

Introduction

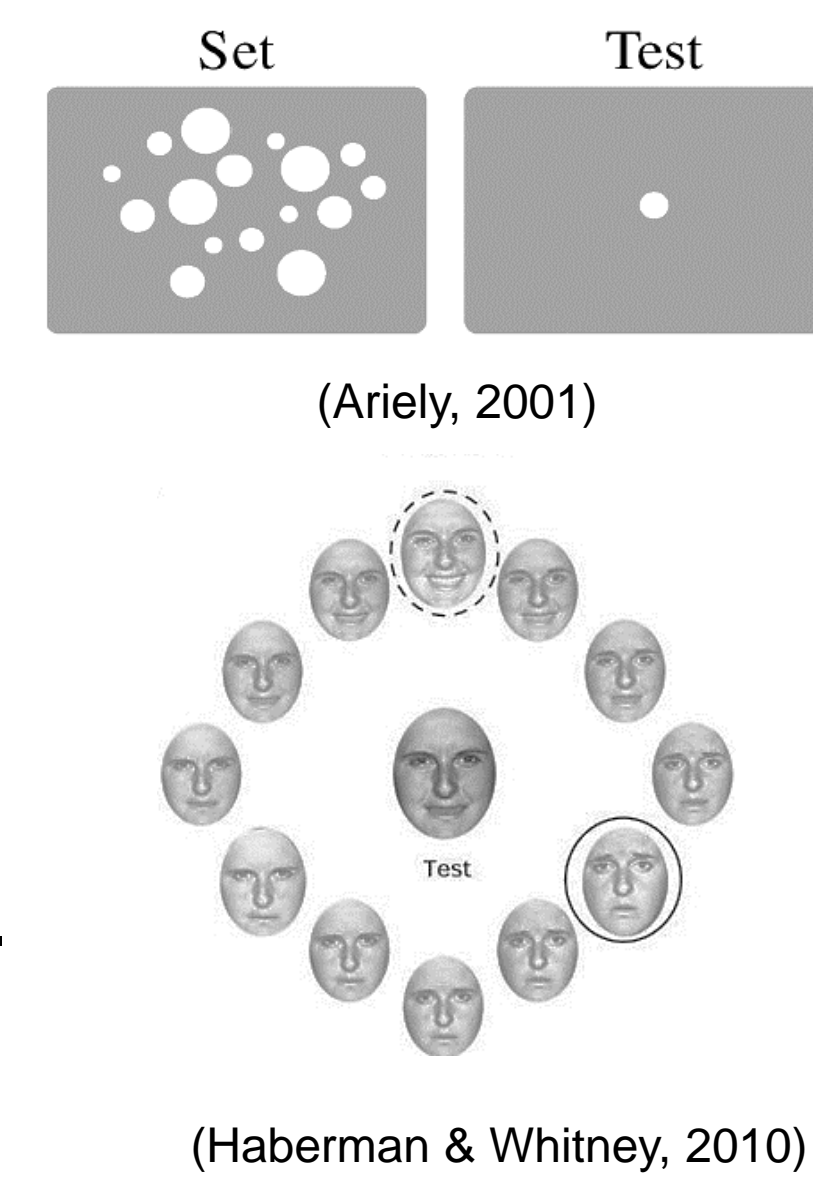
When presented with large sets of items the visual system generates statistical summaries, which overcome limitations in working memory¹.

This process is known as ensemble perception.

Perceptions of ensemble averages are more accurate than reports of single items for low level stimuli¹ (shapes) and faces².

Working memory capacity increases when processing high level real-world stimuli.

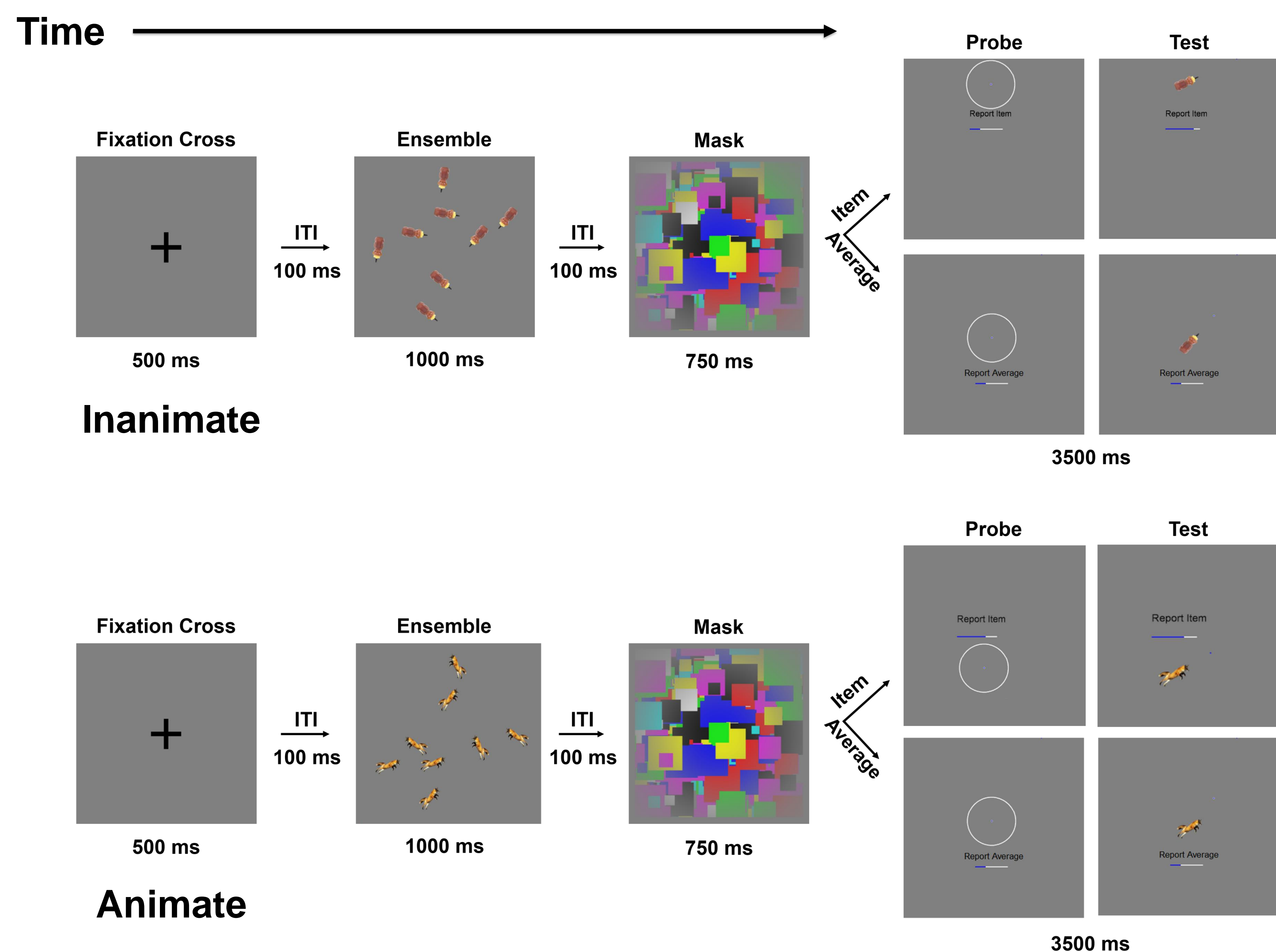
However, less is known about the effect of stimulus level on ensemble perception³.



Stimuli



Methods



N = 20, 288 trials randomized stimulus and response type

Results

Dependent Variables

Absolute Error: orientation is reported with error.

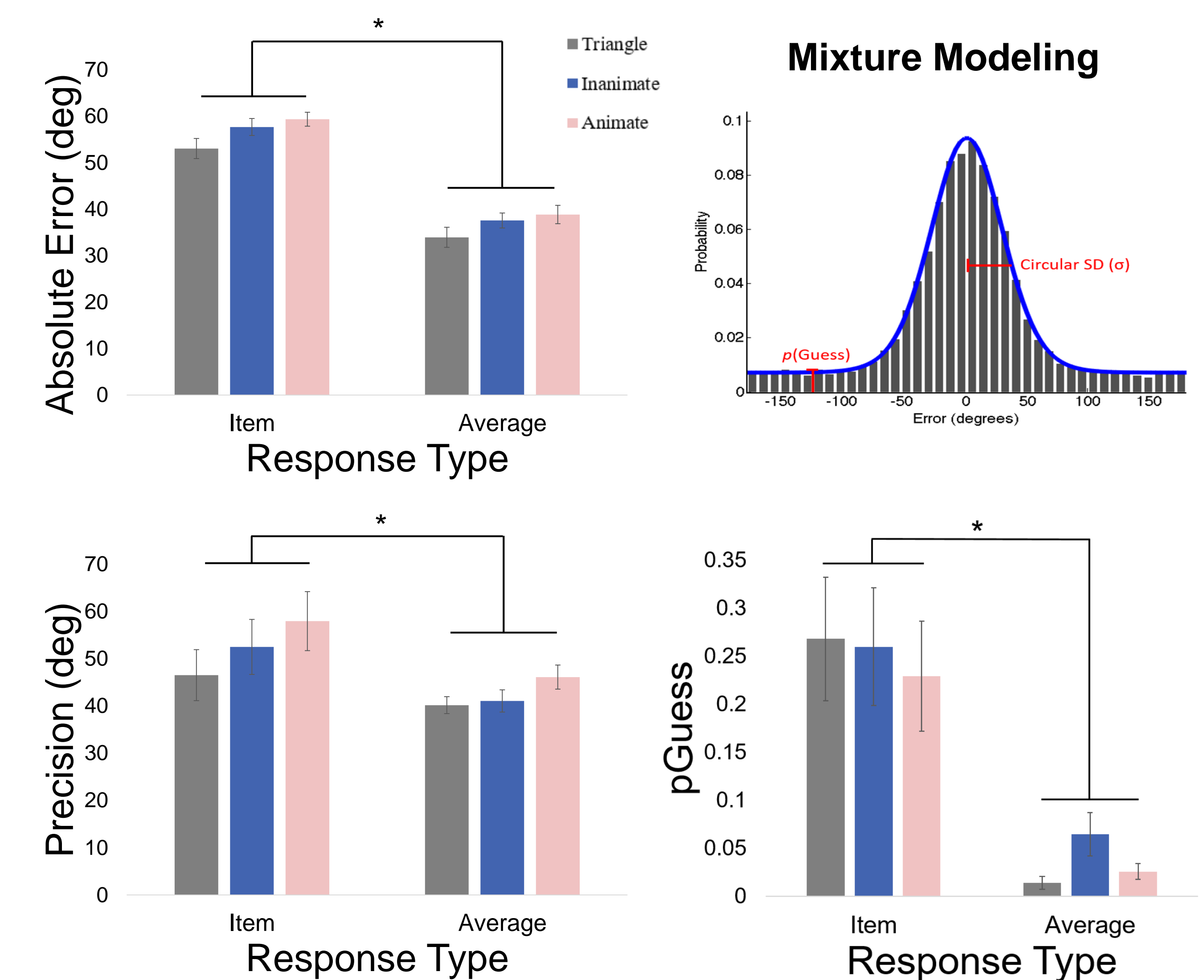
Mixture modeling outputs

pGuess: proportion of trials where target information is unavailable for report.

Precision: degree of noise associated with correct target responses.

Main Findings

- (1) Ensemble perception is better for average responses than for single-item responses.
- (2) Use of real-world stimuli does not appear to effect ensemble perception.
- (3) Animacy does not appear to effect ensemble perception.



* $p < 0.05$

Discussion

Participants are better at reporting average vs. item orientation, this has been demonstrated previously to be robust across different visual properties (e.g. size¹).

Interestingly, our results show that precision is better for average vs. item, even though the average is never presented.

Contrary to the increase in working memory capacity for real-world stimuli vs. low level stimuli processing, ensemble perception does not appear to be affected by the richness of stimuli.

Our study found that ensemble orientation processing performance is similar between simple, inanimate and animate stimuli. This supports recent findings that animacy can be processed using ensemble perception⁵.

This suggests that ensemble statistics can be performed for abstract properties, as easily as for low level properties. Which, may underlie our perceived ability to visualize rich and detailed environments despite limitations in working visual memory.

References

1. Ariely (2001), *Psychol. Sci.*
2. Haberman & Whitney (2010), *Atten. Percept. Psychophys.*
3. Brady, Störmer & Alvarez (2016), *Proc. Natl. Acad. Sci.*
4. Zhang & Luck (2008), *Nat.*
5. Leib, Kosovicheva & Whitney (2016), *Nat. Commun.*

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