

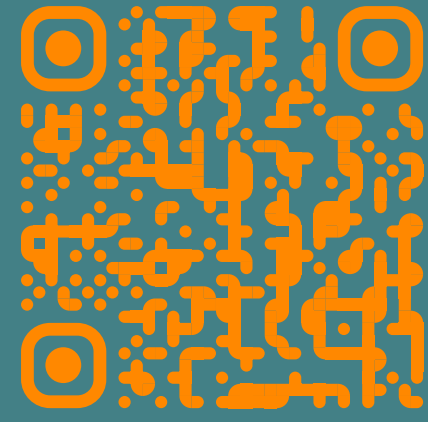
# Internal attention is the only retroactive mechanism for controlling precision in working memory

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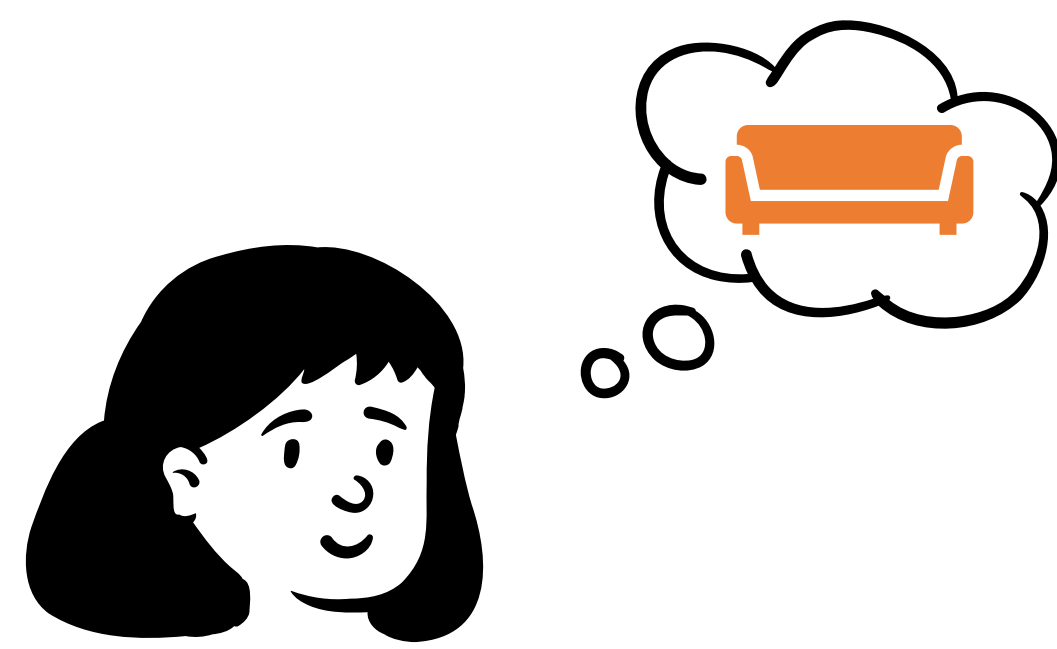


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## Background

Humans can voluntarily and retroactively adjust the precision of working memory (WM) items (Machizawa et al., 2012)



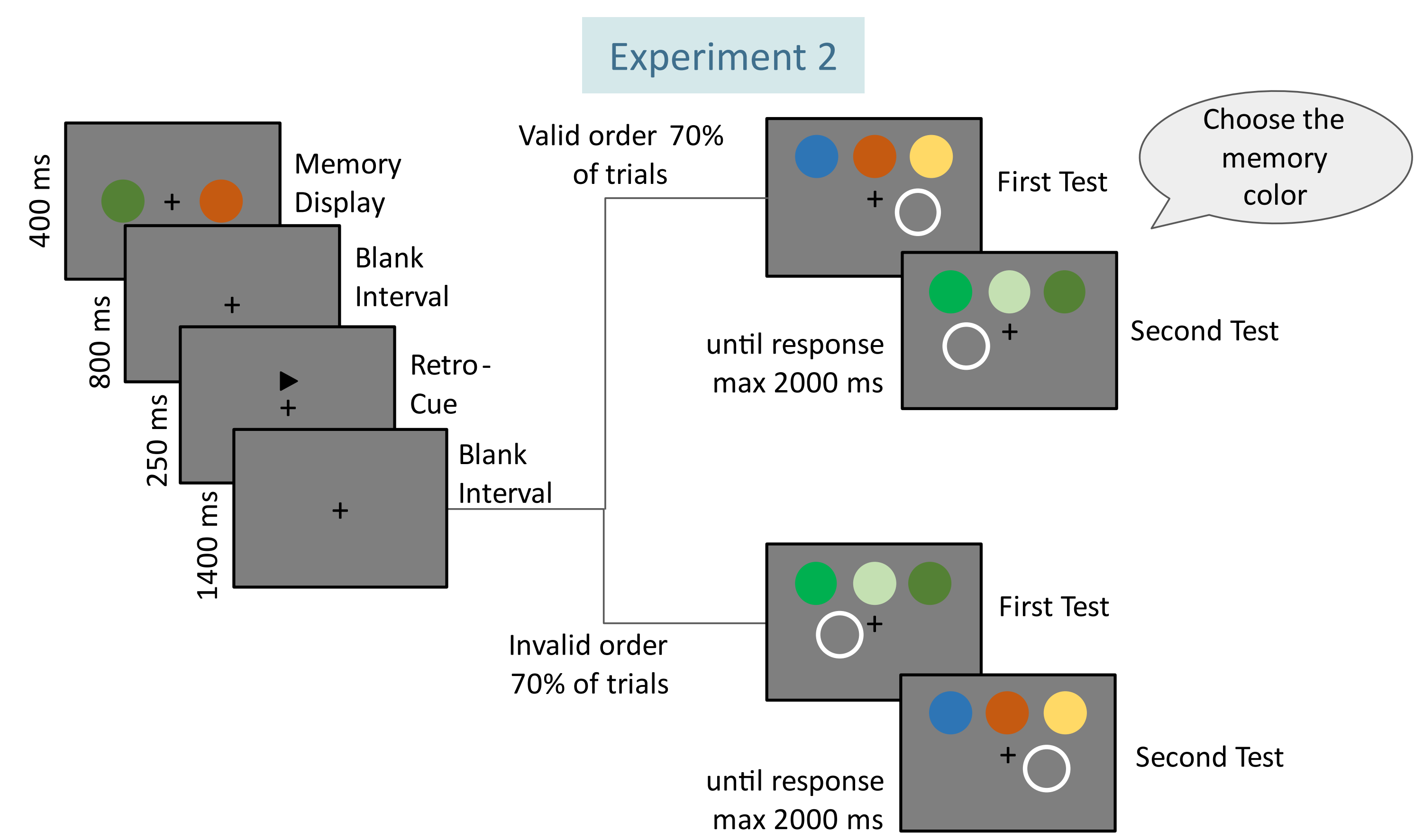
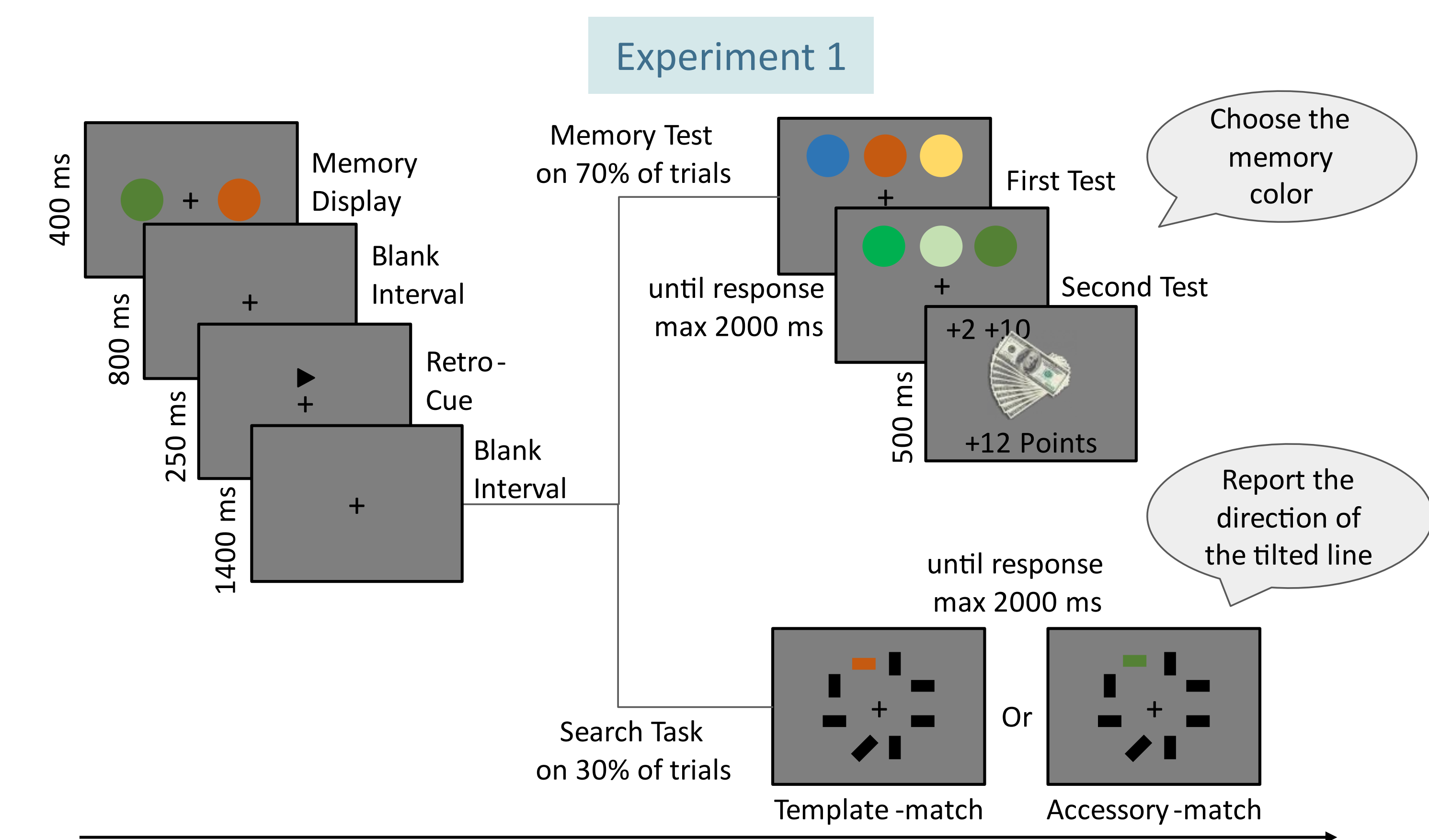
What mechanism allows control over the precision of WM items?

Internal attention is known to be able to retroactively improve precision (Bays et al., 2009; Günseli et al., 2015; van Moorselaar et al., 2015)

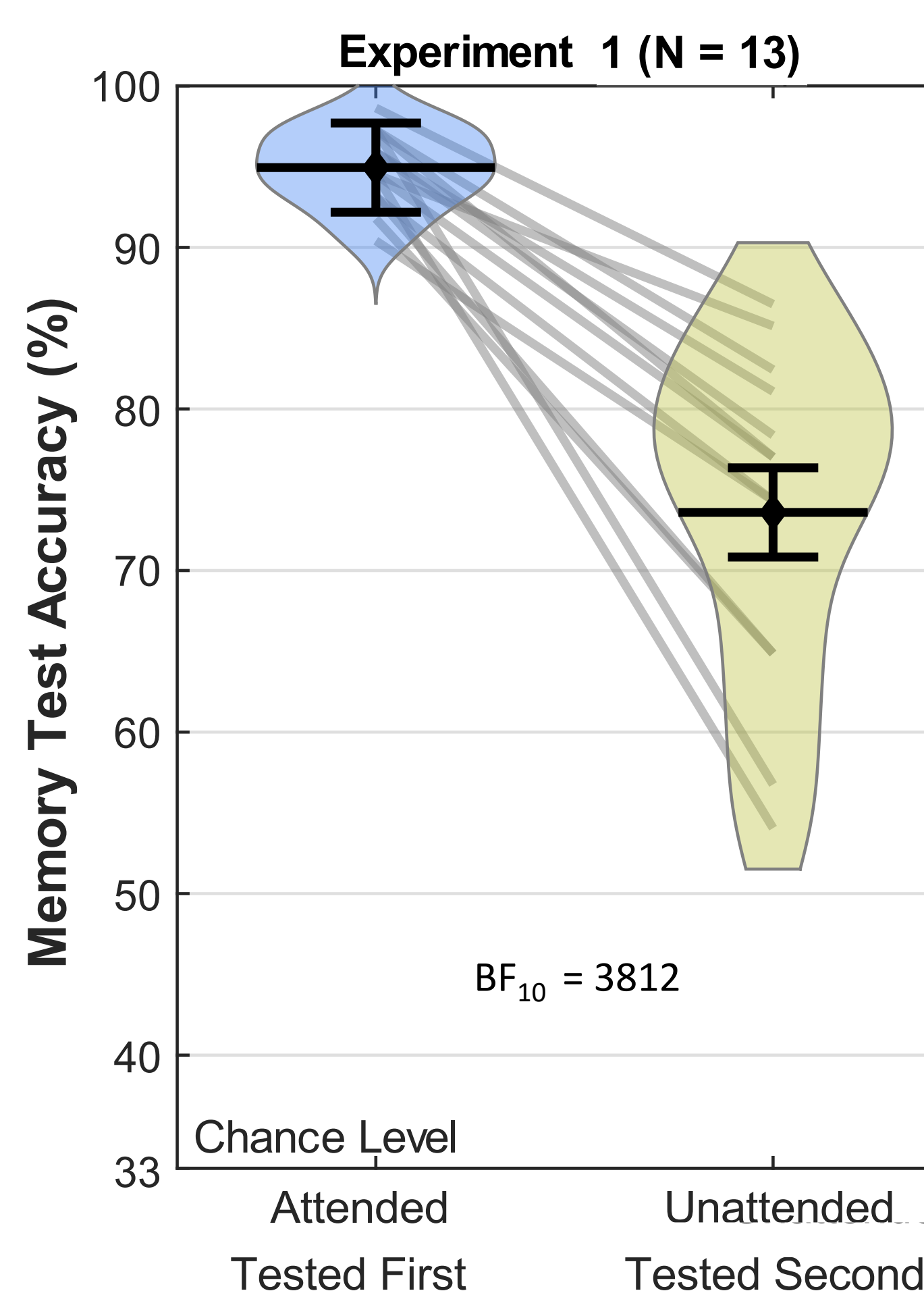
However, internal attention might not be the only mechanism. Previous research dissociated the neural markers of WM storage and internal attention (Günseli et al., 2019; Günseli et al., 2015; Hakim et al., 2019; van Driel et al., 2017).

Here, we tested the possibility of a top-down precision control mechanism beyond internal attention.

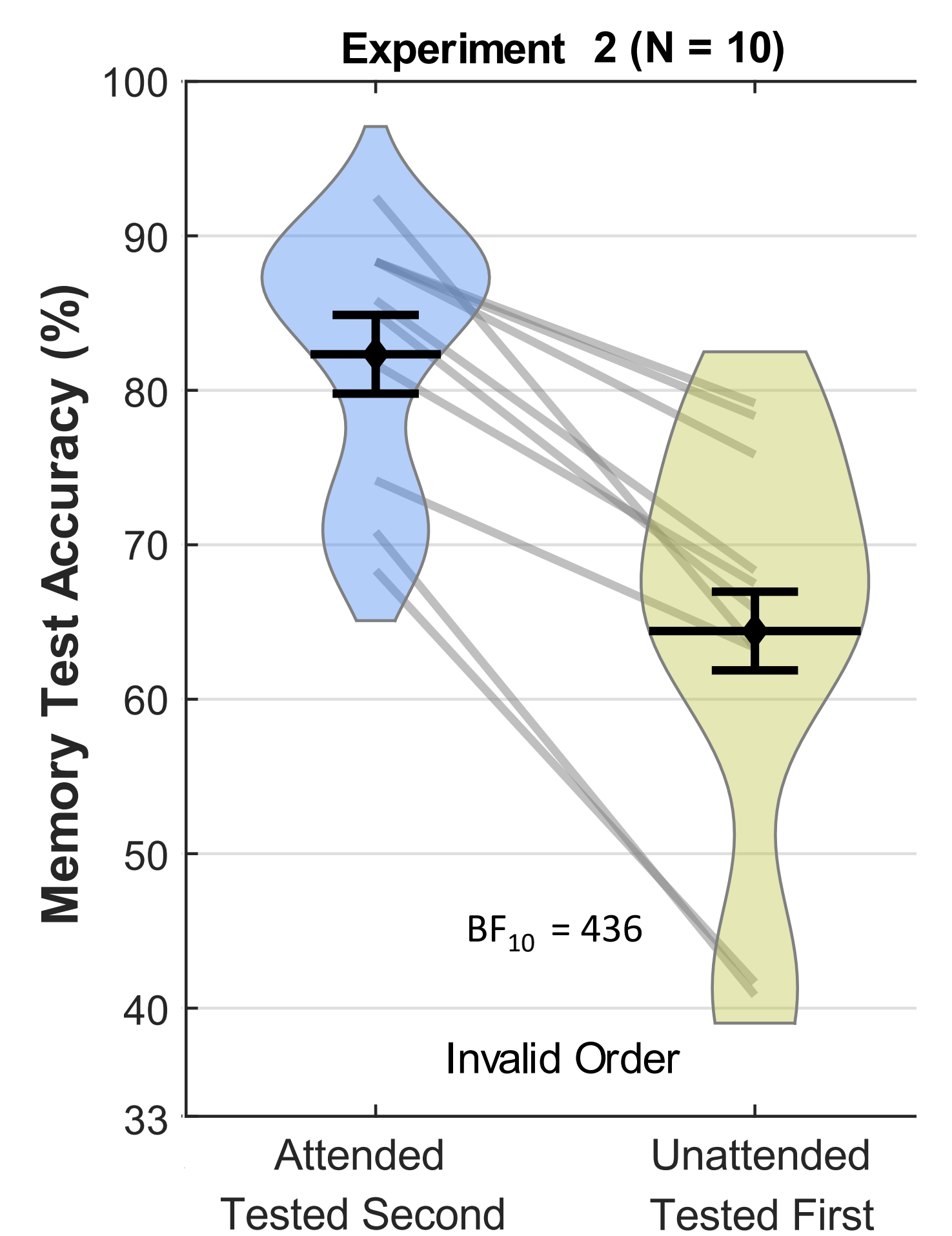
## Methods



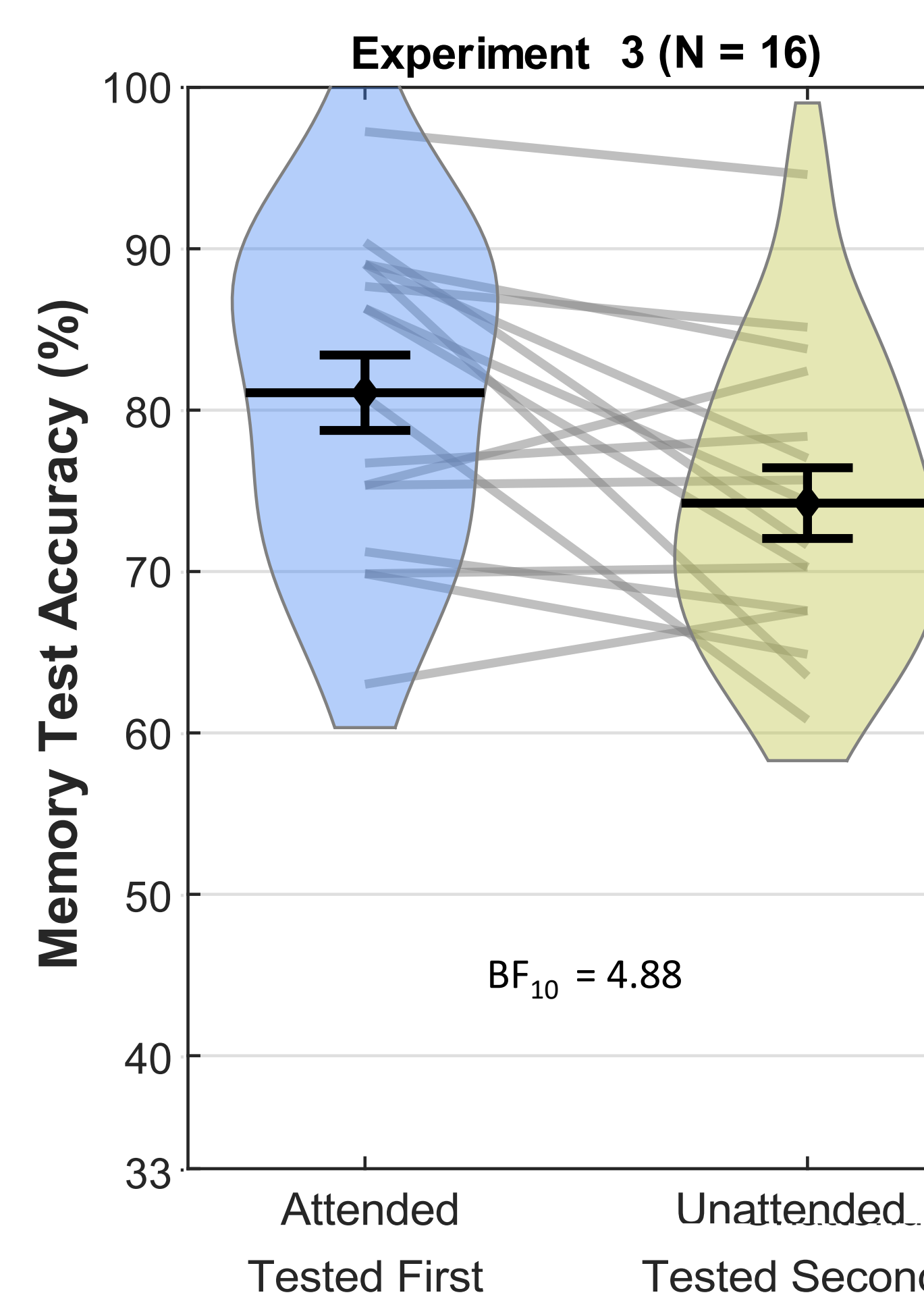
## Results



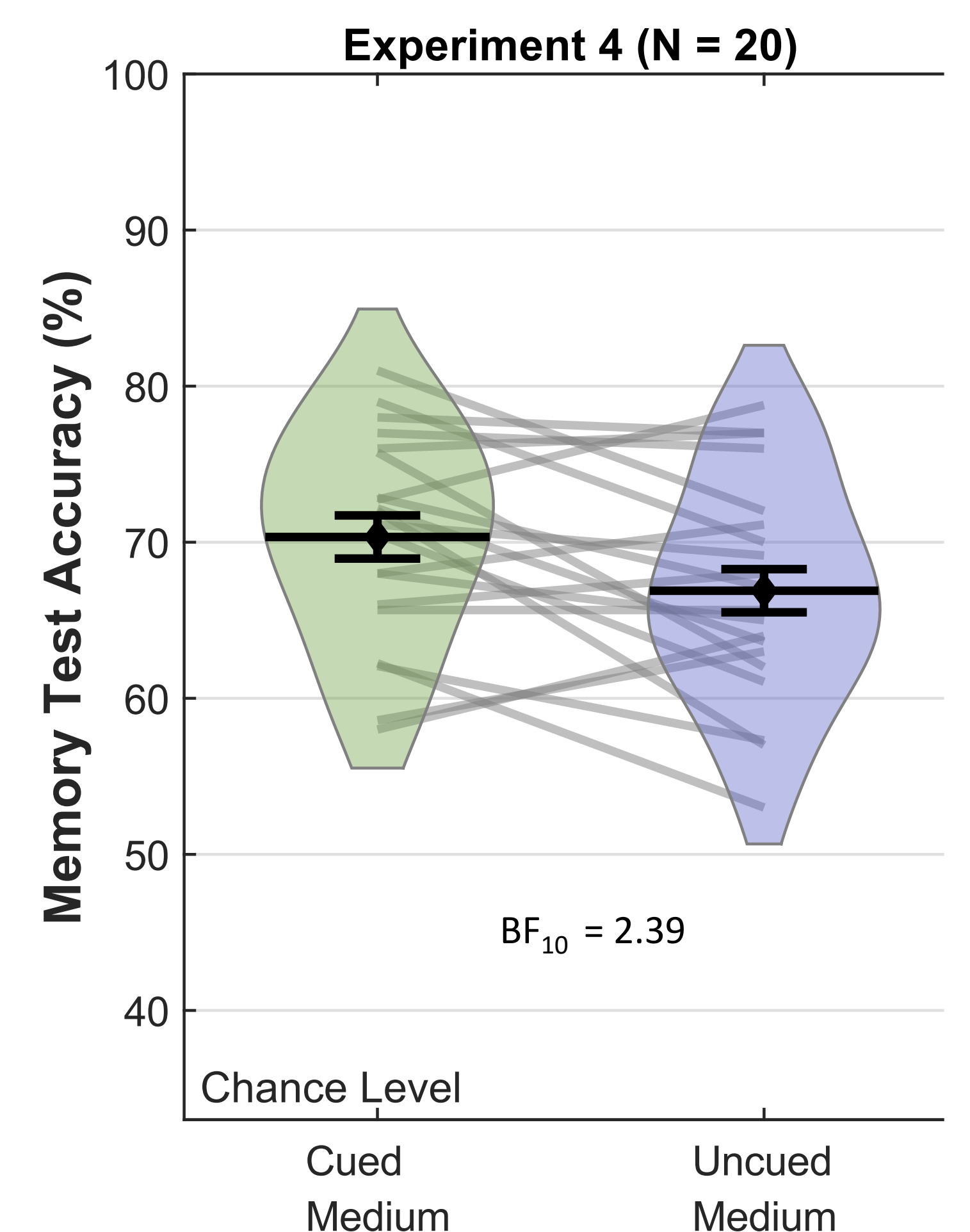
Despite the incentives, unattended item was not maintained with high precision



The attended item was maintained with high precision regardless of the order of testing



Reversing the function of the retro-cue did not reverse the effect



Task difficulty manipulation was effective when it did not need to counteract selective attention

## Conclusion

Participants could not maintain a high precision unattended item despite task requirements, reward, and instructions (Exp 1).

This gap between attended and unattended items was not explainable by testing order (Exp 2), or automatic retro-cue effects (Exp 3). Task difficulty passed the manipulation check (Exp 4).

Overall, we observed that WM precision was consistently determined by internal attention, and therefore, we conclude that internal attention governs precision in WM.