

# Absence of Value-Driven Attentional Capture at Task-Irrelevant Locations

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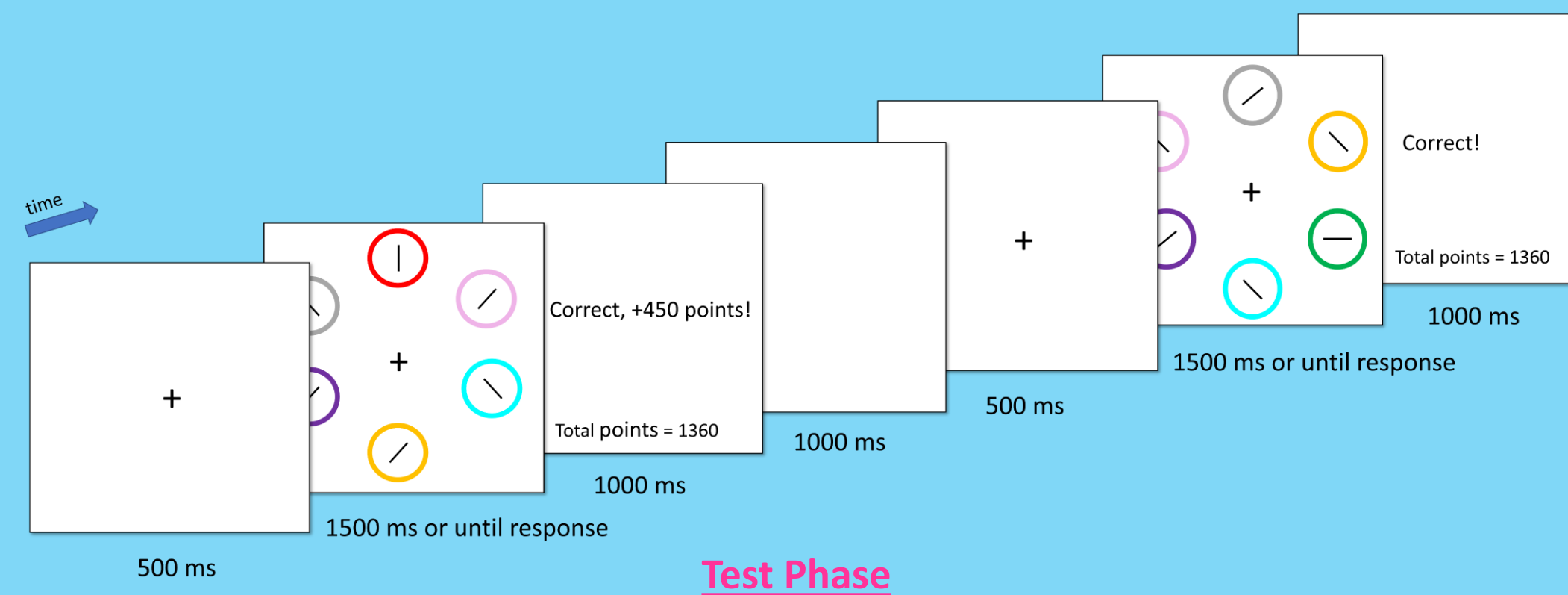
## Introduction

- **Value-Driven Attentional Capture (VDAC)**: Stimuli previously associated with reward prioritize attention independently of current goals and physical salience <sup>[1][2]</sup>.
- Almost all previous studies presented the rewarded stimuli at a potential target location, making it reasonable to be inspected. <sup>1</sup>
- The present study aimed to examine whether value-associated stimuli capture attention at task-irrelevant peripheral locations. (It is known that salient stimuli and goal-matching stimuli do capture at such locations.)

## Methods

### Reward Training Phase

- All three experiments began with the same reward training. Participants searched for a red or green target and reported the orientation of a containing line. Correct responses towards one pre-selected color of the two were followed by points reward.

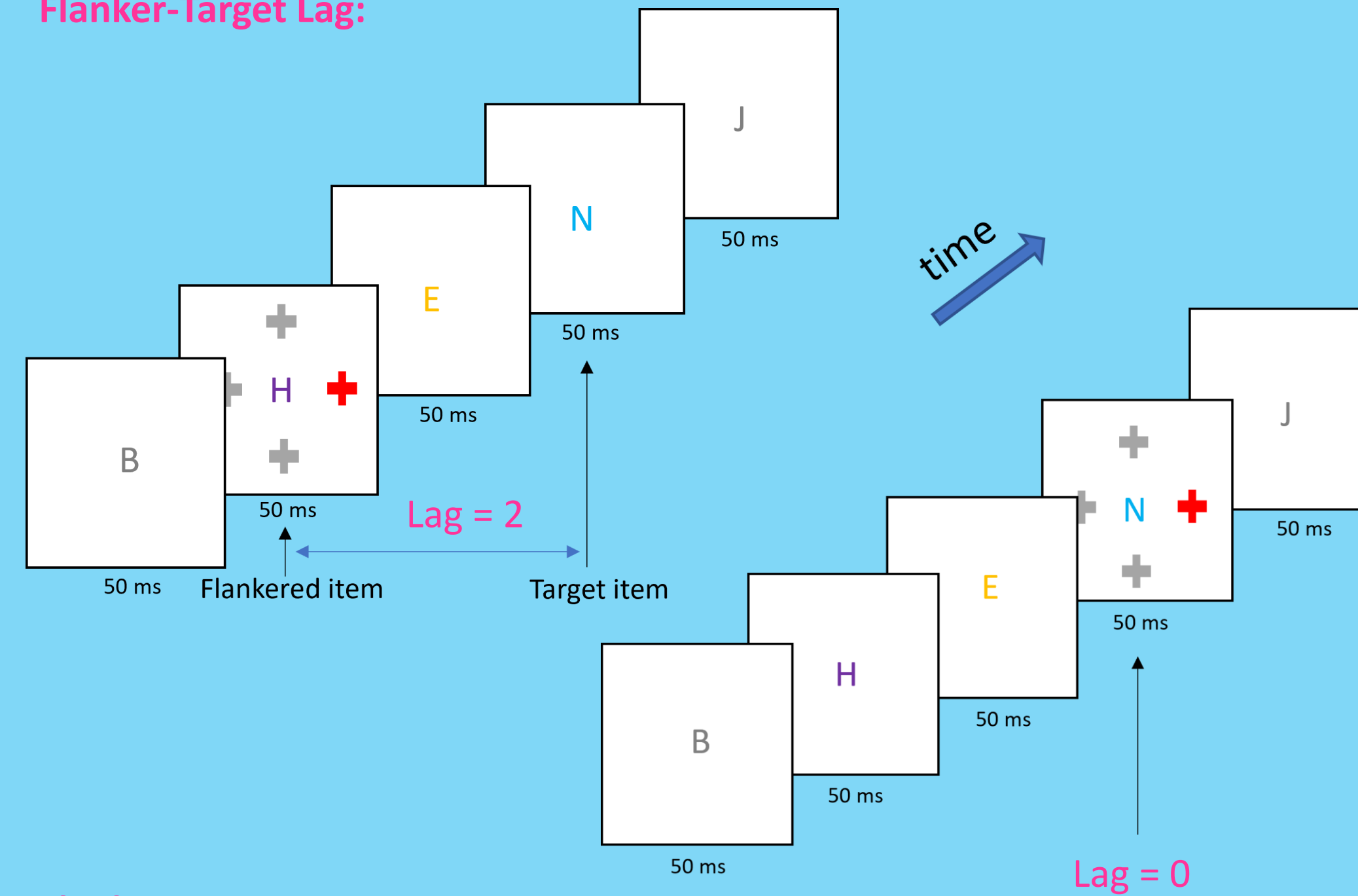


### Test Phase

- In an immediately following test phase, all three experiments used a *rapid serial visual presentation (RSVP) task* <sup>[3]</sup>. Participants searched for a target letter in a specified color in a central stream, while the previously reward-associated color was sometimes a peripheral flanker, appearing shortly before or simultaneous with the target<sup>[4]</sup>.
- **Experiment 1**: Flanker appeared in either a previously rewarded or a goal-match color.
- **Experiment 2**: Flanker appeared in a previously rewarded, a previously non-rewarded, or a goal-match color.
- **Experiment 3**: RSVP task design was the same as in Exp 2. Added a traditional measure of VDAC using an *additional singleton task* <sup>[5]</sup>. Blocks of the RSVP and the additional singleton tasks were interspersed.

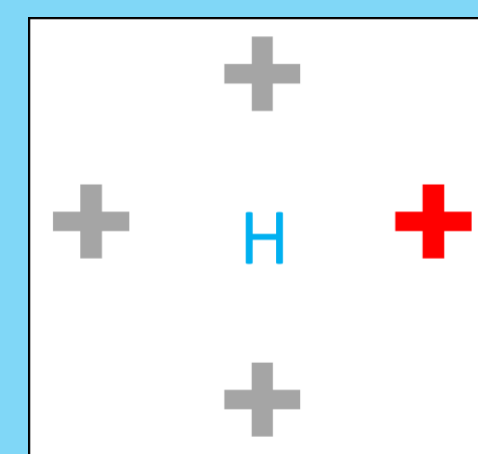
## RSVP task

### Flanker-Target Lag:

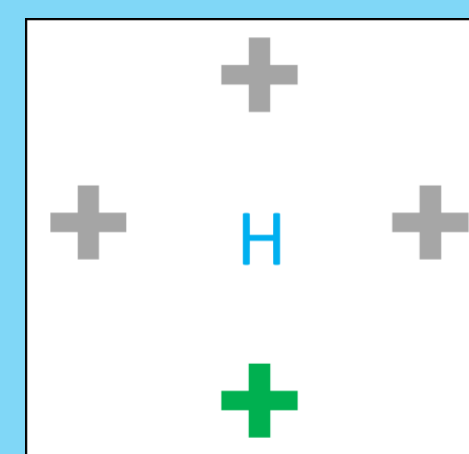


### Flanker Type:

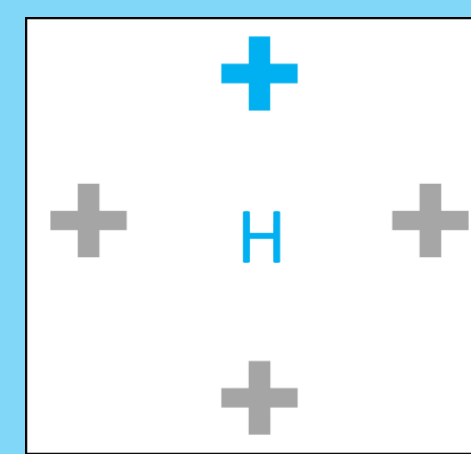
#### Previously Rewarded



#### Previously Non-Rewarded

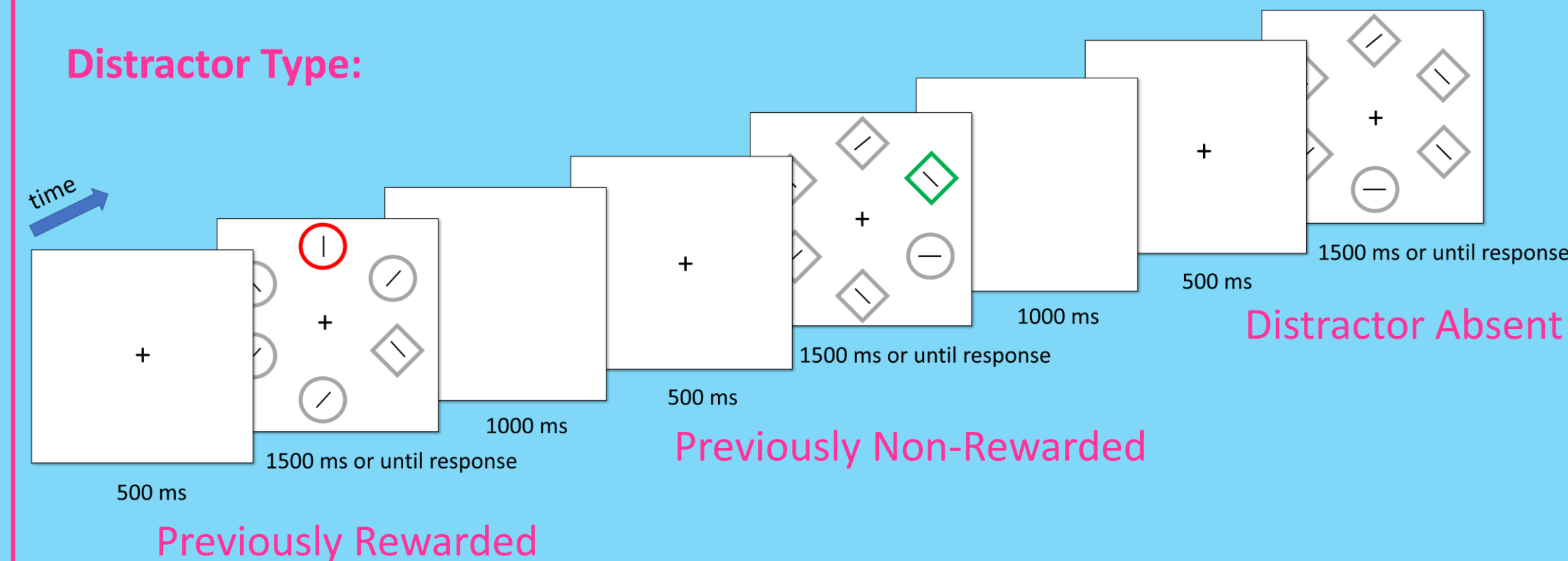


#### Goal-Match

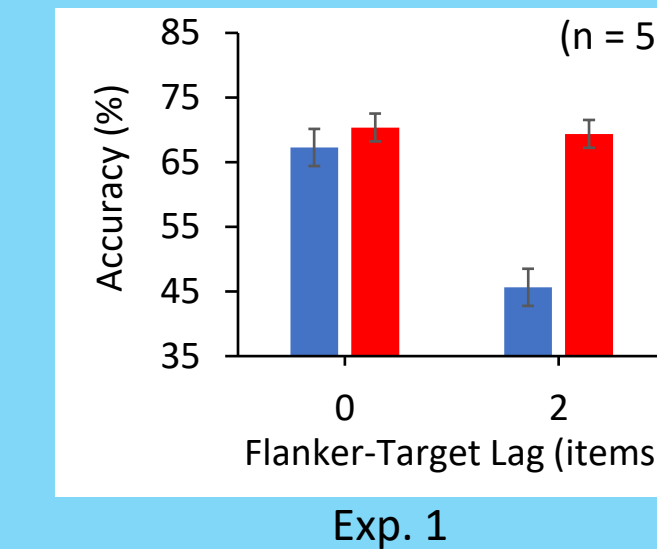


## Additional Singleton Task: Verification of Learned Value

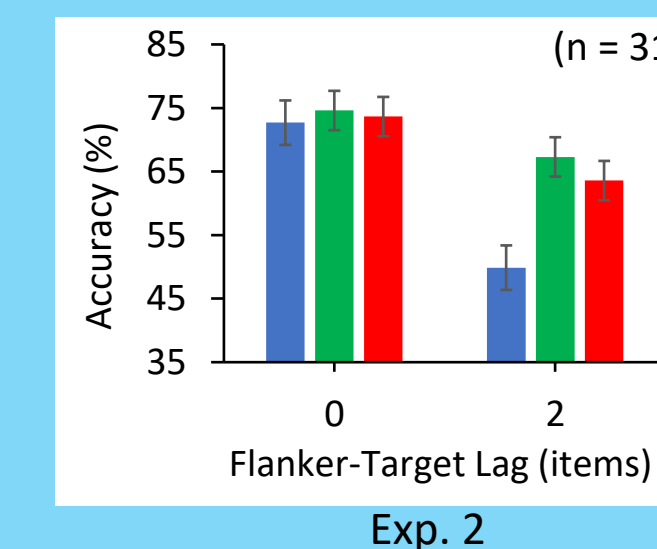
### Distractor Type:



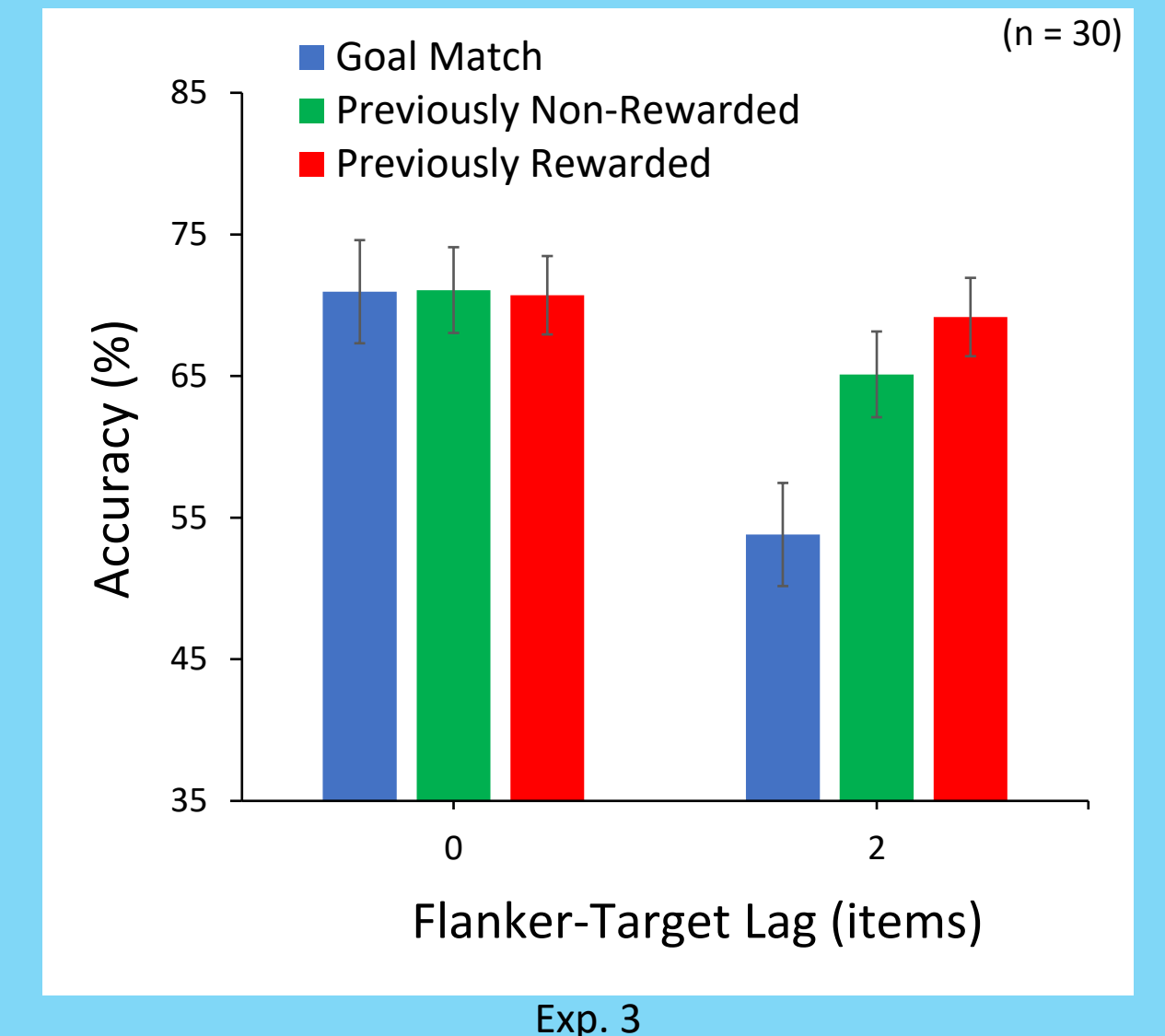
## Results



Exp. 1

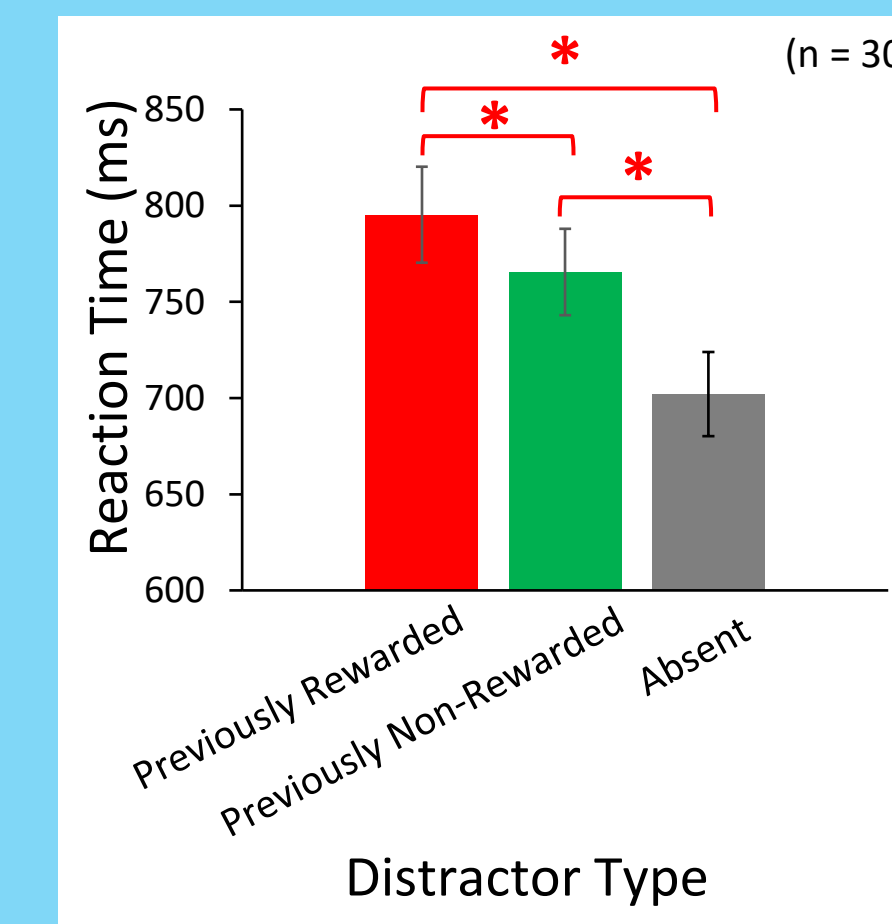


Exp. 2



Exp. 3

**RSVP task results:** The difference in accuracy between Lag 0 and Lag 2 serves as an index of the distractive effect of the flanker. In all three experiments, a goal-matching color significantly impaired accuracy. However, at the same task-irrelevant peripheral location, a **rewarded color had no distractive effect**. ( $p < .001$  for the interaction in each experiment)



**Verification of learned value:** The presence of a previously rewarded distractor impaired performance significantly more than the other two conditions. This replicates the typical VDAC pattern, showing that rewarded stimuli captured attention here when presented at task-relevant locations.

### Conclusion:

Reward-associated stimuli do not capture attention when presented at task-irrelevant locations, unlike goal-matching stimuli (and physically salient stimuli) which do capture attention.

## References

- [1] Anderson, B. A., Laurent, P. A., & Yantis, S. (2011). Value-driven attentional capture. *Proceedings of the National Academy of Sciences*, 108(25), 10367-10371.
  - [2] Anderson, B. A., & Yantis, S. (2013). Persistence of value-driven attentional capture. *Journal of Experimental Psychology: Human Perception and Performance*, 39(1), 6.
  - [3] Joseph, J. S., Chun, M. M., & Nakayama, K. (1997). Attentional requirements in a 'preattentive' feature search task. *Nature*, 387(6635), 805-807.
  - [4] Folk, C. L., Leber, A. B., & Egeth, H. E. (2002). Made you blink! Contingent attentional capture produces a spatial blink. *Perception & psychophysics*, 64(5), 741-753.
  - [5] Theeuwes, J. (1992). Perceptual selectivity for color and form. *Perception & psychophysics*, 51(6), 599-606.
- Note 1. MacLean, M. H., & Giesbrecht, B. (2015). Irrelevant reward and selection histories have different influences on task-relevant attentional selection. *Attention, Perception, & Psychophysics*, 77(5), 1515-1528.