Average size estimation of dots completing behind an illusory surface is precise

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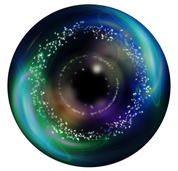
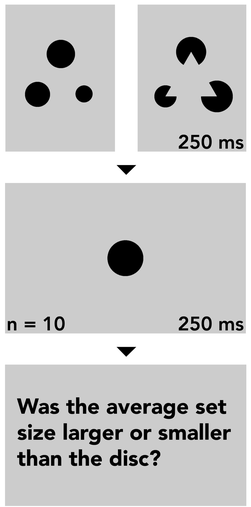


Ensemble perception has been demonstrated across a host of visual domains. In these demonstrations, the set members were wholly visible to observers. Here we explore whether ensemble perception extends to the conceptual level as well; that is, whether the average size may be derived from information that is inferred by the visual system.

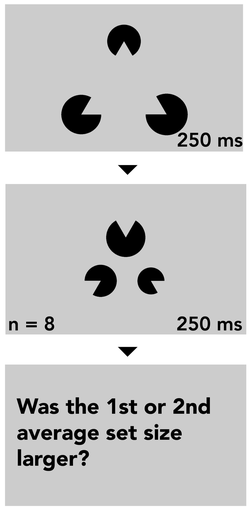
Question: Does the visual system represent information at a conceptual level?

PHASE 1: STIMULI + TASK

EXPERIMENT 1:
CONCEPTUAL ENSEMBLE
PRECISION

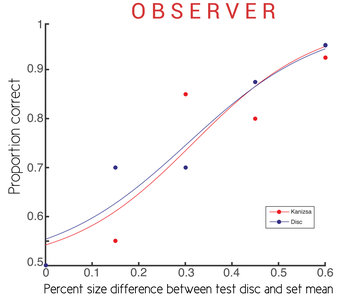


EXPERIMENT 2:
CONCEPTUAL ENSEMBLE
BIAS

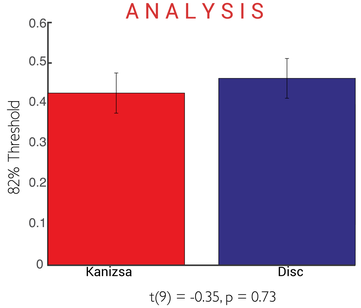


PHASE 1: RESULTS

REPRESENTATIVE OBSERVER



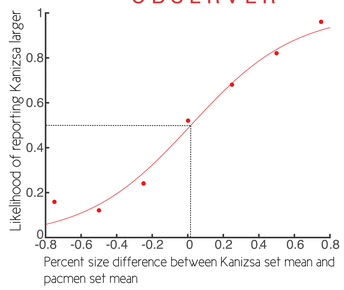
GROUP ANALYSIS



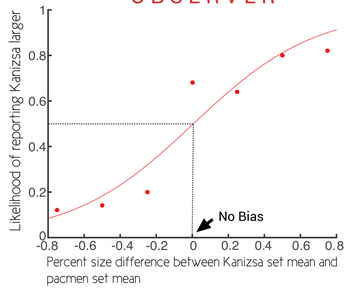
t(9) = -0.35, p = 0.73

Experiment 1: Observers' mean size representation was as precise in the Kanizsa condition (i.e., conceptual) as they were in the disc condition (i.e., physically visible).

REPRESENTATIVE OBSERVER



REPRESENTATIVE OBSERVER



Average threshold = 0.0125, t(7) = 0.15, p = 0.88

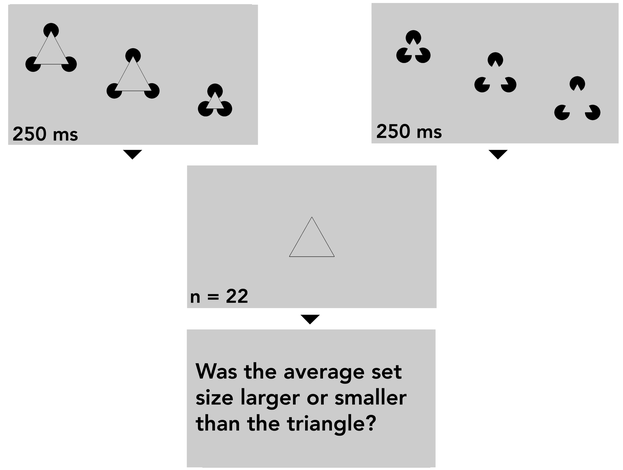
Experiment 2: Even though observers had access to conceptual ensemble information, they were not biased to see the amodally completed discs as larger than the pacmen.

REFERENCES

Emmanouil, T. A., & Lee, J. (2015). Statistical processing of partly occluded sets. Journal of vision, 15(12), 1073-1073.
Chong, S.C. & Treisman, A. 2003. Representation of statistical properties, Vision Research, 43, 393-404

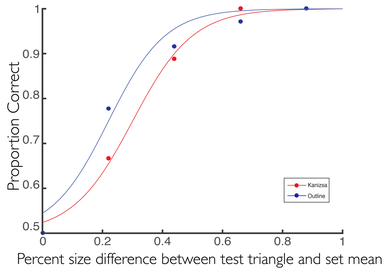
PHASE 2: STIMULI + TASK

EXPERIMENT 3: ENSEMBLE REPRESENTATION OF ILLUSORY TRIANGLES

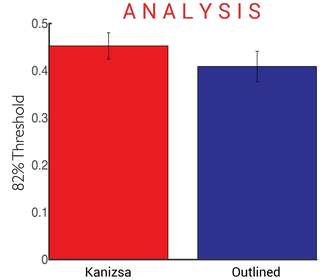


PHASE 2: RESULTS

REPRESENTATIVE OBSERVER



GROUP ANALYSIS



t(21) = 2.03, p = 0.055

Experiment 3: A trend exists for observers to represent the average size of the fully visible triangles better than the average of the modally completing triangles (by just over 4%), suggesting that the ensemble is marginally more difficult to perceive, at least for illusory contours.

Conclusion: The visual system extracts conceptual average size precisely. However, this comes at a small cost when representing sets of modally completing contours.