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1. INTRODUCTION

What is prospective memory (PM)?

Performing goal-relevant actions at the appropriate time
Combination of memory and control processes



How do we perform PM tasks?

Dynamic Multiprocess View (DMPV)^{1,2} of prospective memory suggests:

Proactive Control³

- Strategic Search
- High Cognitive Cost

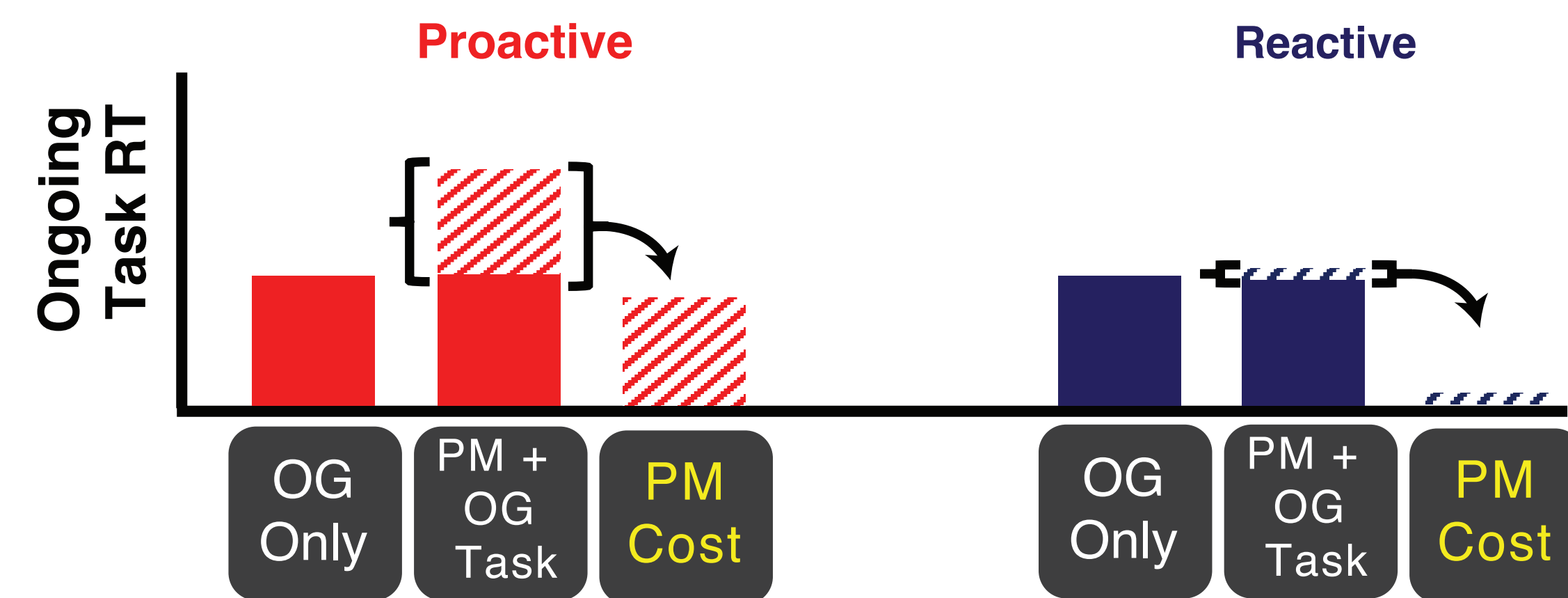


Reactive Control⁴

- Cue-Intention Association
- Low Cognitive Cost

How do we measure PM strategy in the lab?

Often an indirect dual-task interference cost measure: **PM Costs**



$$\begin{matrix} \text{Ongoing Task RT} \\ \text{(PM + Ongoing Task)} \\ - \\ \text{Ongoing Task RT} \\ \text{(Ongoing task only)} \\ \hline \text{PM Cost} \end{matrix}$$

PM Costs are useful but incomplete^{5,6}

Open questions remain about what PM costs represent^{7,8}

Project Goals

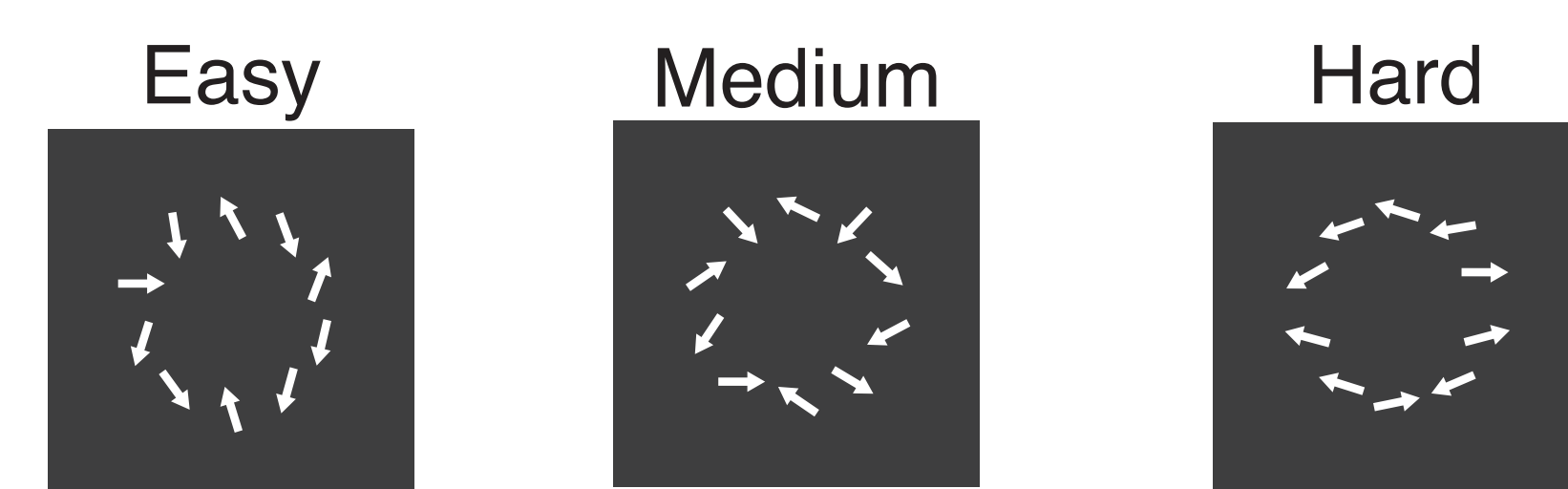
1. Use eye-tracking to directly quantify strategic monitoring
2. Evaluate how strategic monitoring changes with demands
3. Describe the relationship between monitoring and PM costs

Experiment design

modeled after Lewis-Peacock, Cohen, & Norman (2016)

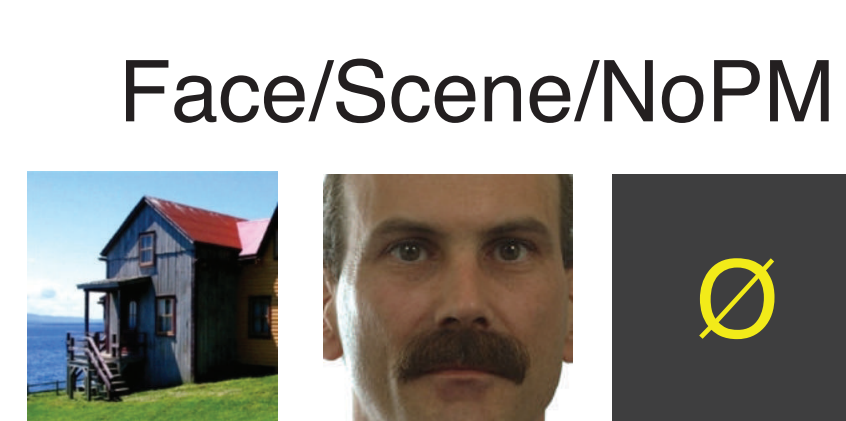
N=30

Ongoing Task Difficulty



"Present/Absent"

Trial Type:



Unique to trial
Never repeated

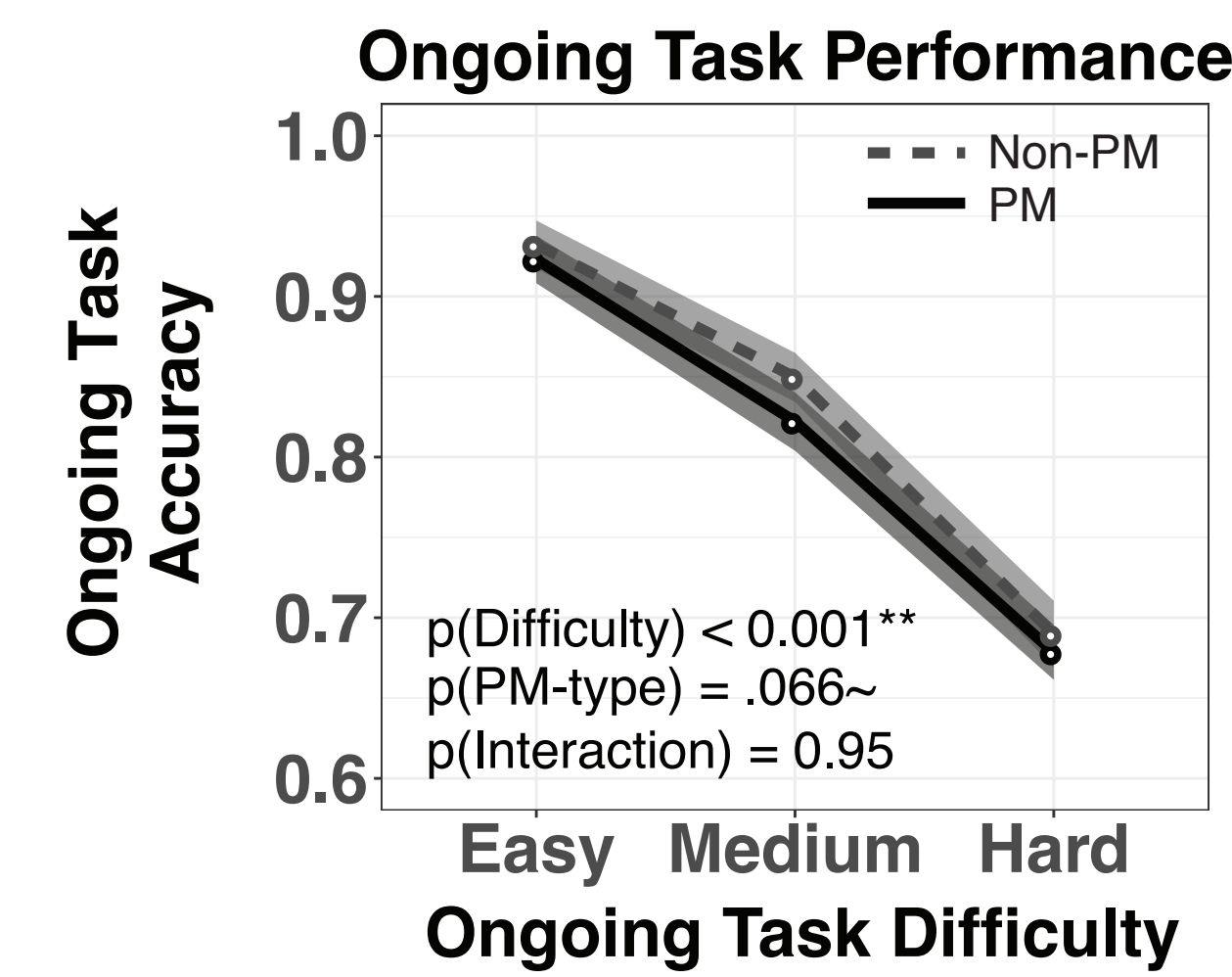
Target: 3s Probes: 2s each (1-15 per trial), "Present/Absent" or "Target"



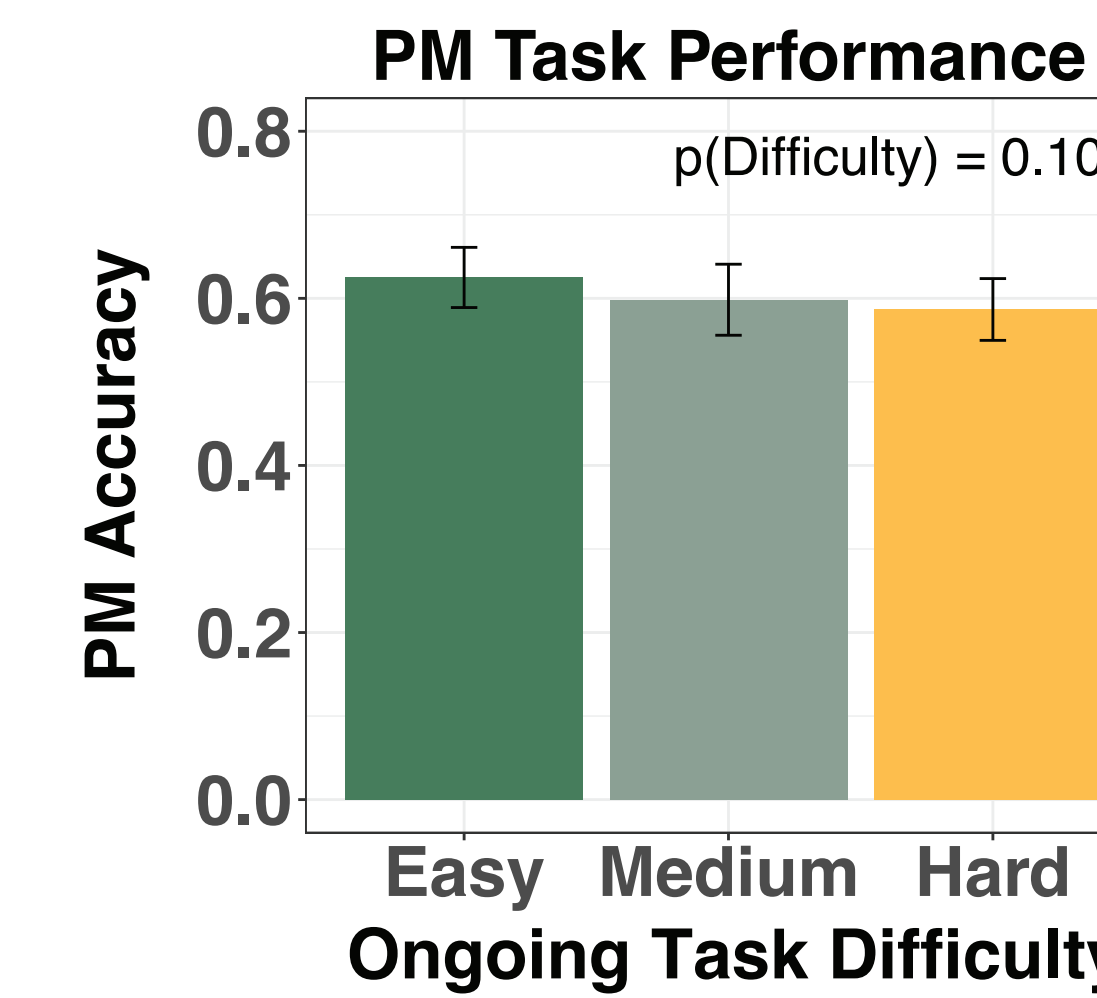
Eye Tracking Analyses ~ Strategy leading up to the PM event

2. RESULTS

Performance Check: No sacrifice on one task to perform the other

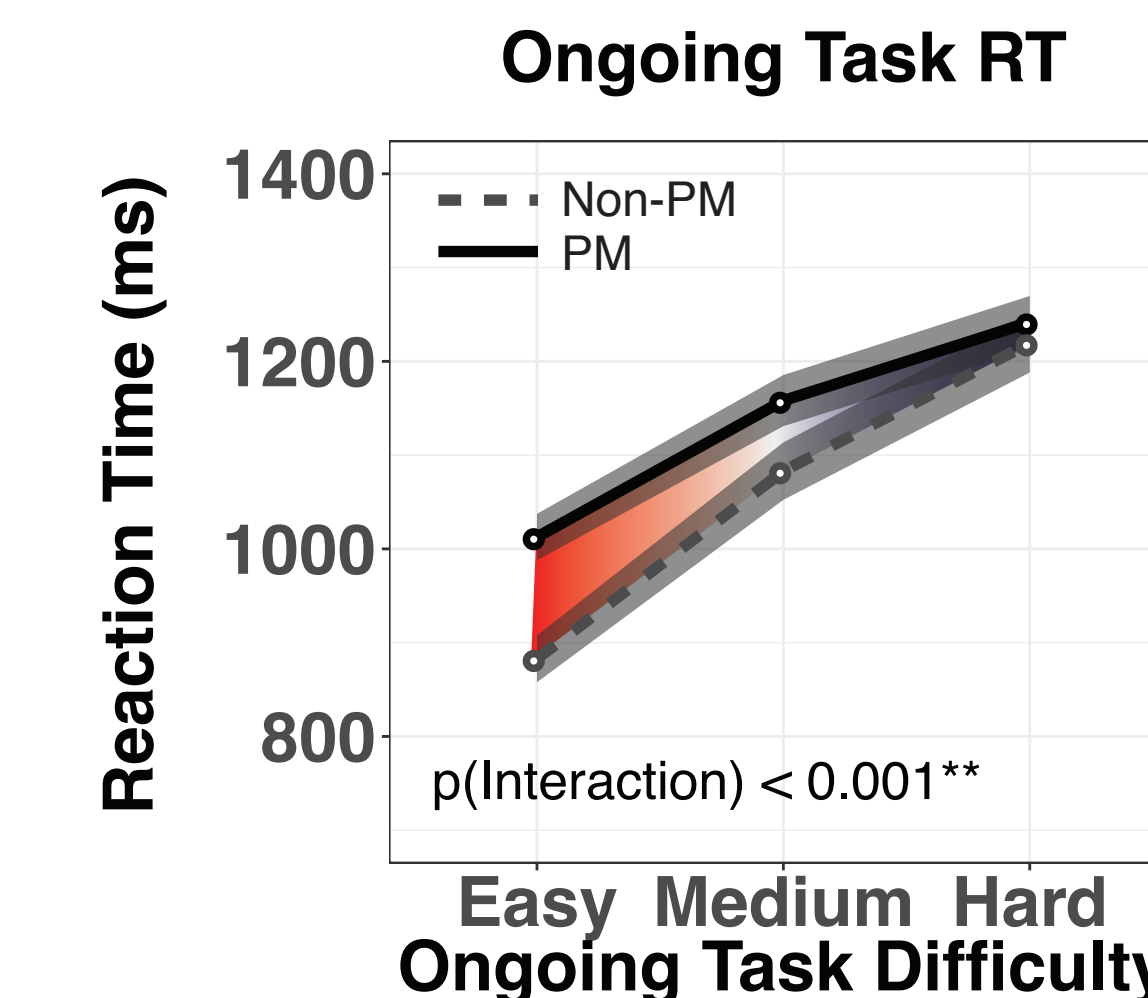


Equal ongoing task accuracy across PM and non-PM probes

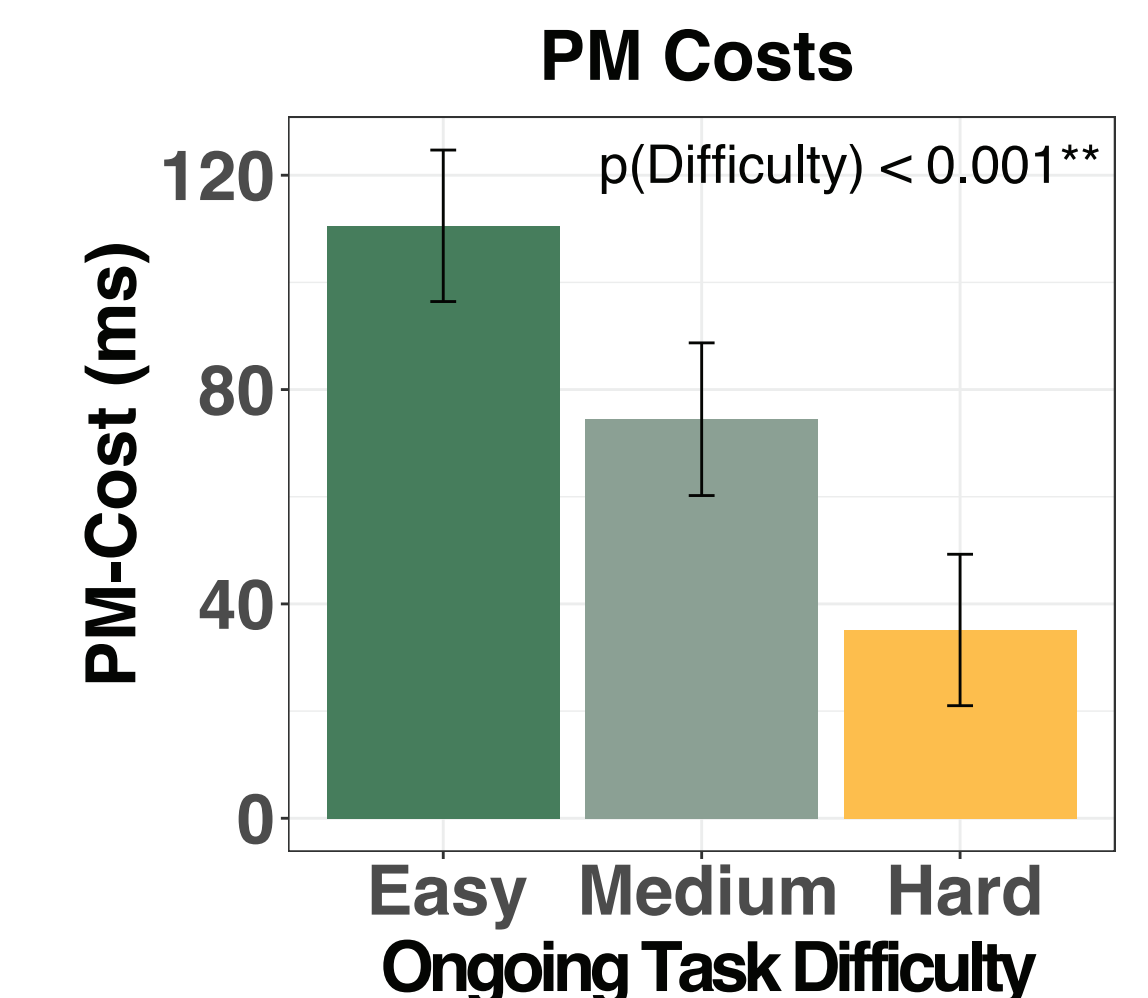


No loss in PM performance across on-going task difficulties

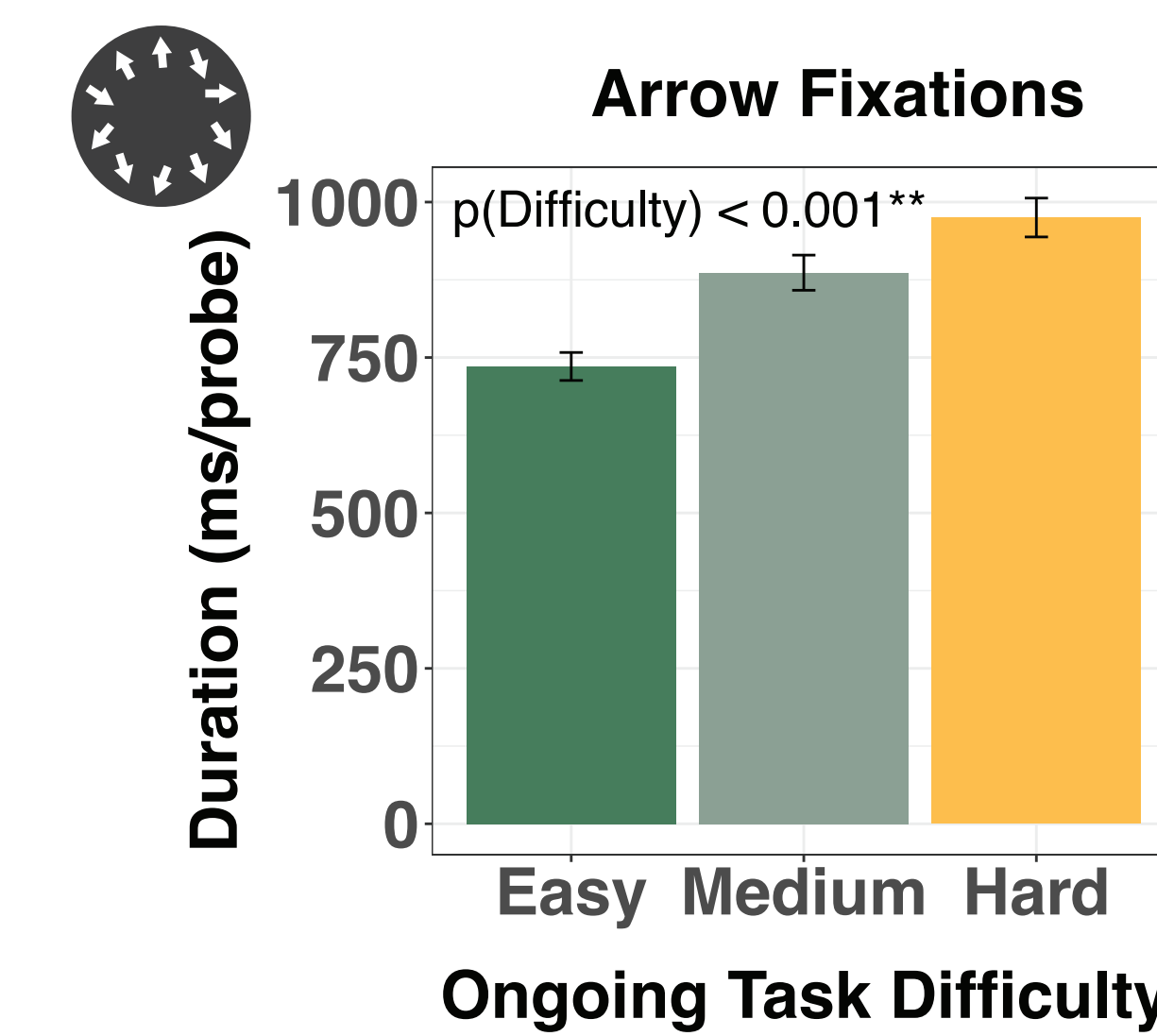
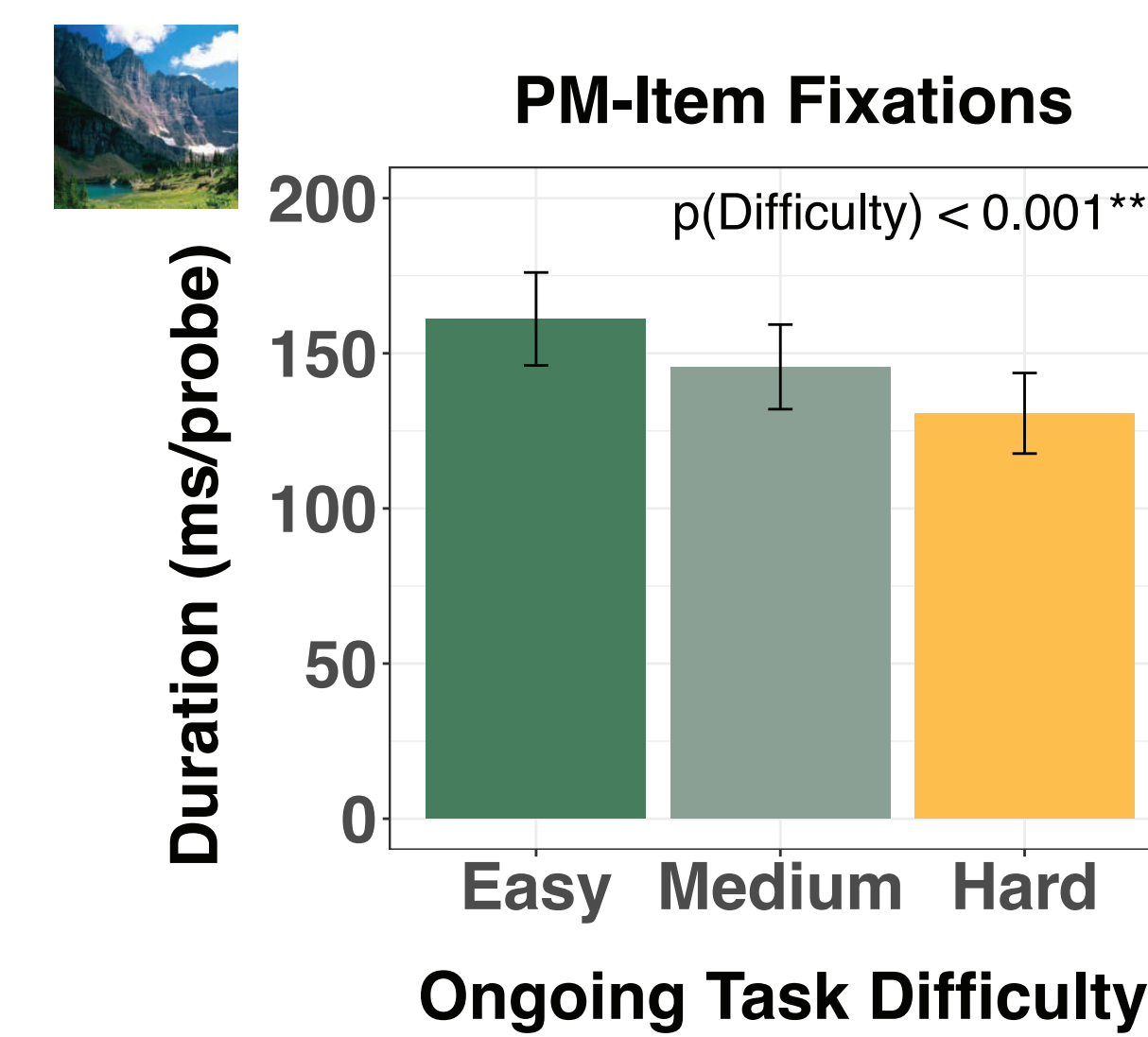
PM Costs: Indicate PM strategy changes in response to difficulty



PM costs are higher at the easy difficulty levels (more proactive) and lower at the hard difficulty level (more reactive)

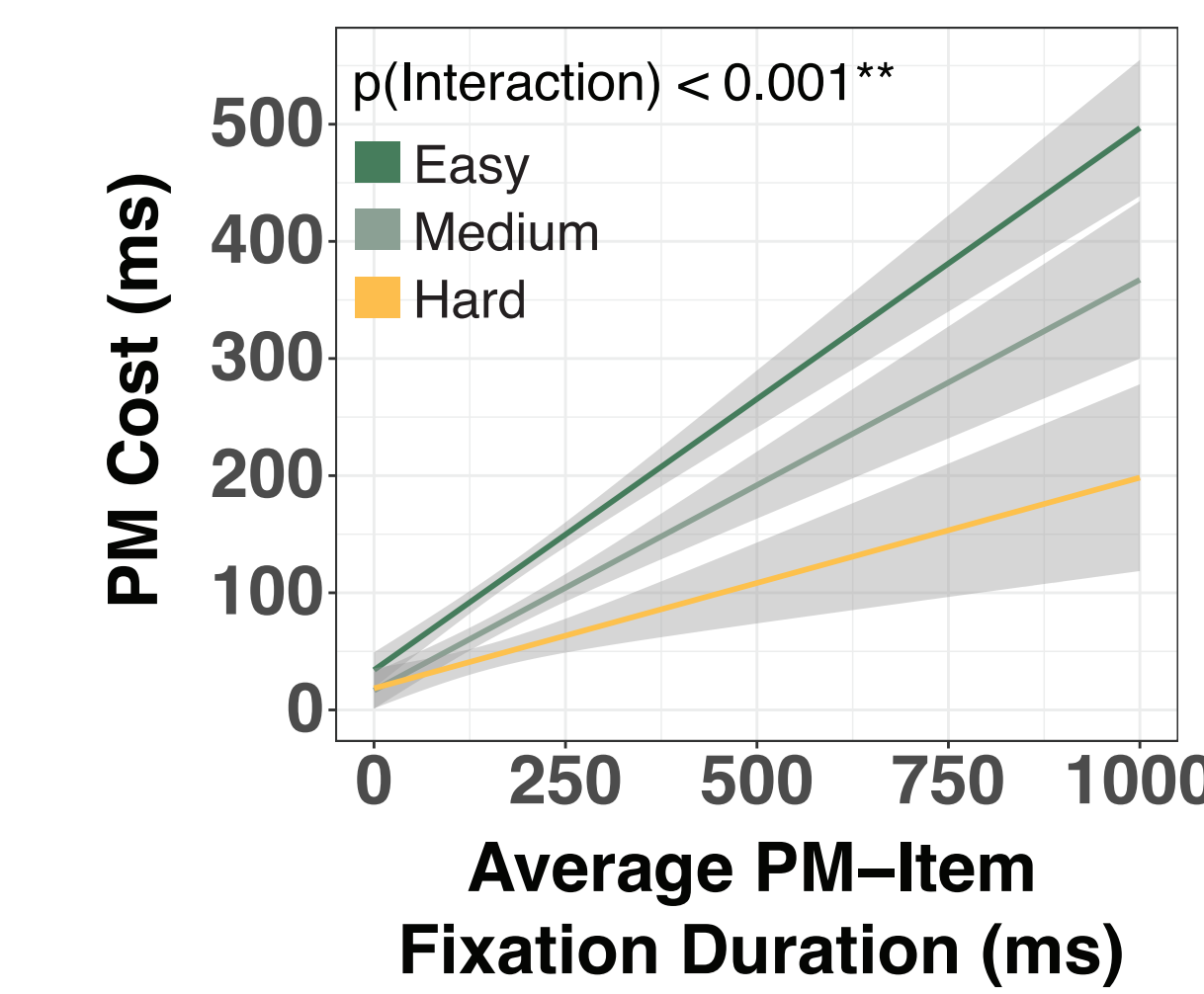


Fixation duration changes as a function of ongoing task difficulty

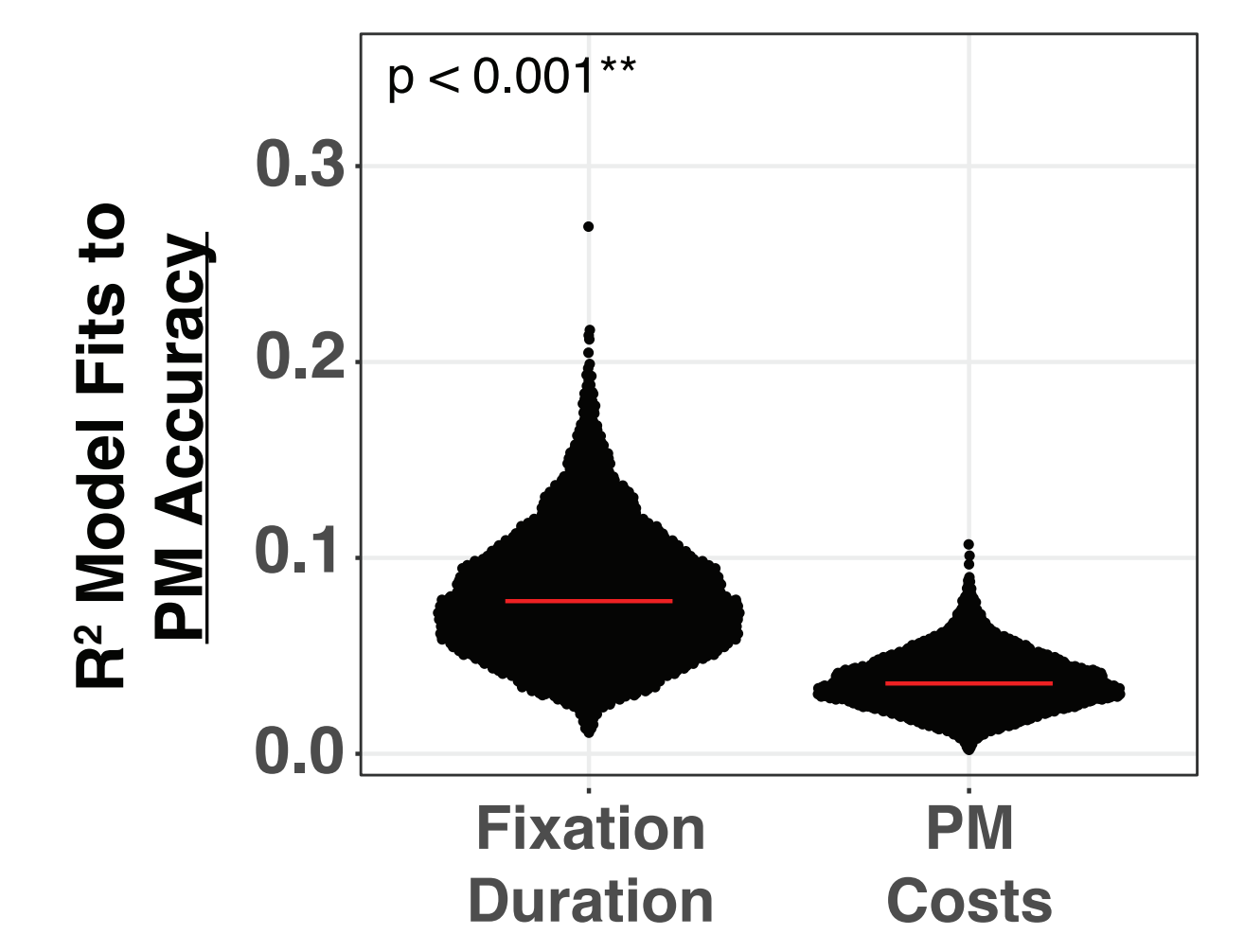


PM Fixation Duration + Arrow Fixation Duration ≈ 70% variance in PM costs

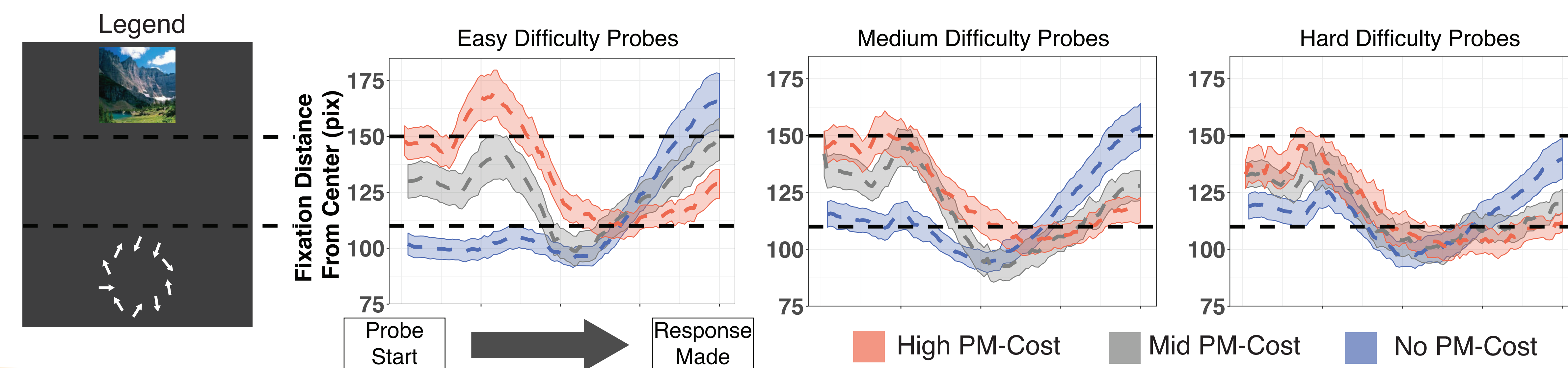
PM Cost more strongly related to PM-item fixations at the easy difficulty level



Fixation durations explain more variance in PM Accuracy than PM costs



By-probe fixation timecourses reveal dissociable search strategies across PM-cost bins



3. Summary

- 1) Eye tracking allows direct, time-sensitive measurement of PM monitoring
- 2) We have captured monitoring strategies obscured by traditional PM cost analyses
- 3) These analyses reveal strategy gradients between proactive and reactive control

References:

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