Preexisting Spatial Biases Influence the Encoding of Information into Visual Working Memory

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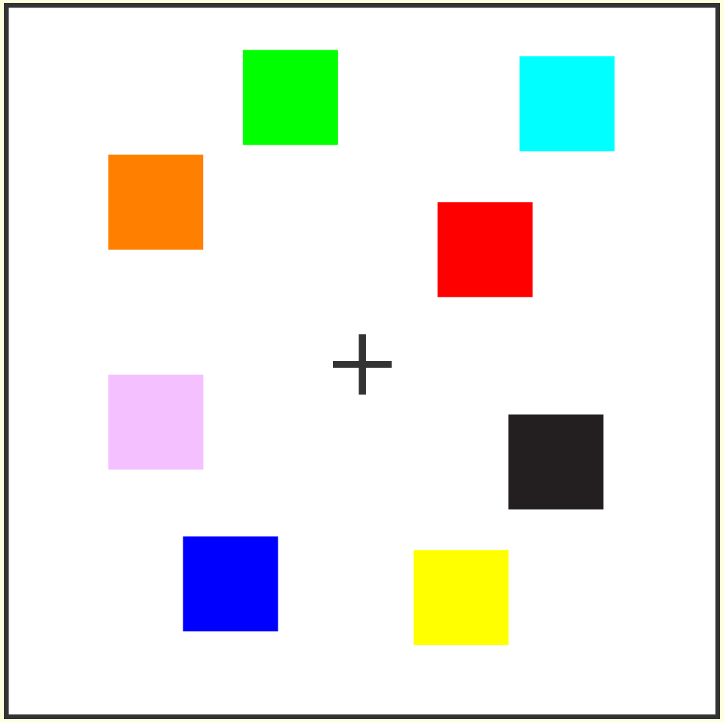
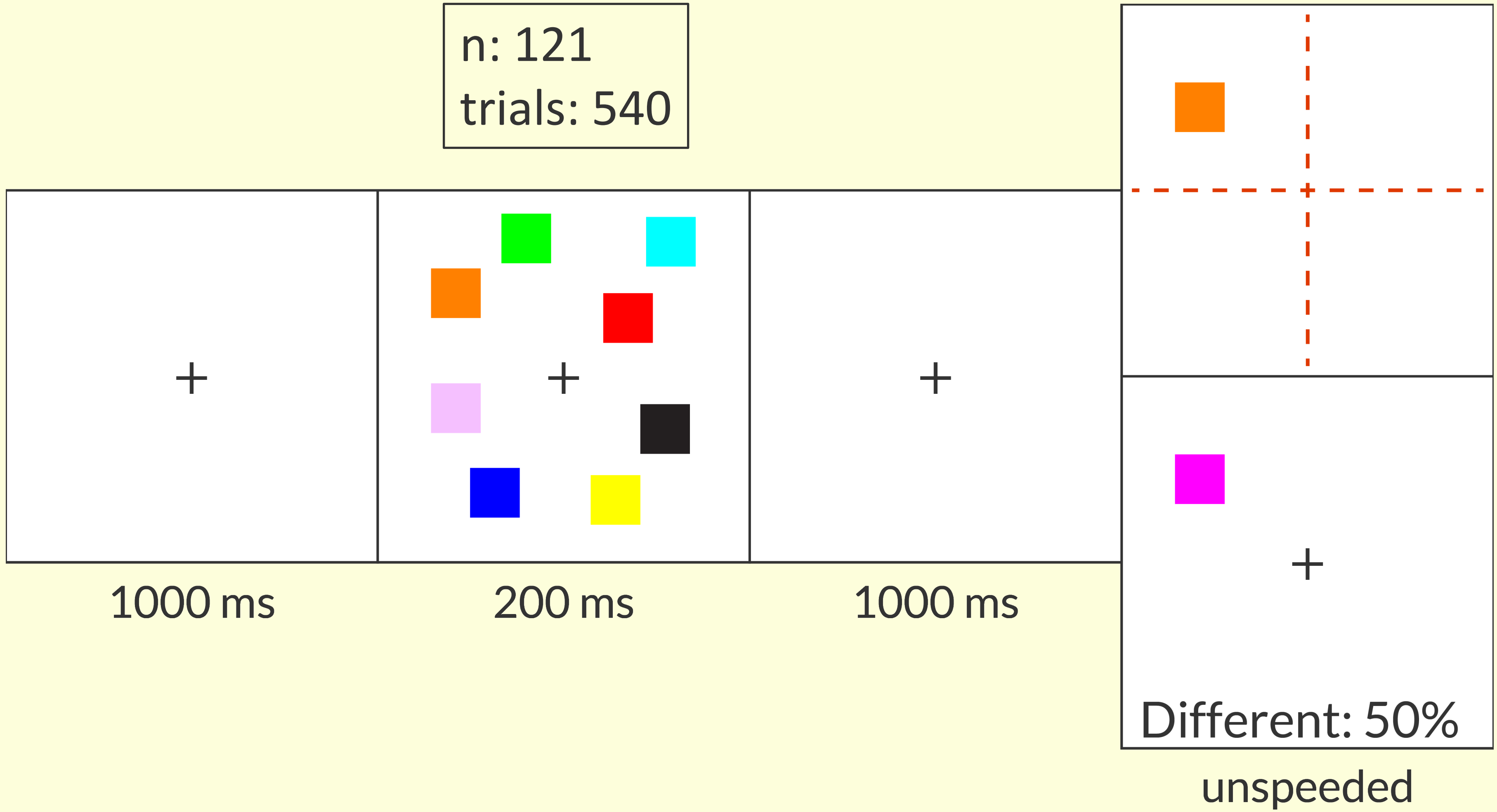
Introduction

Which items are stored when a display contains more information than you can remember?

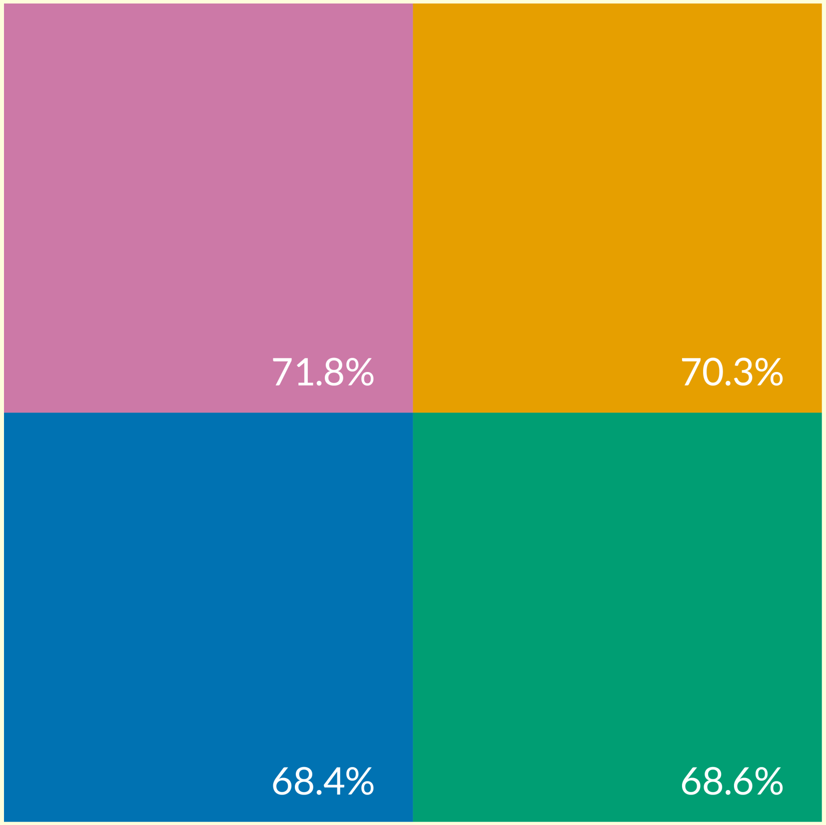


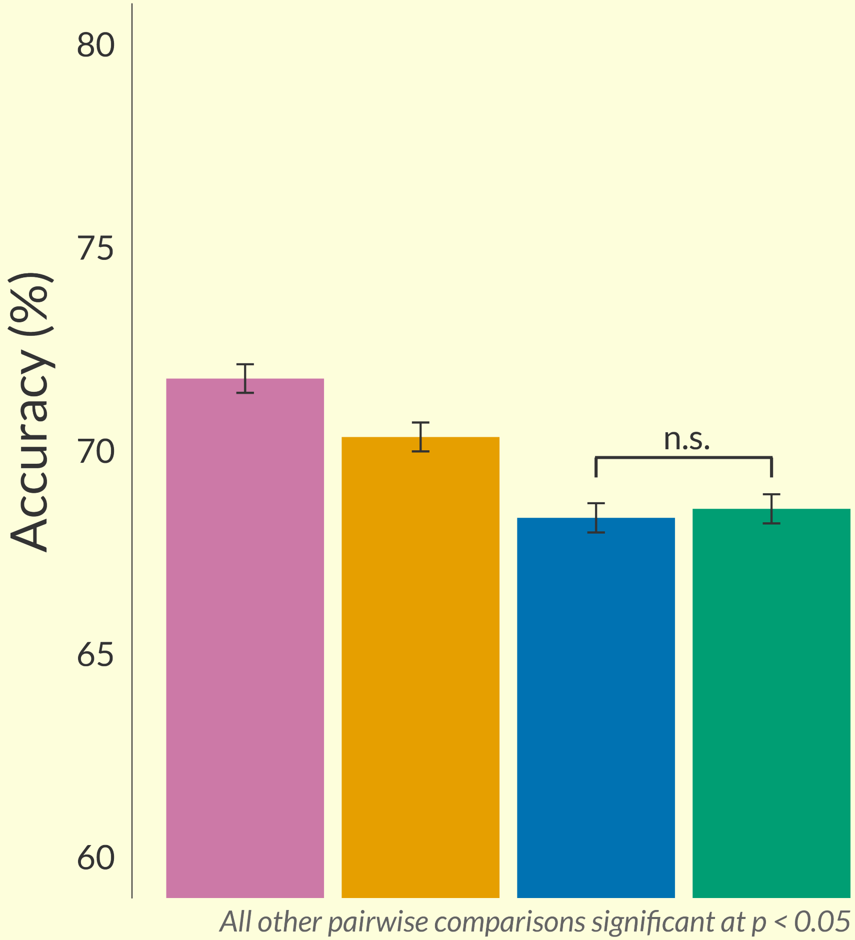
Experiment 1 Procedure

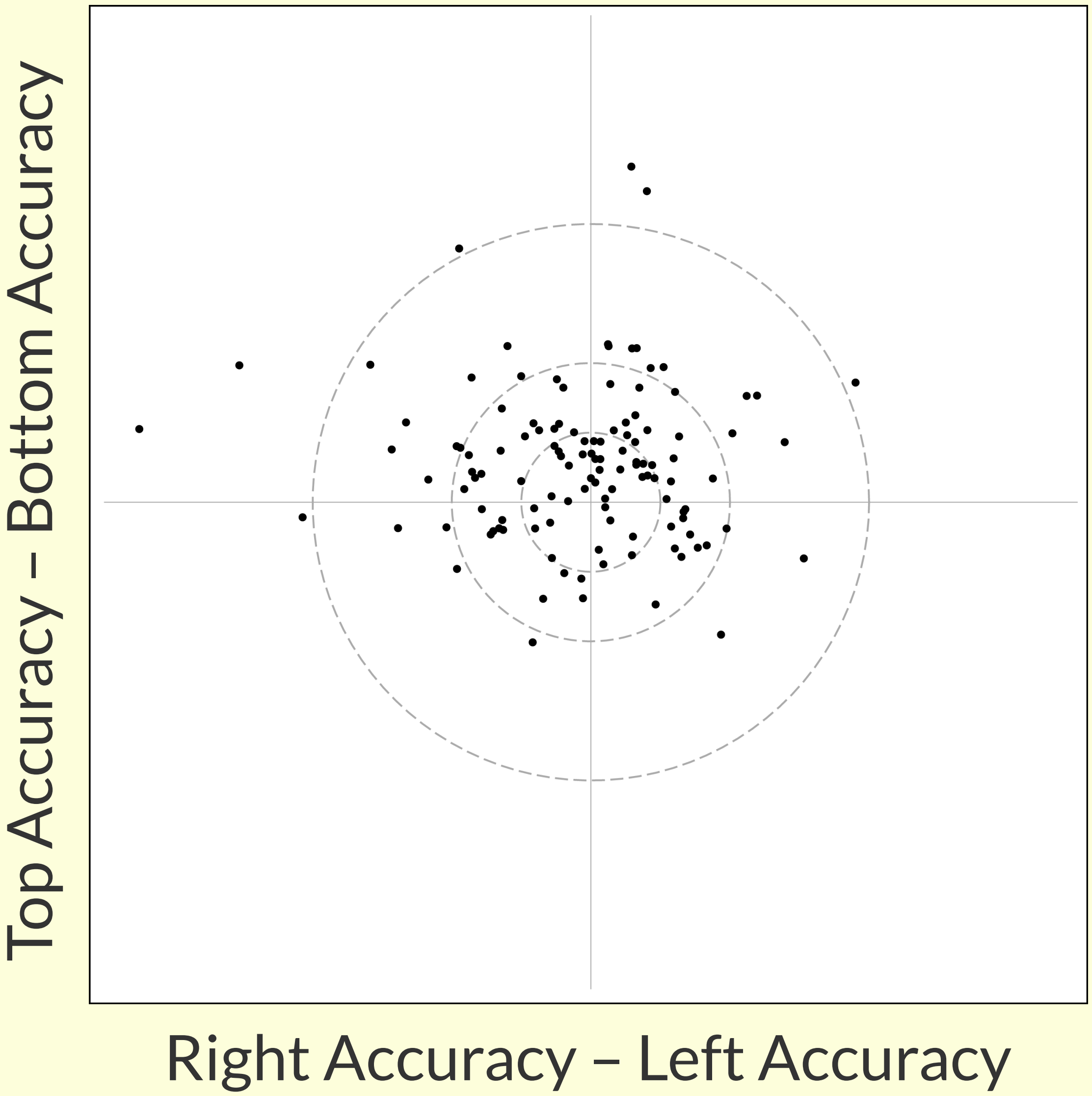


Data published in Xu, Adam, Fang & Vogel (2018)

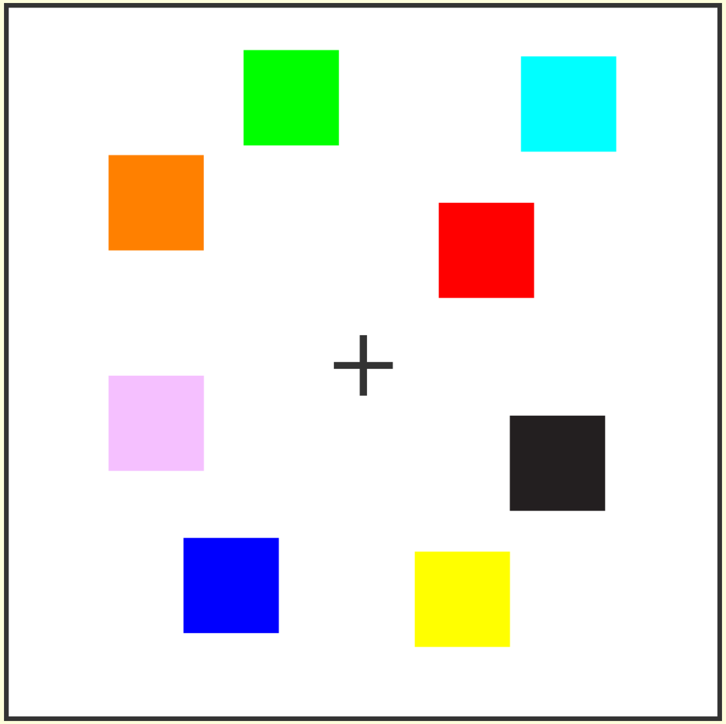
Experiment 1 Results





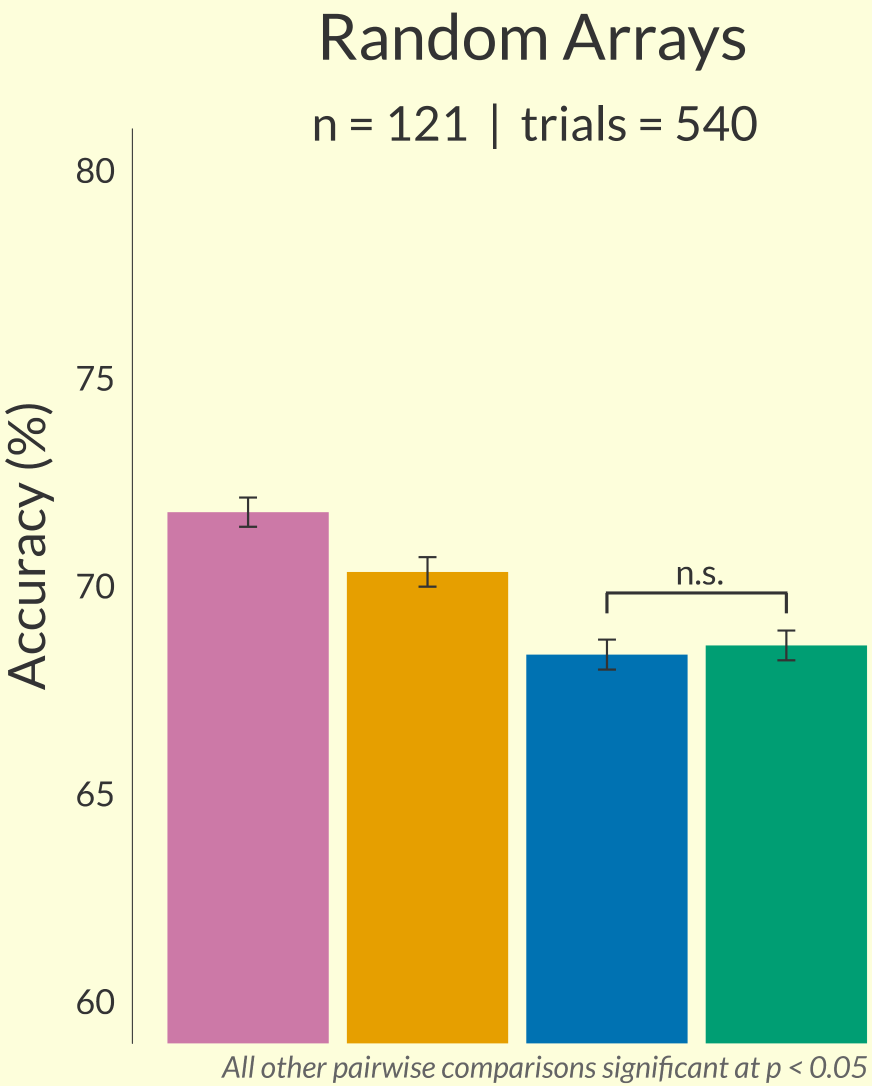

Top Accuracy – Bottom Accuracy
Right Accuracy – Left Accuracy

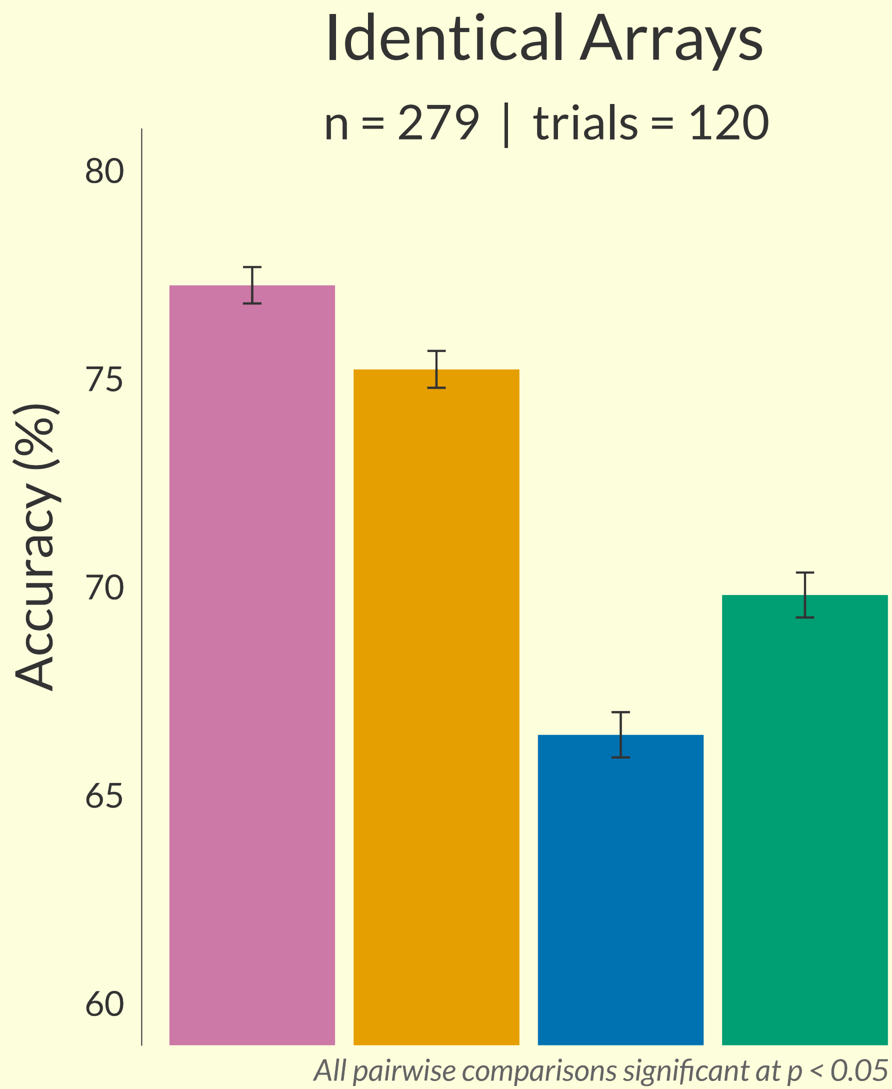
Stimulus Properties

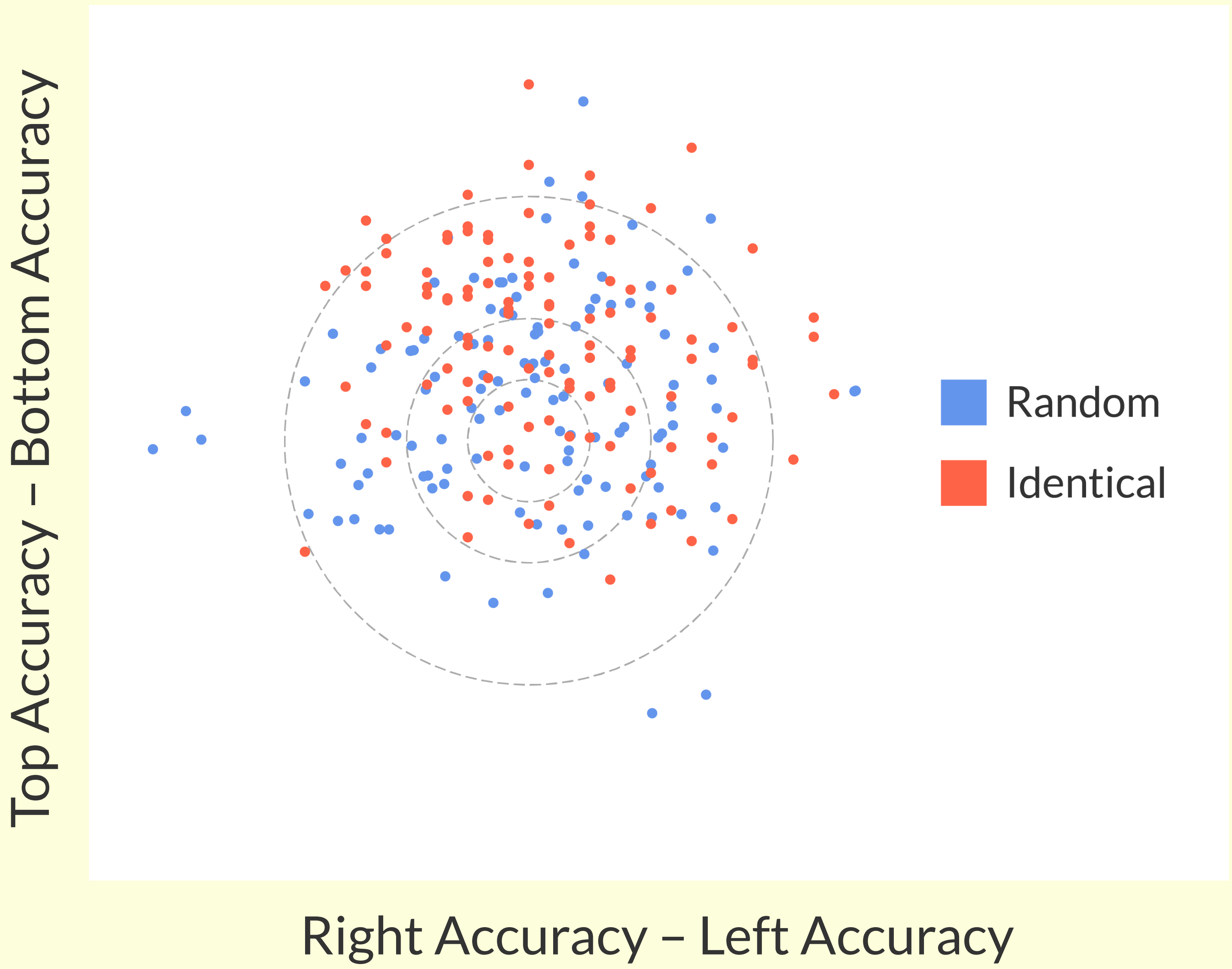


Brady and Tenenbaum (2013) found that subjects are consistent in their performance when viewing the exact same change detection displays.

Experiment 2 Results

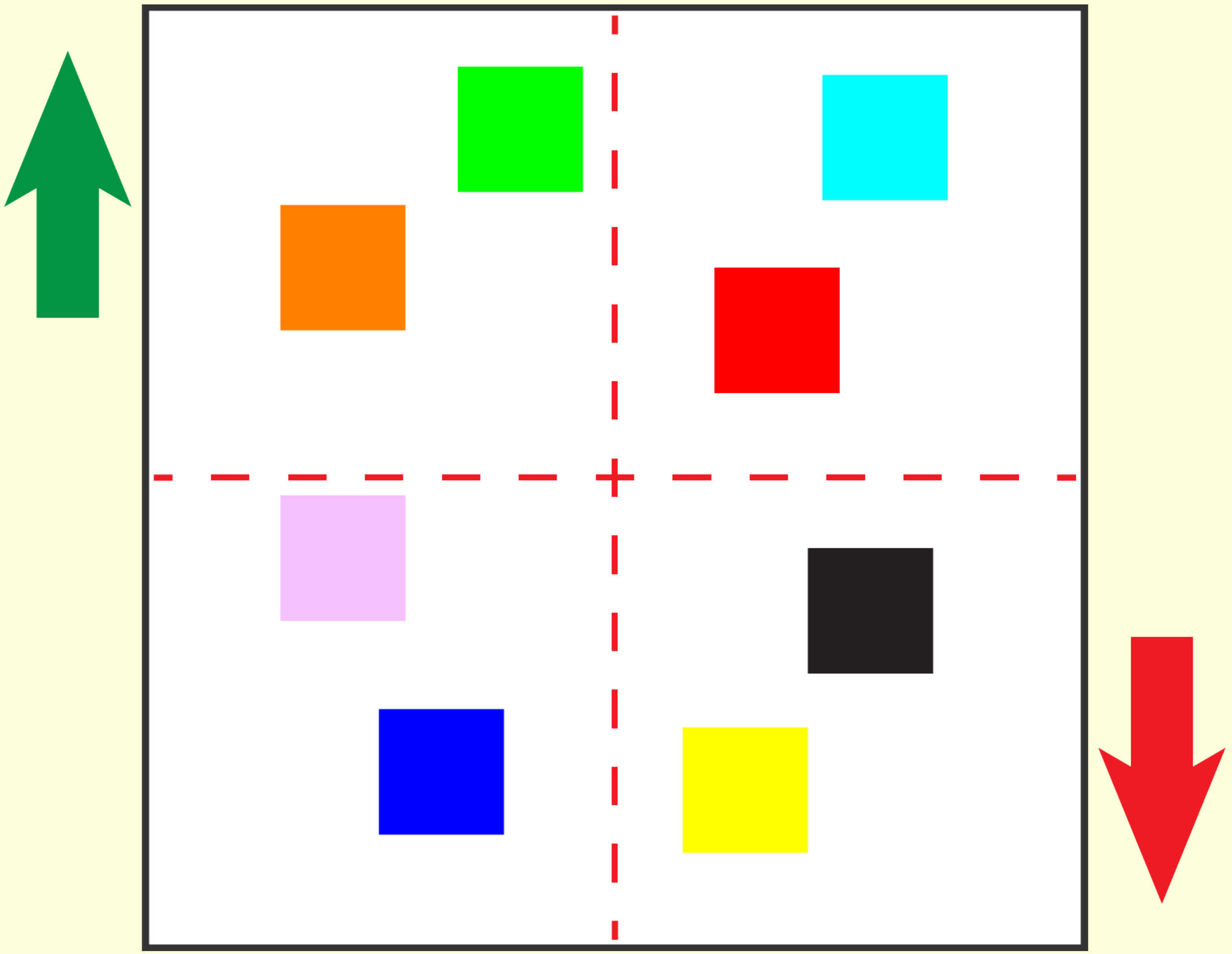




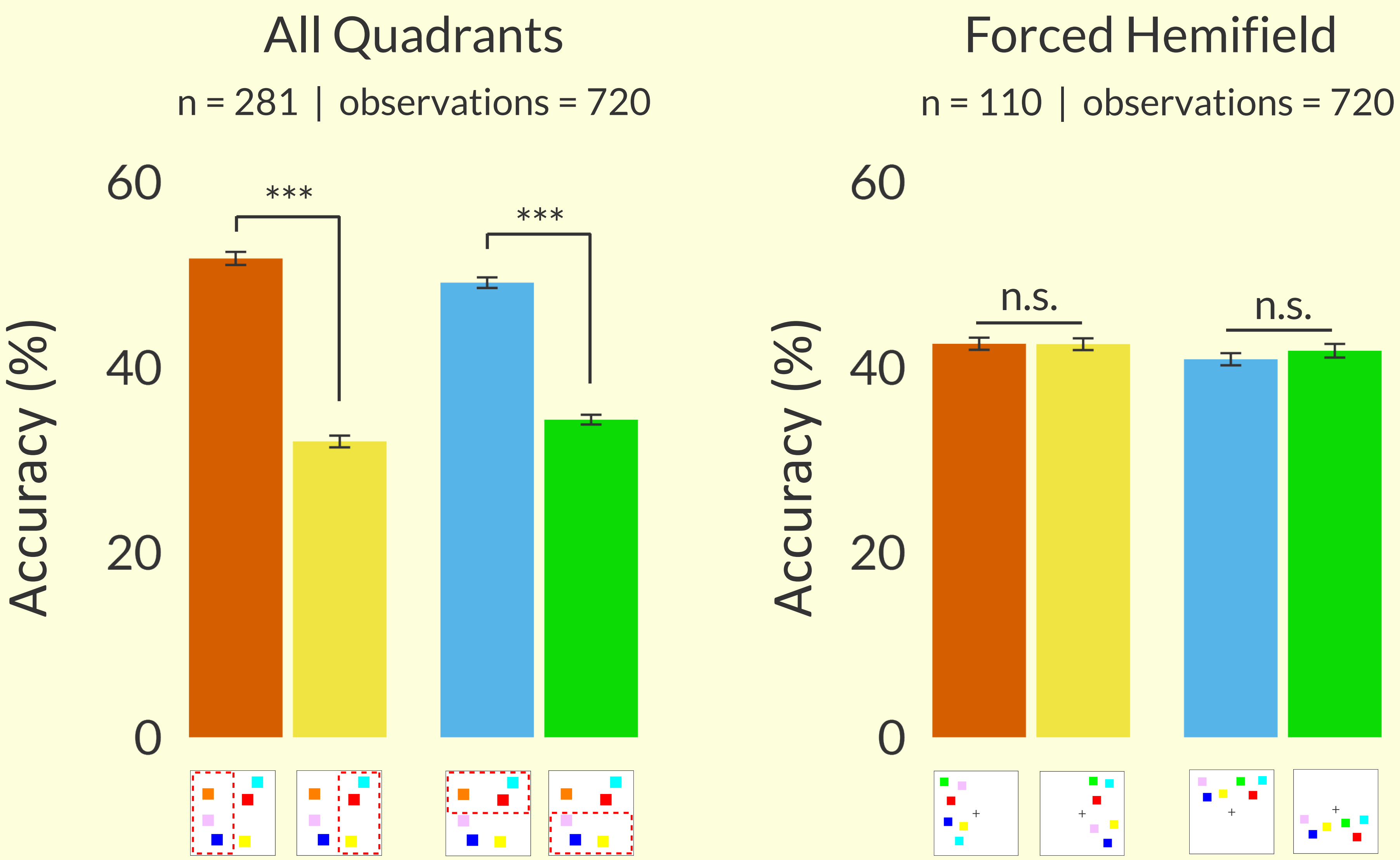


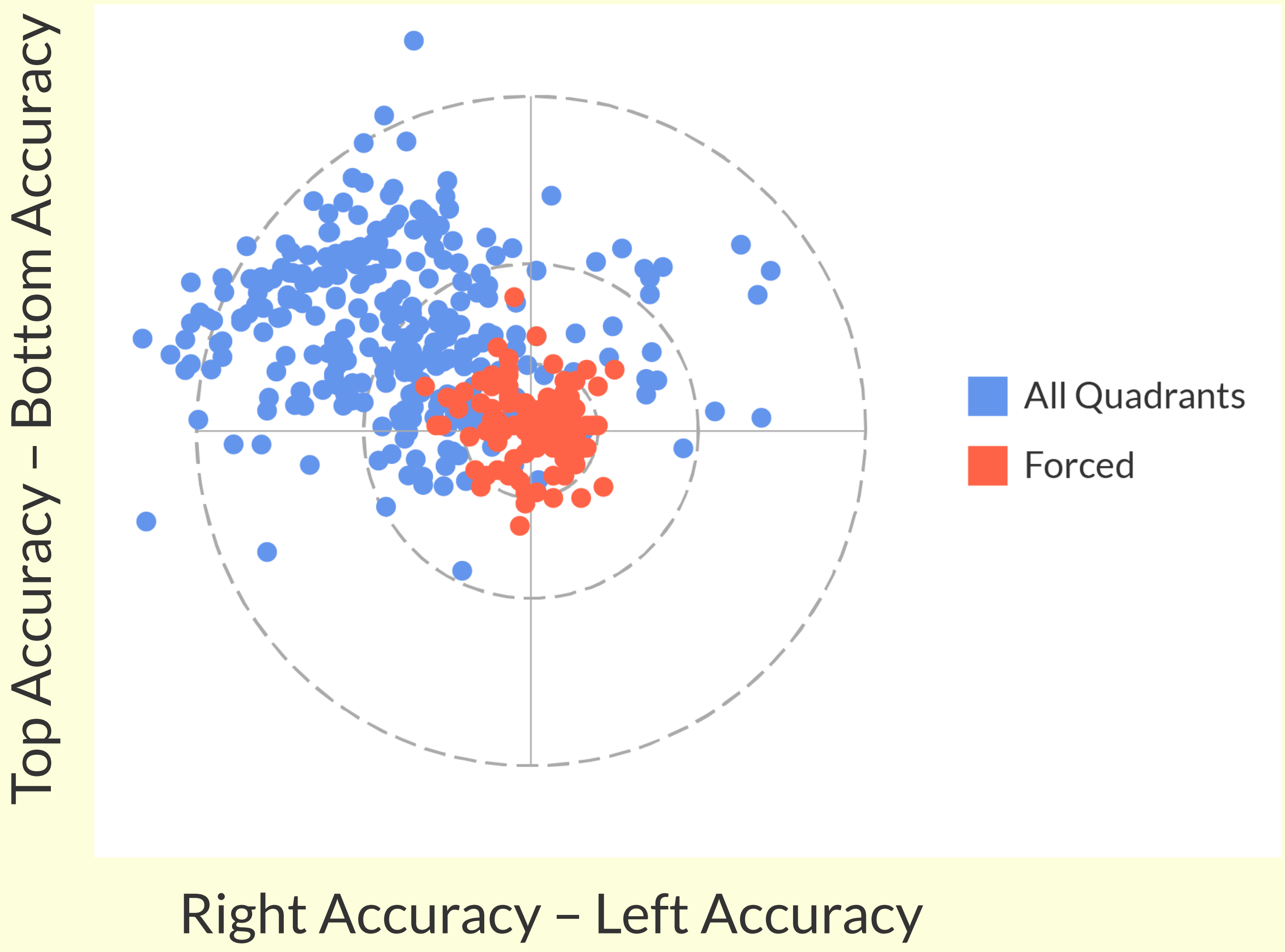
Random
Identical
Top Accuracy – Bottom Accuracy
Right Accuracy – Left Accuracy

Capacity Differences



Experiment 3 Results

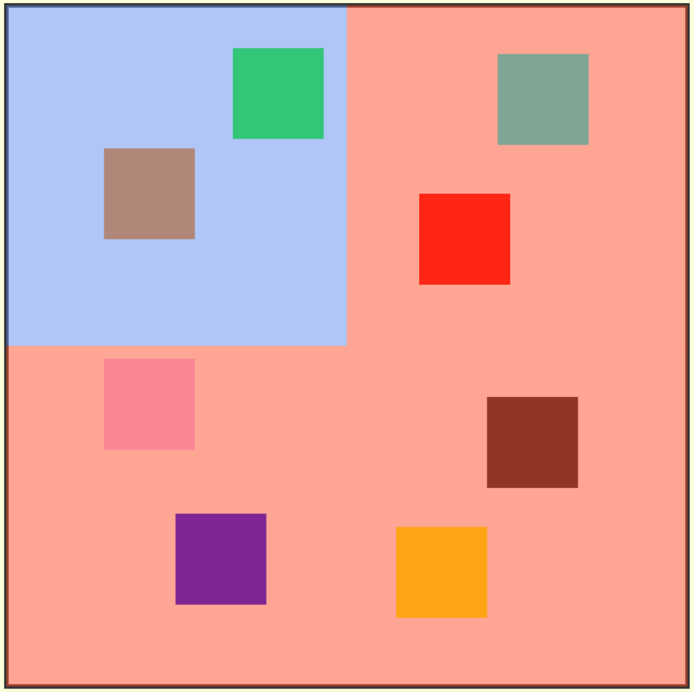


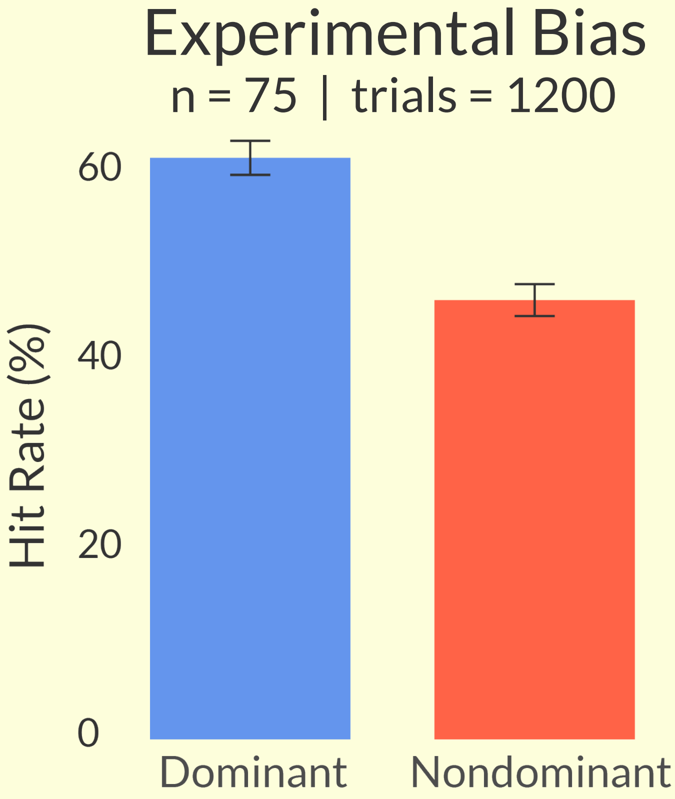


Top Accuracy – Bottom Accuracy
All Quadrants
Forced
Right Accuracy – Left Accuracy

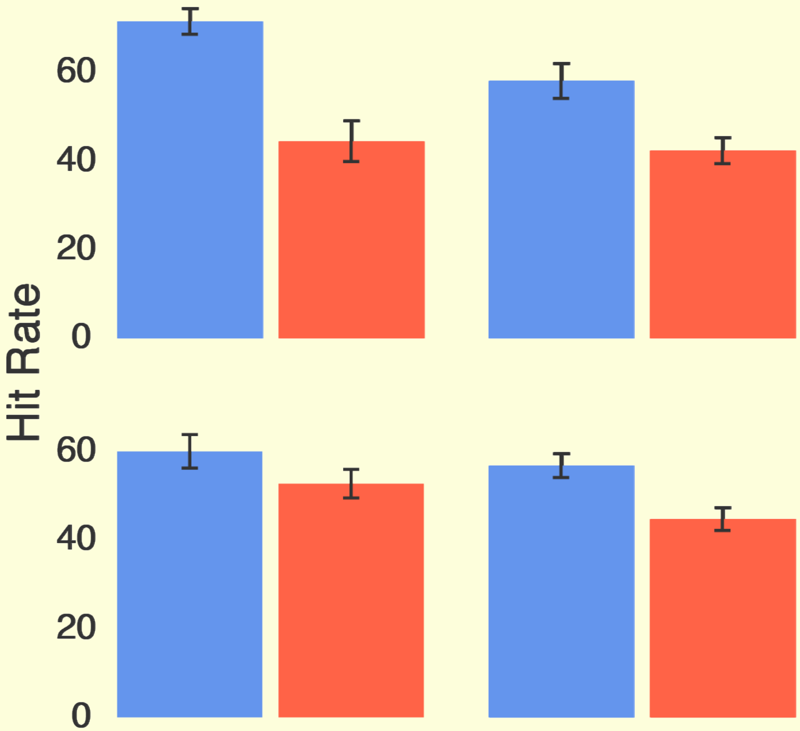
Selection Bias

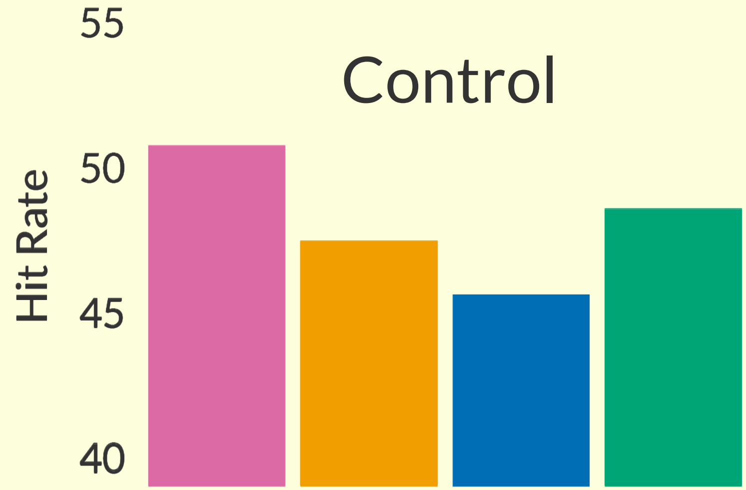
Umemoto et al. (2010) found that participants can implicitly learn where changes in a display are more likely to occur

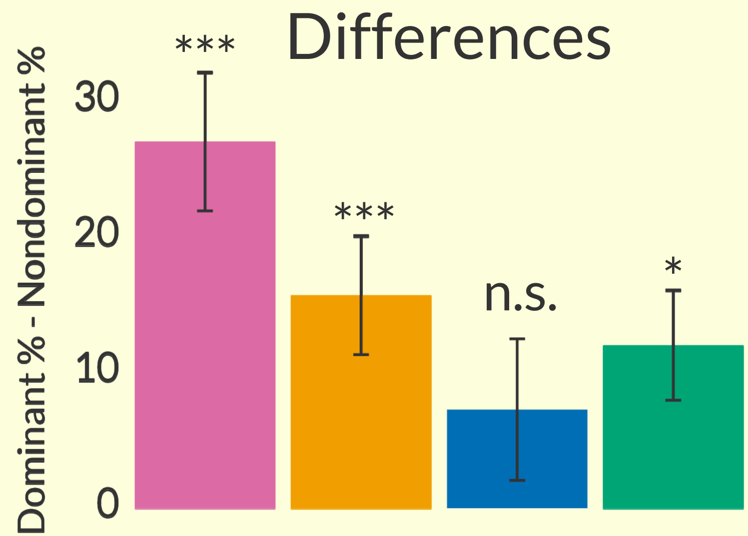




Experiment 4 Results







Conclusion

Over multiple experiments (470340 observations), we have repeatedly observed the same pattern of performance differences across quadrants.

Preliminary results seem to suggest this is due to a bias in selection, as opposed to something about stimulus properties or capacity

Complete working memory models need to account for these existing biases when attempting to estimate capacity