

The Role of Object Size on Distance Judgments: Evidence for the Generation of *Ad-hoc Metrical Systems*

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Abstract

The current research addresses asymmetries found in human data by providing evidence for a heuristic of generating *local ad-hoc metrical systems*, where the size of salient objects is used to facilitate the encoding of distance by generating a ratio of distance to object size.

Ad-Hoc Metrics

In our theory, the distance between two objects in a visual scene is encoded using a heuristic of the size of the objects themselves. For example, car driving instructions advise you to stay two 'cars' away rather than 30 feet.

If this is so, then larger objects the same distance apart should *appear* to be closer together.



EX1: Forced-Choice Change Detection

Materials consist of paired-stimuli seen in Figure 1. Upon seeing the second stimulus, participants indicated whether the new distance was *CLOSER*, the *SAME*, or *FARTHER* than the last.

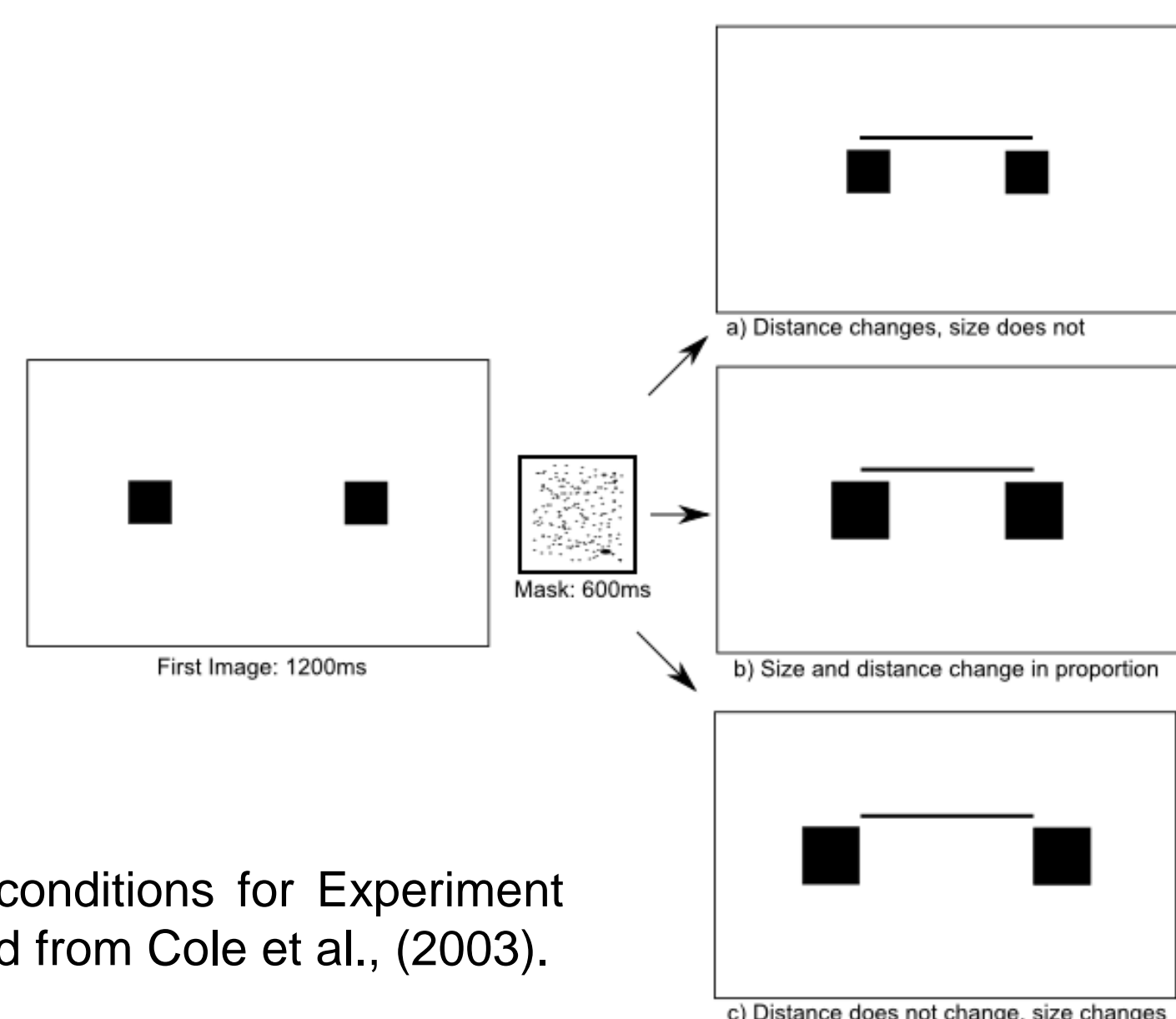


Figure 1. Sample conditions for Experiment 1. General method from Cole et al., (2003).

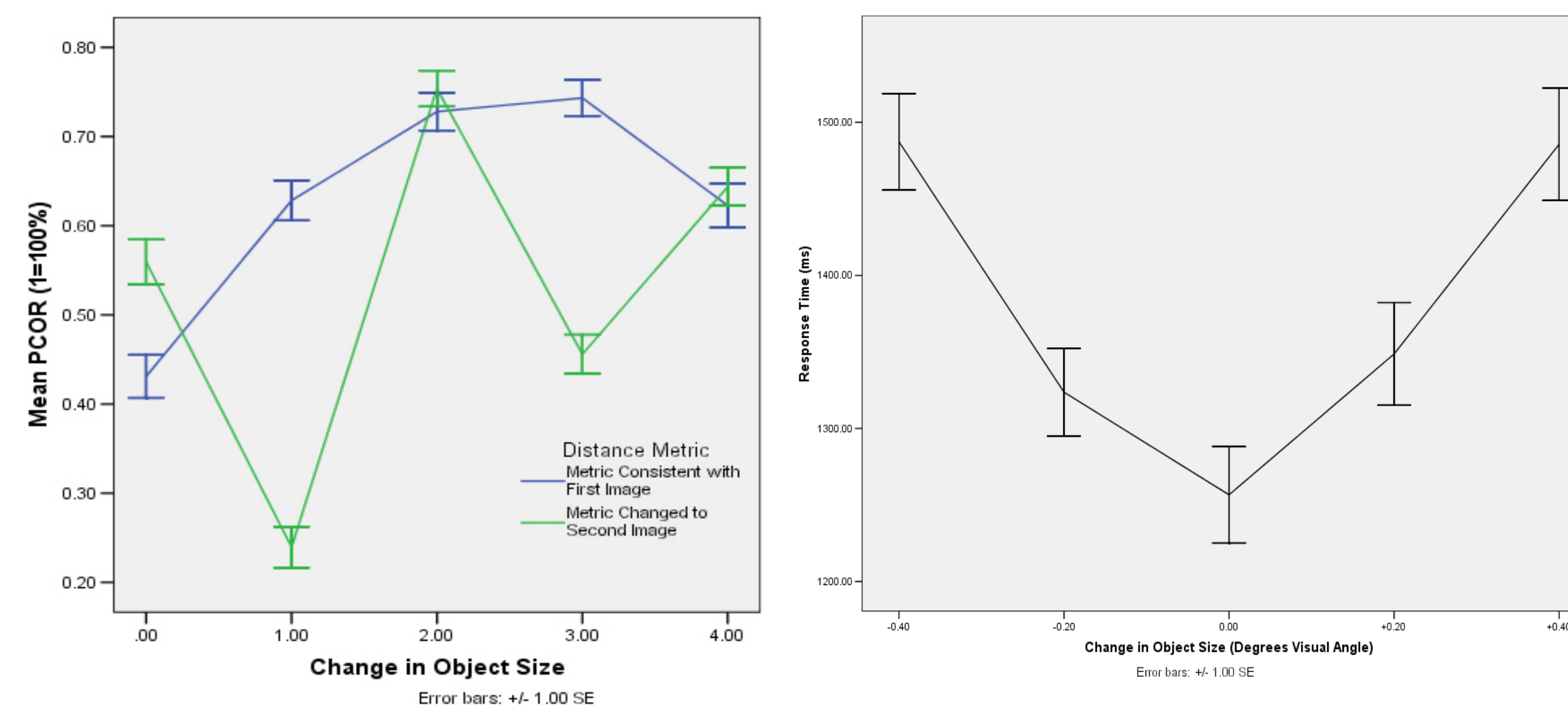


Figure 2: Results from Experiment 1. To the left is accuracy and to the right is response time data.

Results

- Consistent with the ad-hoc metric theory, accuracy is reduced when object size changes such that participants tend to exhibit a false SAME response when object size changes in proportion with distance.
- Response times increase linearly with changes in object size.
- Results not consistent with strategies involving fuzzy boundary detection or judging outer edge.

EX2: Drag-and-Drop Change Detection

Similar stimuli were used as in Experiment 1, but one square is anchored and the participant drags out the other square to the distance perceived from the first image (see Figure 3).

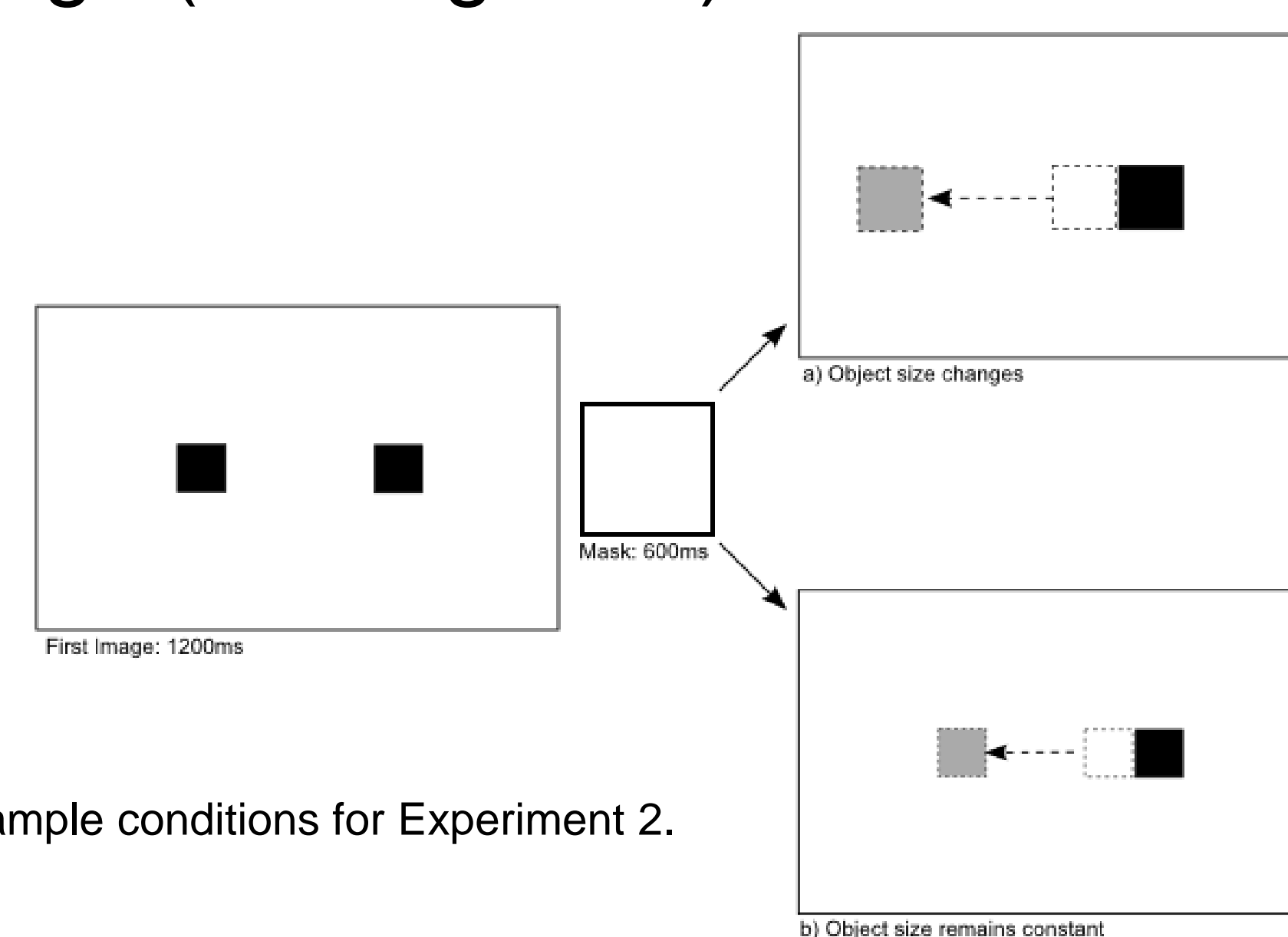


Figure 3. Sample conditions for Experiment 2.

Results

- Dragging deviations change linearly with changes in object size, consistent with Experiment 1.
- Response time dependent on dragging distance.
- Unlike EX1, response times were not dependent on changes in object size.
- Eliminates possibility that Experiment 1 results were due to a SAME response bias.

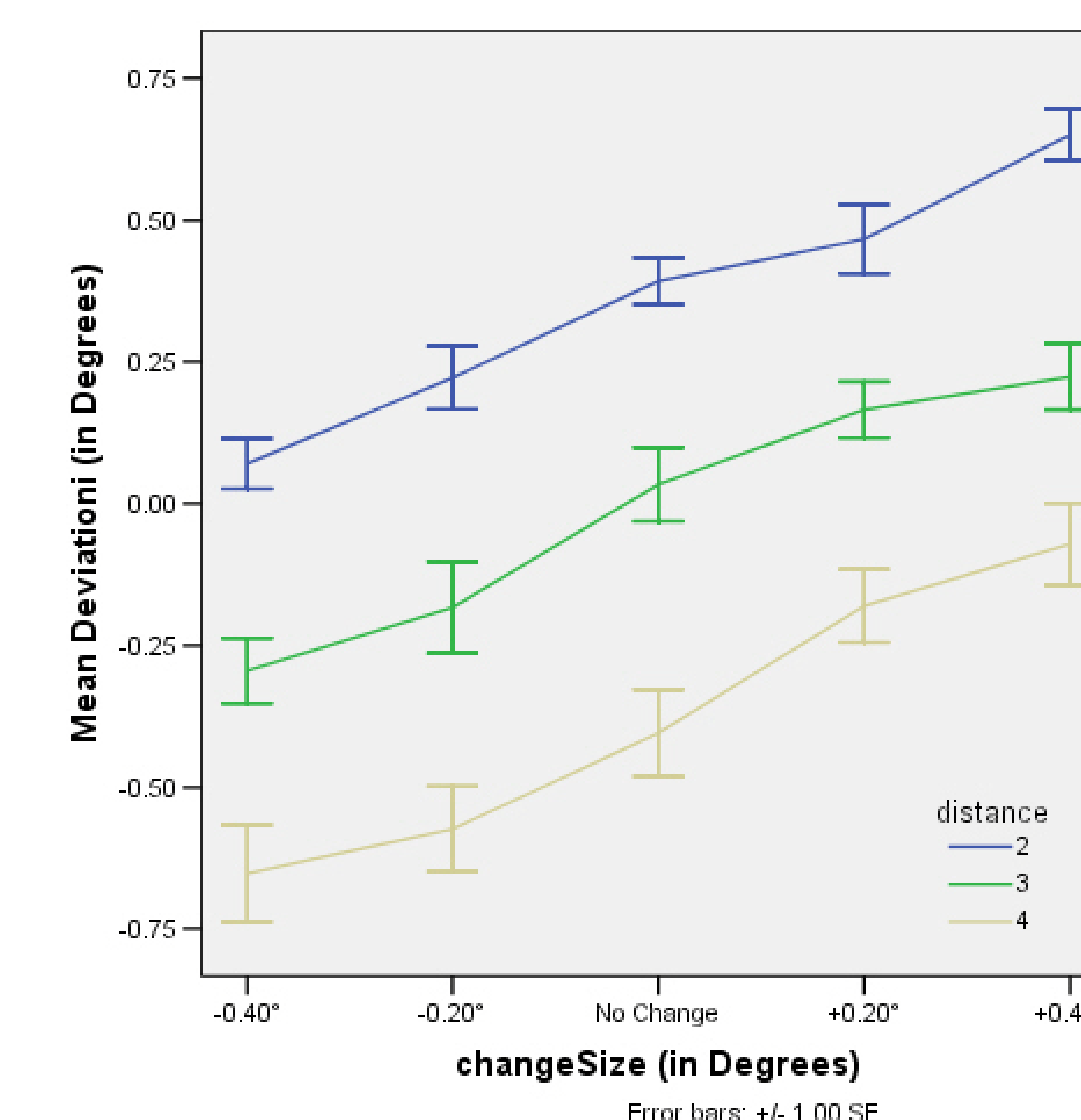


Figure 4: Experiment 2 dragging deviations

Conclusions

- Object size affects both **estimation** and later **production of distance judgments**, consistent with a theory of ad-hoc metrics.
- Asymmetries in distance judgments can be accounted for by differential perception of salient objects in a scene.
- Dragging durations do not accord with psychophysical estimates, some dragging-as-counting strategies may be implicated.

References

Cole, G.G., Kenridge, R.W., Gellatly, A.R.H., & Heywood, C.A. (2003) Detectability of onsets versus offsets in the change detection paradigm. *Journal of Vision*, 3, 22-31.

