

# Voluntary temporal attention improves perception even in the absence of temporal competition

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## Background

- Perception can be impaired when successive stimuli appear close together in time, demonstrating **temporal competition** for representational resources<sup>1-2</sup>
- Voluntary temporal attention** can enhance the perception of a stimulus at a relevant moment in time at the expense of earlier and later stimuli<sup>3-5</sup>
- Determining whether these perceptual trade-offs require temporal competition would provide insight into the mechanisms of selection by voluntary temporal attention

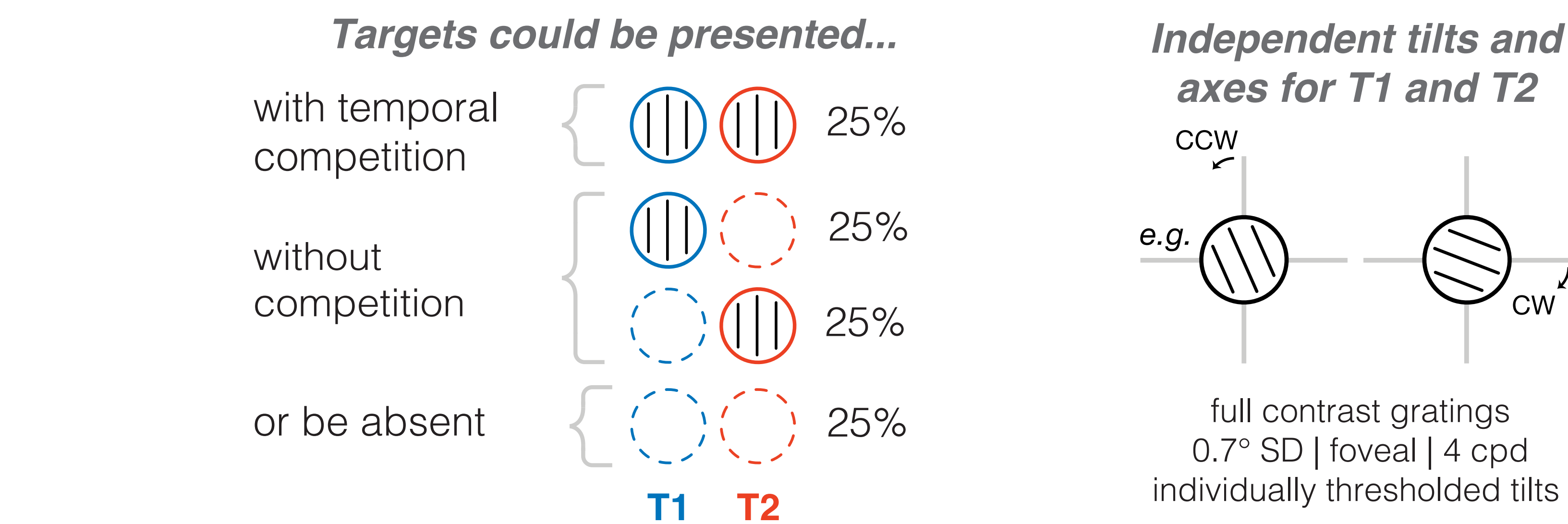
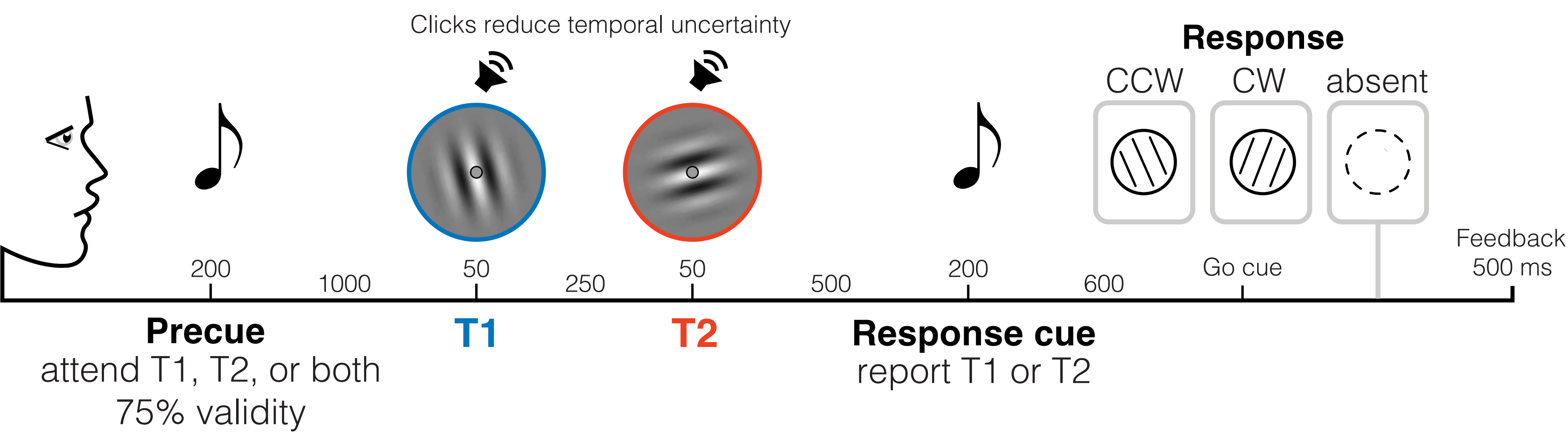
## Question

*Does voluntary temporal attention enhance performance even without temporal competition?*

## Temporal cueing task

*Independent manipulation of voluntary temporal attention and temporal competition*

n = 15 | 2-3 sessions | 1280 trials per observer  
online fixation monitoring



## References

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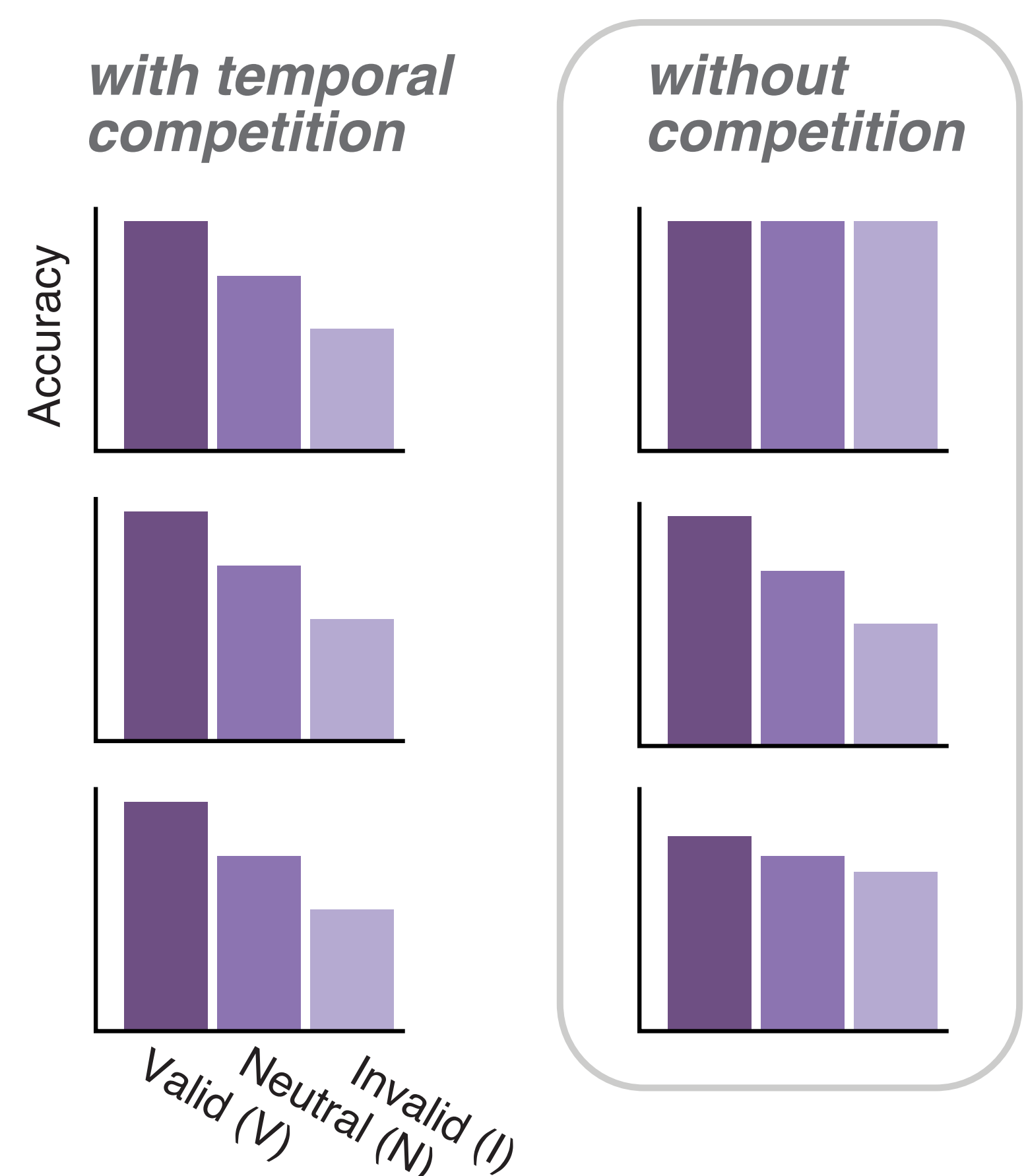
## Hypotheses

*If voluntary temporal attention...*

- selects among actively *competing* stimulus representations<sup>6</sup>
- biases stimulus representations *prior* to a competitive stage<sup>4,5</sup>
- interacts with temporal competition<sup>3</sup>

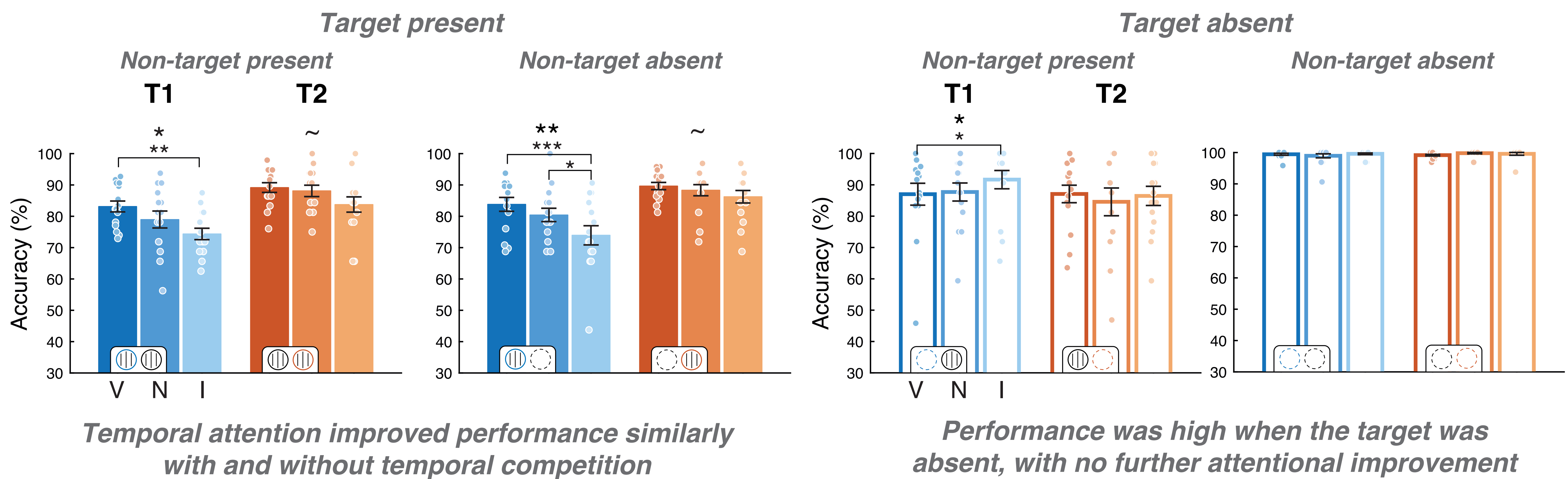
*then attention should affect performance...*

- only when there is temporal competition
- even without temporal competition
- more with than without temporal competition



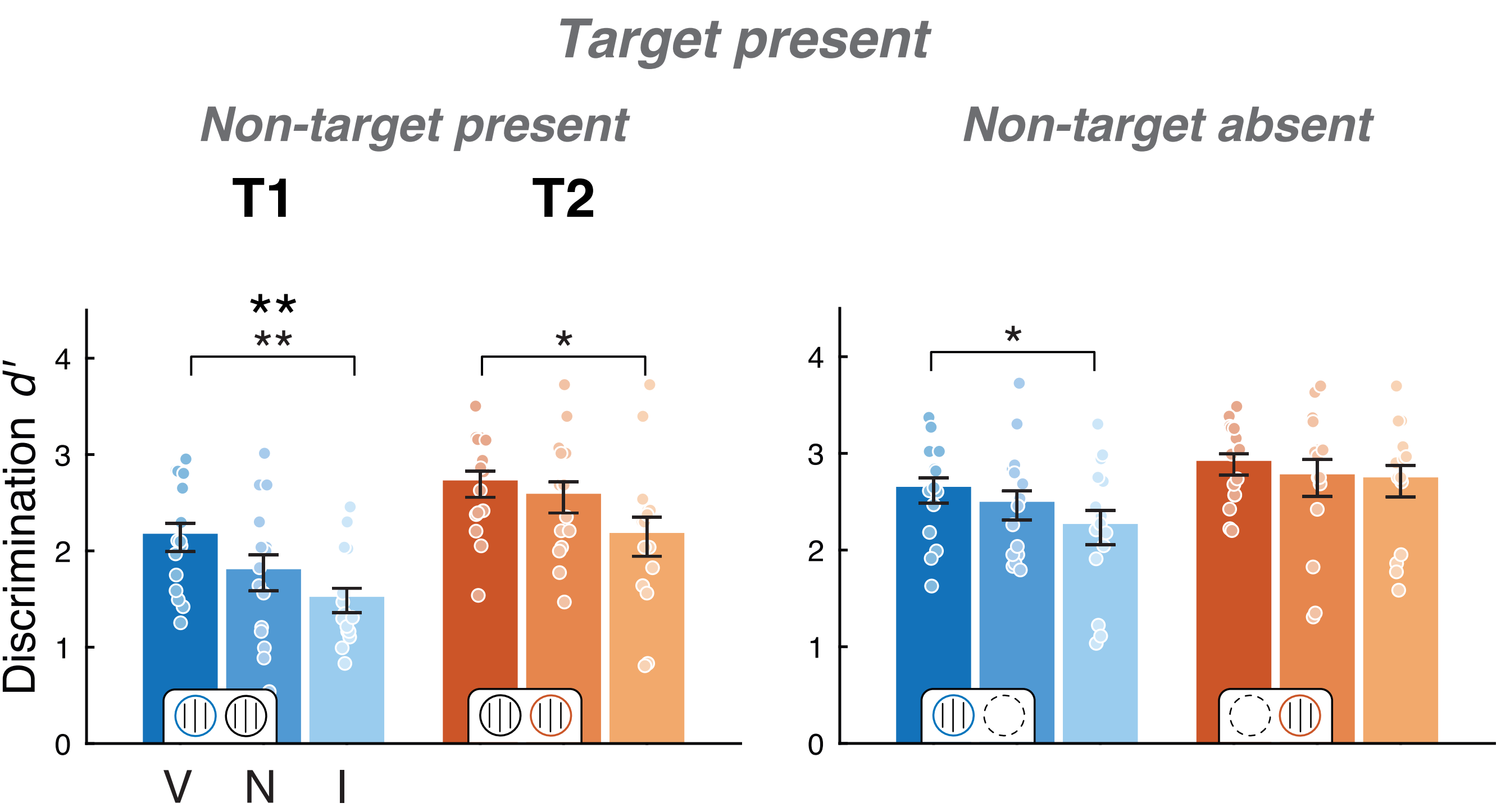
## Results

*Voluntary temporal attention enhanced performance even without temporal competition*

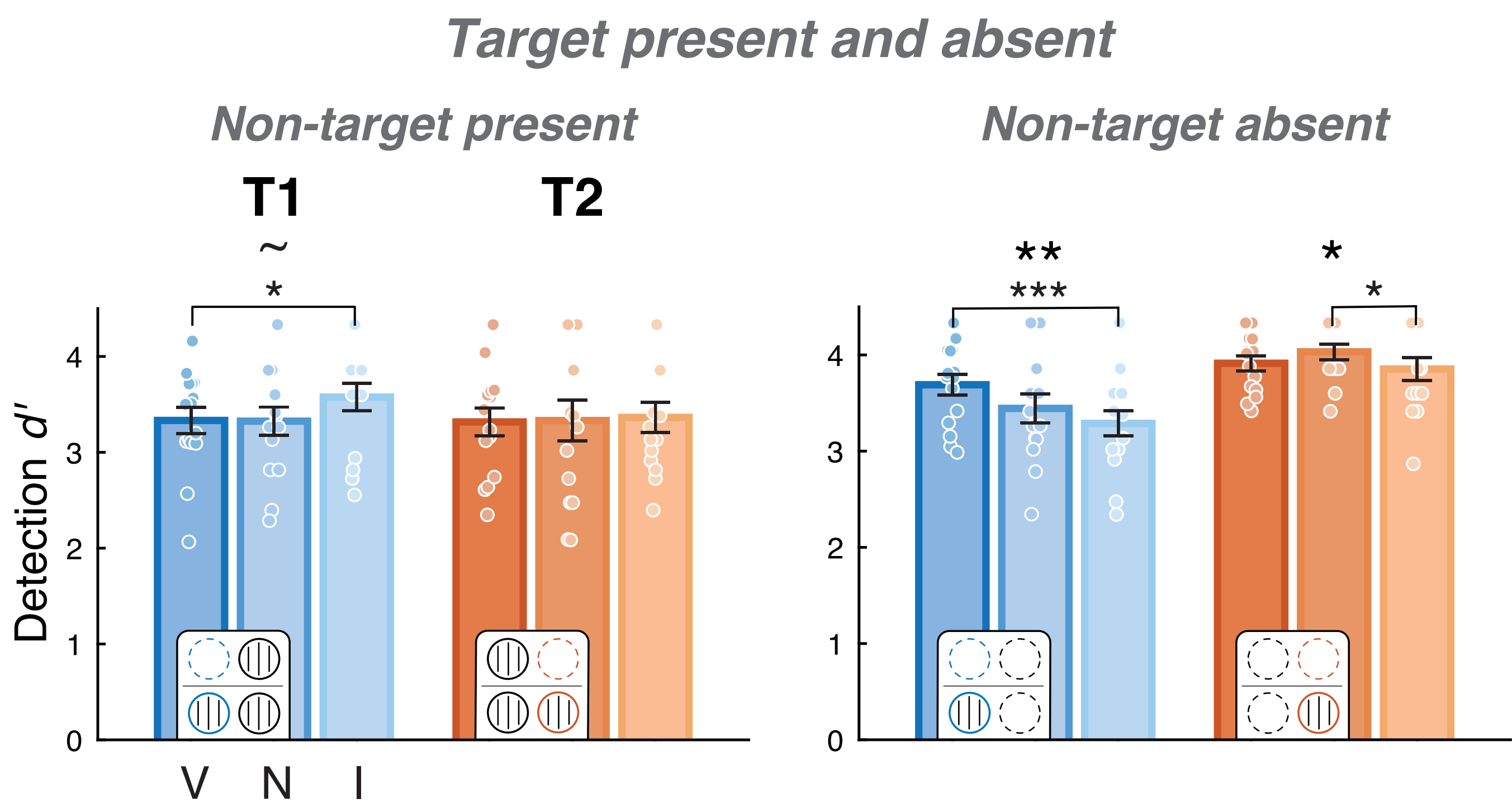


## Signal detection theory analysis

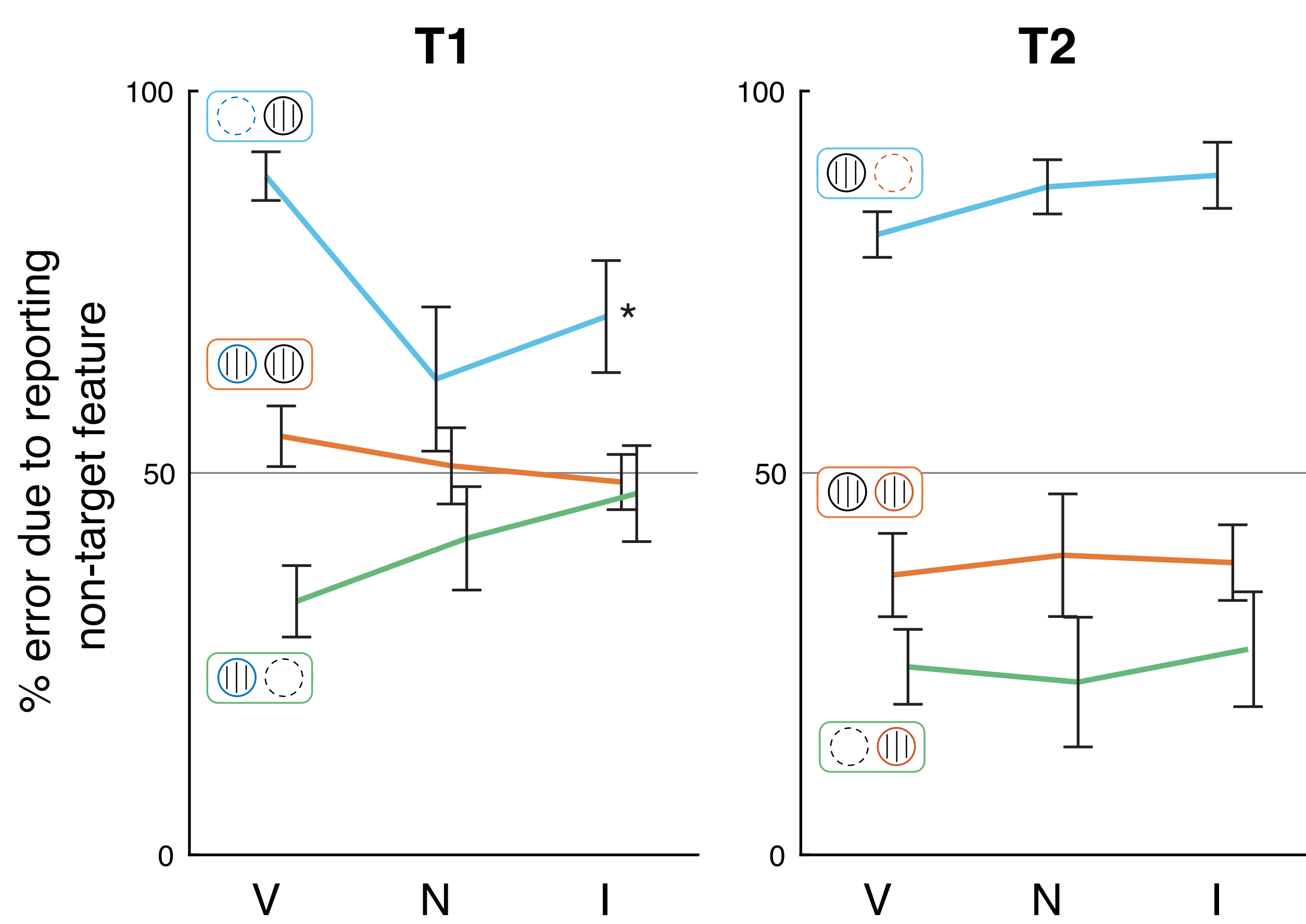
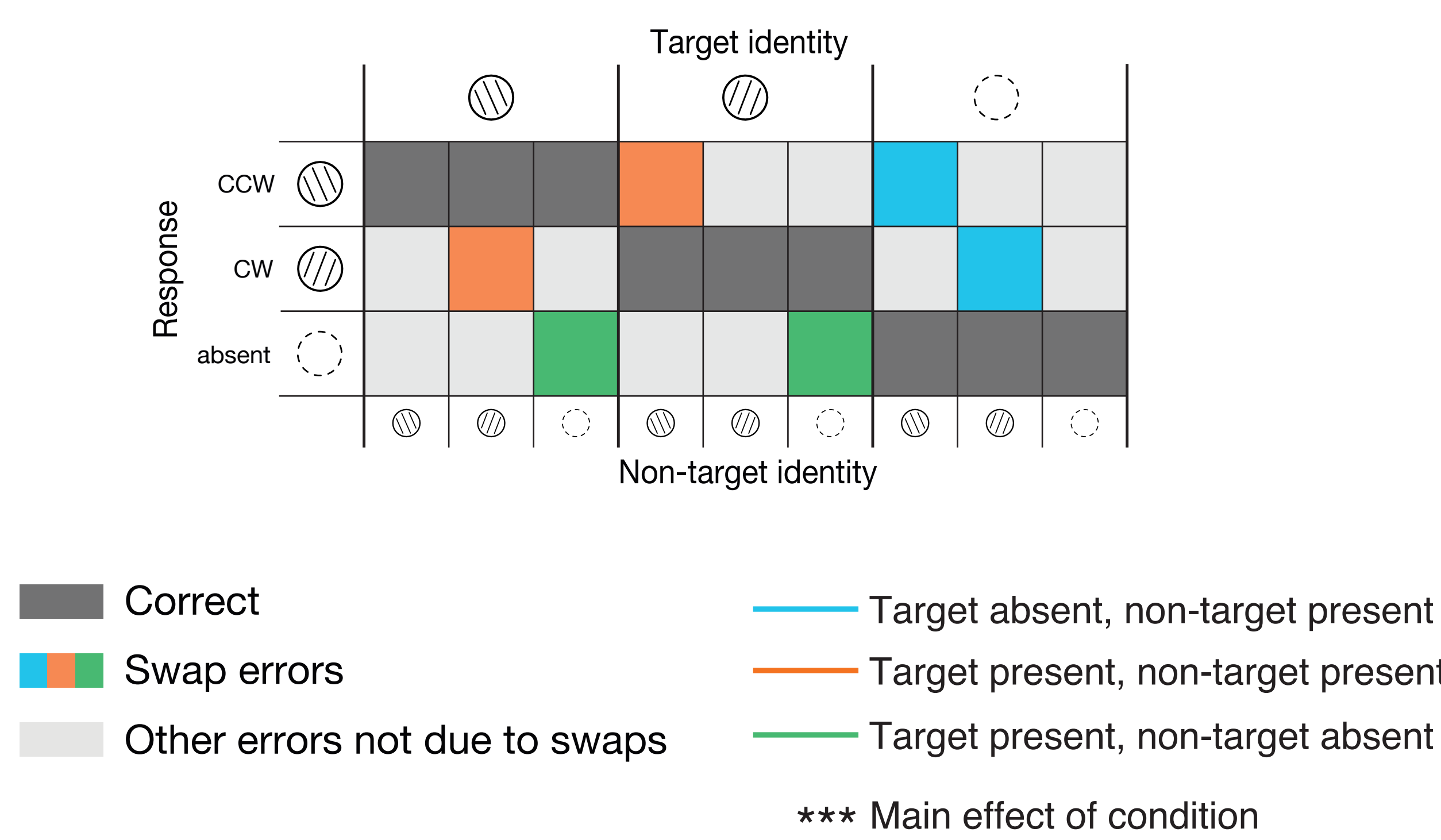
*Temporal attention enhanced T1 tilt discrimination sensitivity with and without temporal competition*



*Temporal attention improved detection sensitivity when the non-target was absent*



*Higher rate of swap errors when the non-target was present*



## Conclusions

- Voluntary temporal attention enhanced performance even without temporal competition
- The attentional improvement was similar whether a target was presented with or without competition
- These results suggest that temporal attention biases stimulus information prior to a competitive stage**

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Error bars indicate  $\pm 1$  SEM.  $\sim p < 0.1$ ,  $*p < 0.05$ ,  $**p < 0.01$ ,  $***p < 0.001$ .