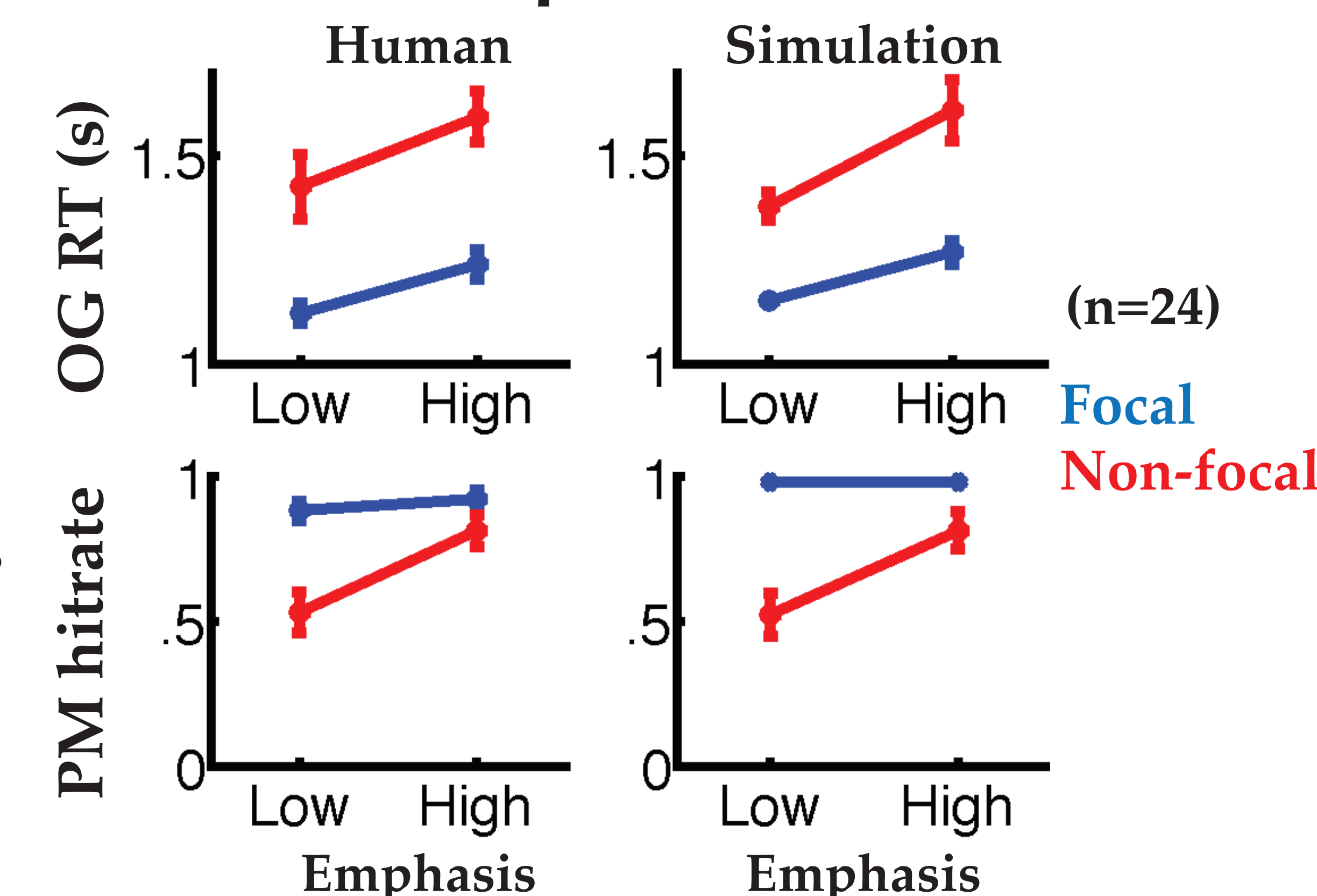
OG task's stimulus features are same as PM target's

Non-focal PM:

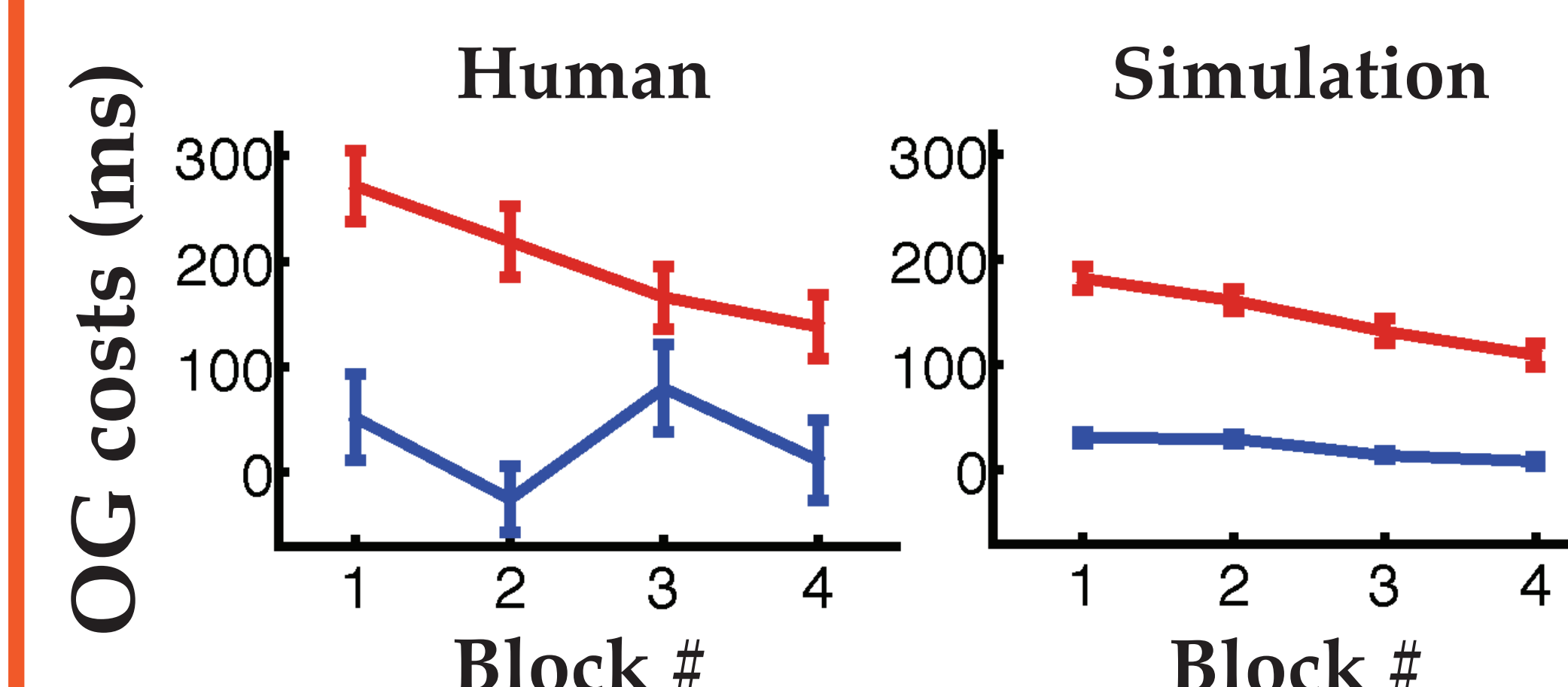
Attention to different features for OG stimuli vs. PM target

PM emphasis:

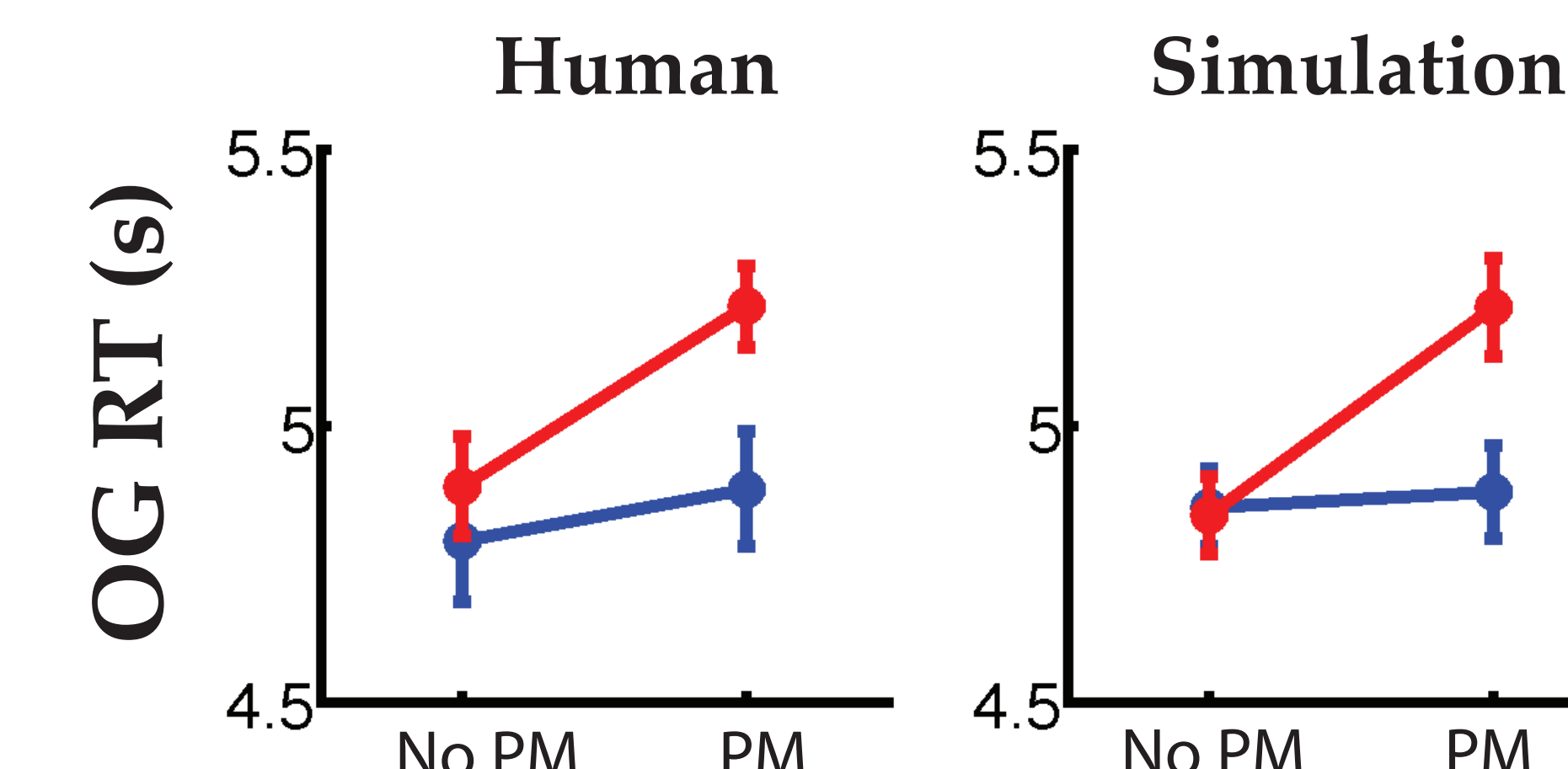
Priority of PM vs. OG (e.g. PM more rewarding)



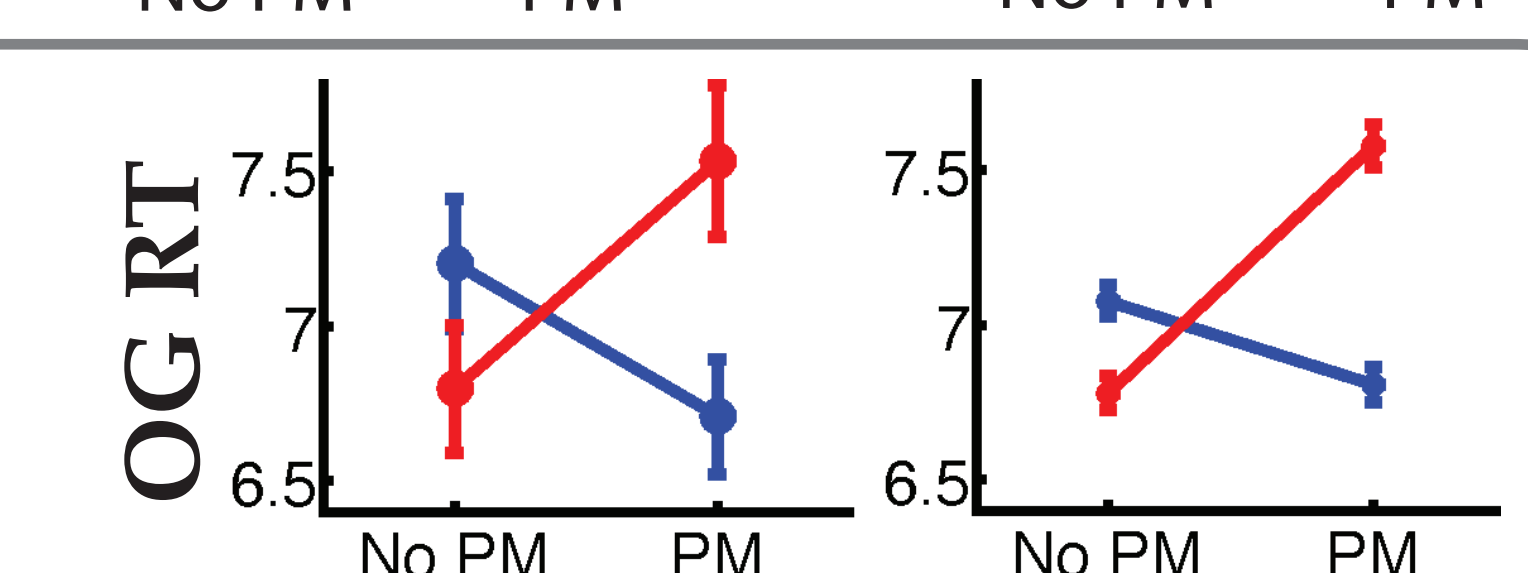
Exp 2. Focal vs. nonfocal costs over time



Exp 3. 1 target vs. 6 targets

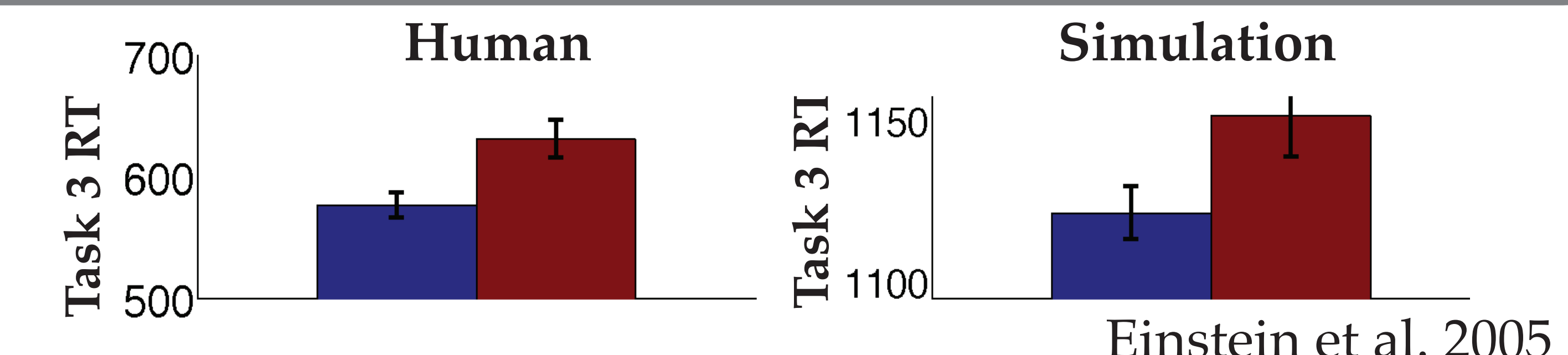


Exp 4. Individual differences in OG RT costs reflect low cost vs. high cost strategies (n=104)

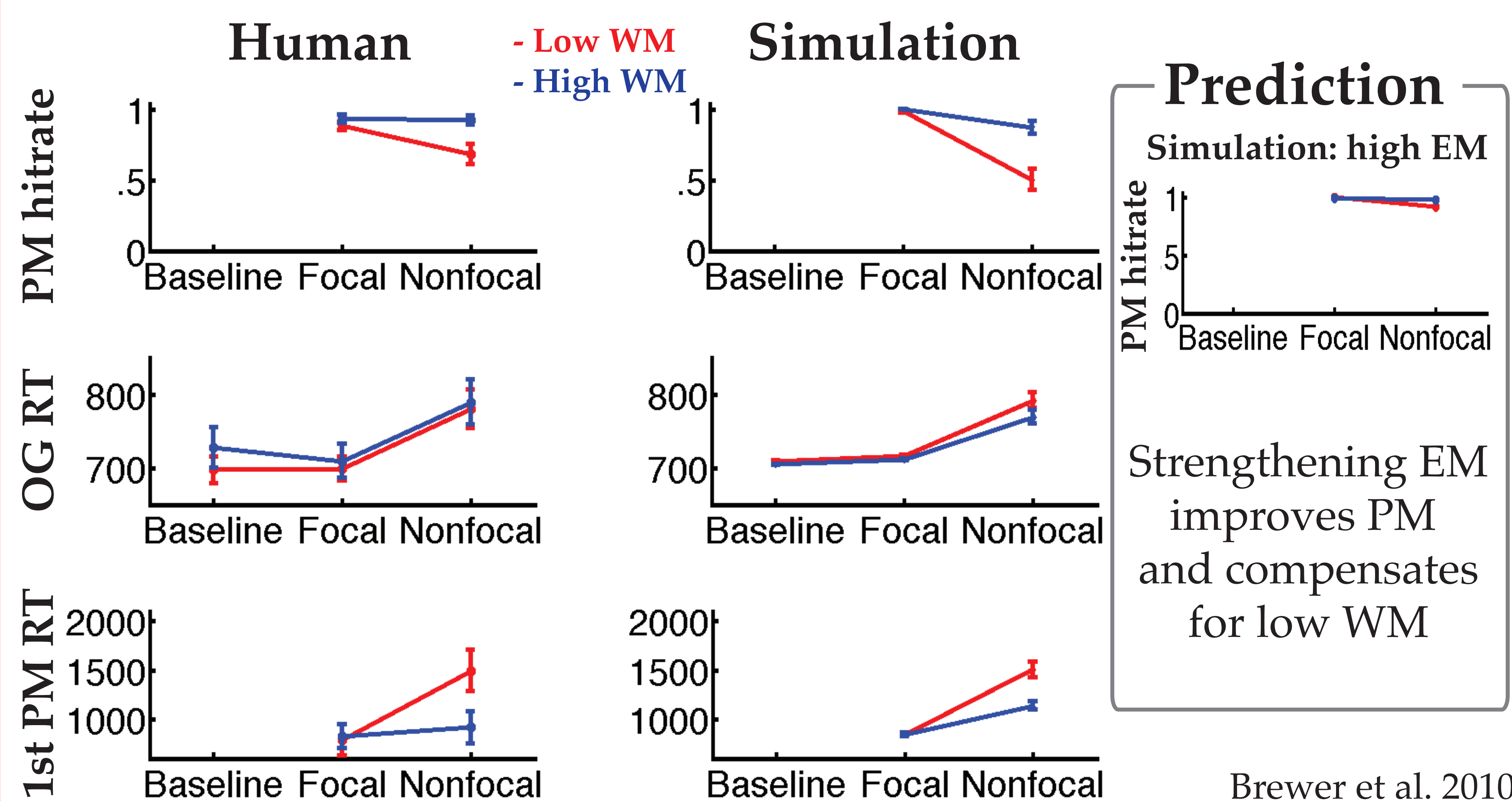


Exp 5. After-effects

after PM task is over, slower RT to a **former target** during 3rd task

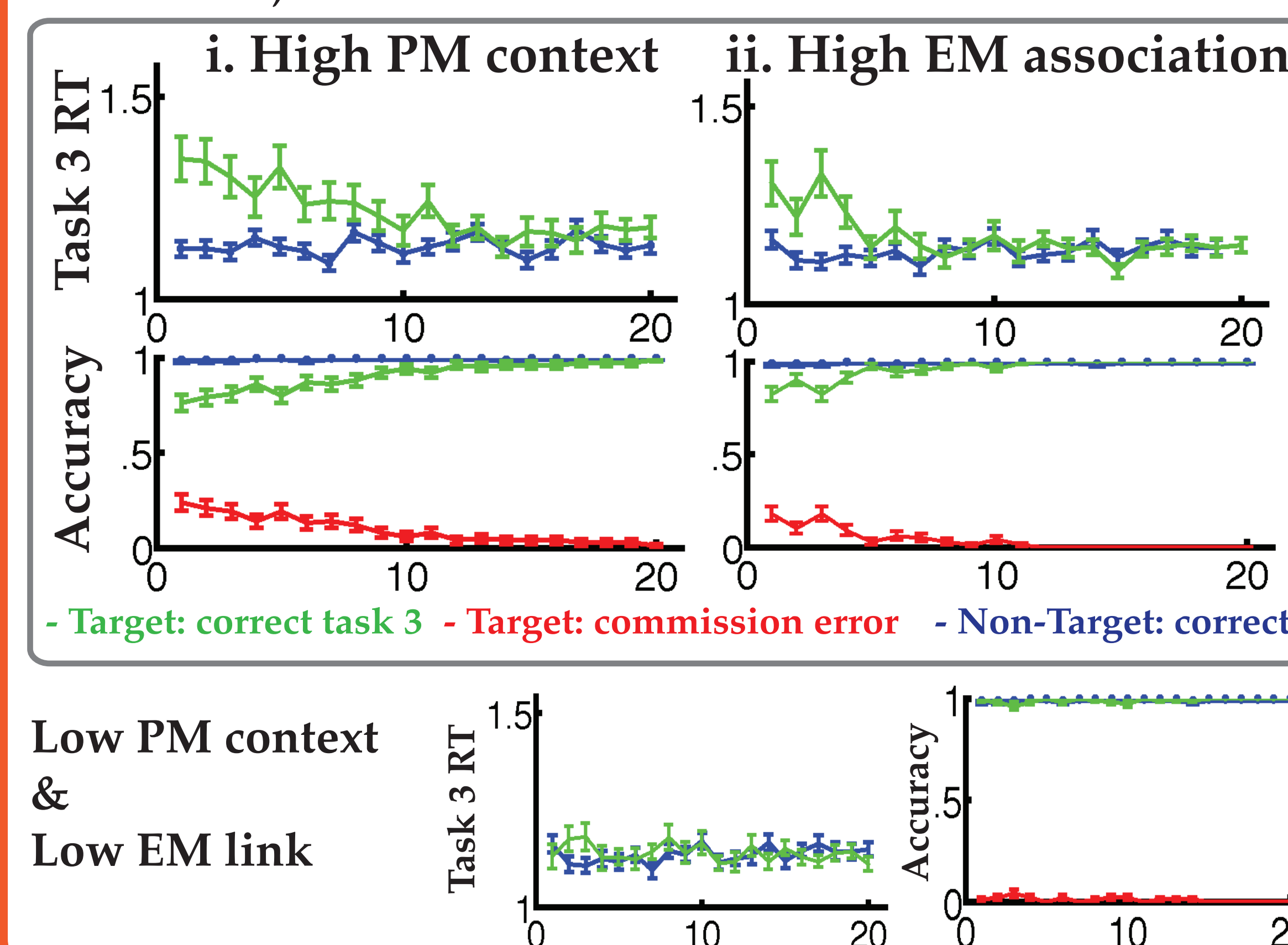


V. WM capacity & strategic WM-EM balance



VI. Commission errors

Commission errors: PM response is made outside PM context. We suggest (i) strong encoding of PM context or (ii) strong EM target-task association can trigger a bottom-up reaction to a former PM target. Over time, context activation & hence CEs diminish.



Conclusions

Our mechanistic model combines WM & EM strategies to solve the prospective memory problem, & shows human-like regulation of planned action while performing ongoing tasks. Representations & dynamics derived from the model can be compared to patterns & dynamics of fMRI data from PM paradigms to test our proposed mechanism.

References & acknowledgments

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 - 3- Brewer et al. (2010). Individual differences in PM: Evidence for multiple processes supporting cue detection. Memory and Cognition.
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