The Contents of Visual Working Memory Bias Ensemble Perception

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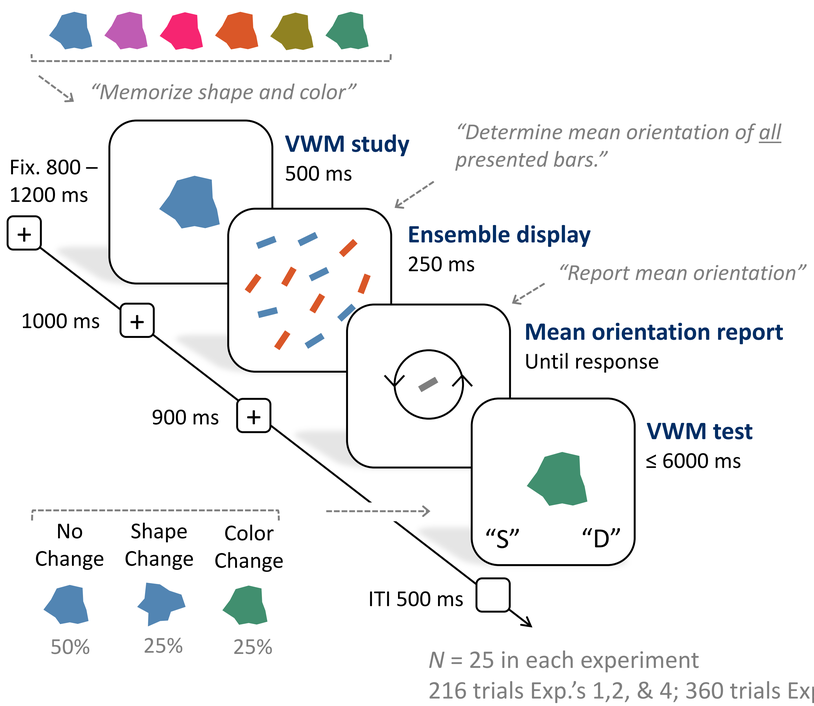
Background

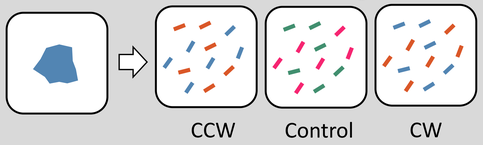
- Many have examined whether focused attention is required for accurate representations of ensemble statistics (e.g. mean size)[1,2], with less research considering how attentional biases may interfere with ensemble judgments[3]
- Relying on automatic guidance by visual working memory (VWM)[4], we examined whether attentional processes bias ensemble estimations in the absence of explicit instruction to attend to any single item in the set (Exp. 1)
- Additionally, we consider whether this bias can be accounted for by perceptual priming (Exp. 2), or strategic attentional allocation (Exp.'s 3 & 4)

General Procedure



N = 25 in each experiment
216 trials Exp.'s 1,2, & 4; 360 trials Exp. 3

Feature-matching subset

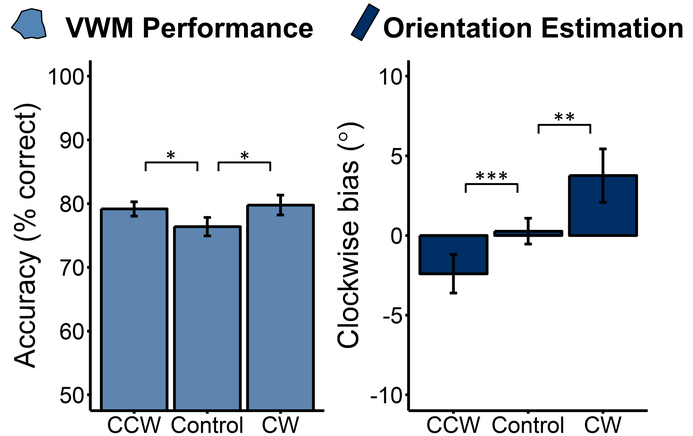


If individuals overweight feature-matching items, orientation reports should be biased towards subset mean (CCW = μ - 15˚; CW = μ + 15˚).

* $p < .05$; ** $p < .01$; *** $p < .001$

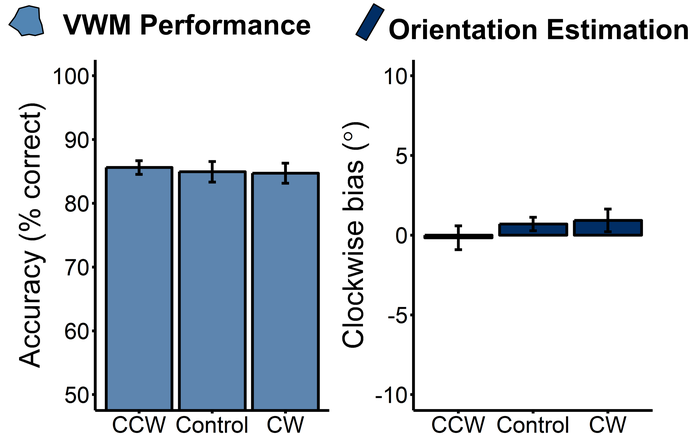
Exp. 1: Single Ensemble Duration

Shape and color equally relevant; 250 ms display duration.



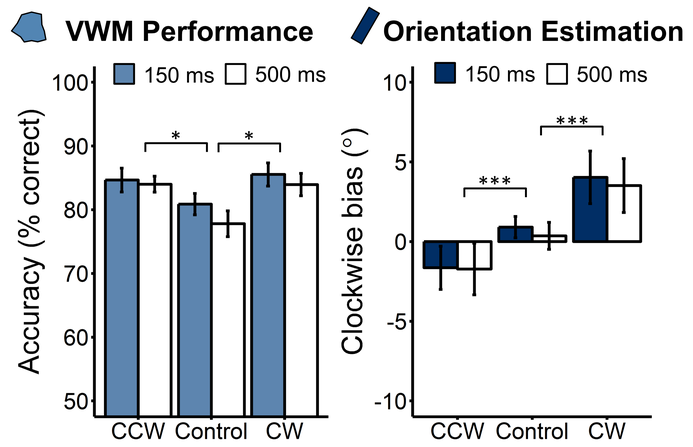
Exp. 2: No Color Change

Shape, but not color, of VWM object could change at test.



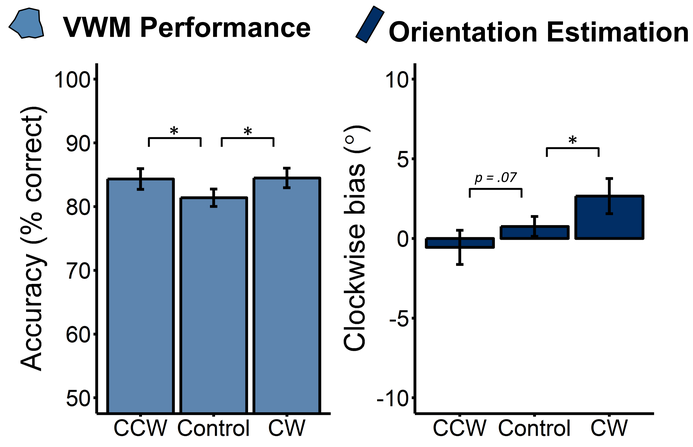
Exp. 3: Short and Long Ensemble Durations

Display durations of 150 ms and 500 ms, intermixed.



Exp. 4: Low-Prevalence Color Change

Shape change 5x more likely than color change.



Conclusion

- Ensemble judgments are susceptible to biases owing to altered attentional weighting of individual elements, even in the absence of explicit instruction to attend to any single item
- As such, we argue that future models should not only consider whether focused attention is required in the formation of accurate ensemble representations, but also the contribution of feedback processes between cognitive systems

1. Alvarez & Oliva (2008). *Psychol. Sci.*, *19*; 2. Jackson-Nielsen, Cohen, & Pitts (2017). *Conscious.& Cogn.*, *48*.; 3. De Fockert & Marchant, A. P. (2008). *Percept & Psychophys.*, *70*; 4. Olivers, Meijer, & Theeuwes, (2006). *J. Exp. Psychol.: Hum. Percept. & Perf.*, *32*.