Does Retinal or Perceived Space Guide Eye Movements?

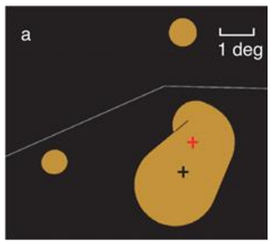
Adina Cianciotto, Christine Nothelfer & Steven Franconeri

HOW DO WE PERCEIVE OBJECTS IN OUR ENVIRONMENT?

Changes in our eye-movements to objects can provide insight into how our visual system represents and understands objects.

Past work has shown that eye-movement is guided by the center-of-area of the target shape. [1]

It has also shown that eye-movement to objects can be sensitive to other visual cues, such as 3D structure. [2]



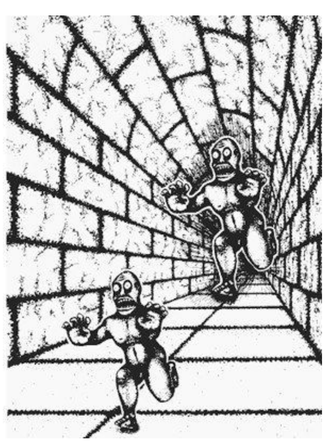
However, it's still unclear whether people attend to the center of the 2D (retinal space) or 3D object (perceived space).

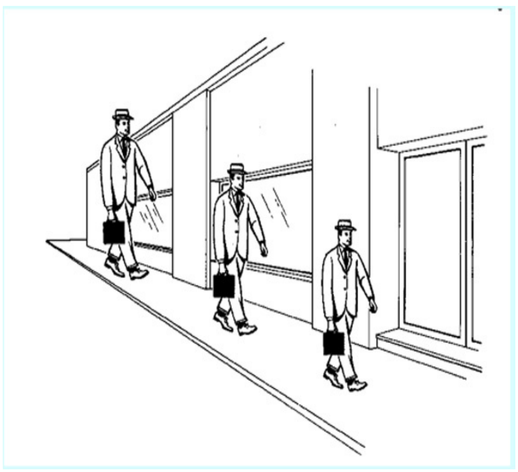
HYPOTHESES

Question: Does retinal or perceived area of an object guide eye-movements?

Retinal-Space Hypothesis: We look at two different-*looking* objects in the same way, even if they are perceived to be different sizes.

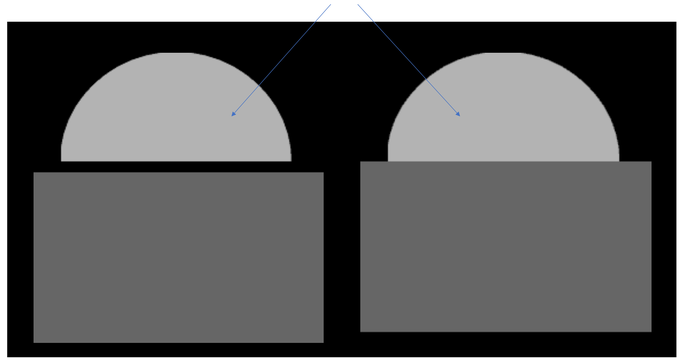
Perceived-Space Hypothesis: We look at those two objects in different ways, even if they are the same size from one's perspective. [3,4]





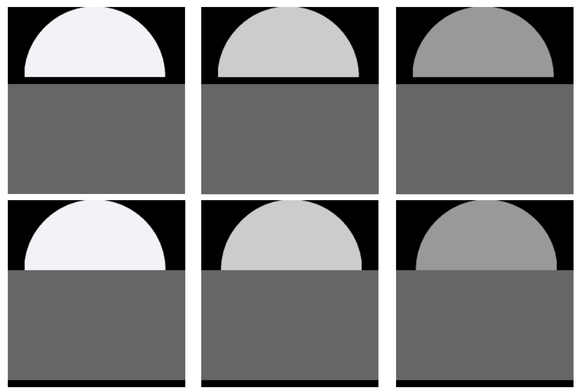
CONFIGURAL SHAPE ILLUSION[5]

Same Area

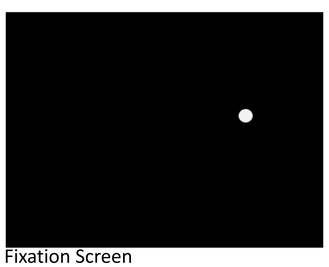


Appears Smaller Appears Larger

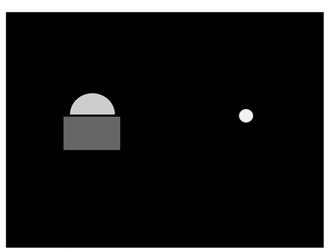
Stimuli:



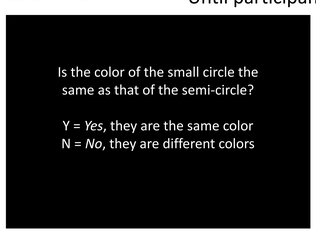
PROCEDURE



Fixation Screen
Until participant fixates on circle



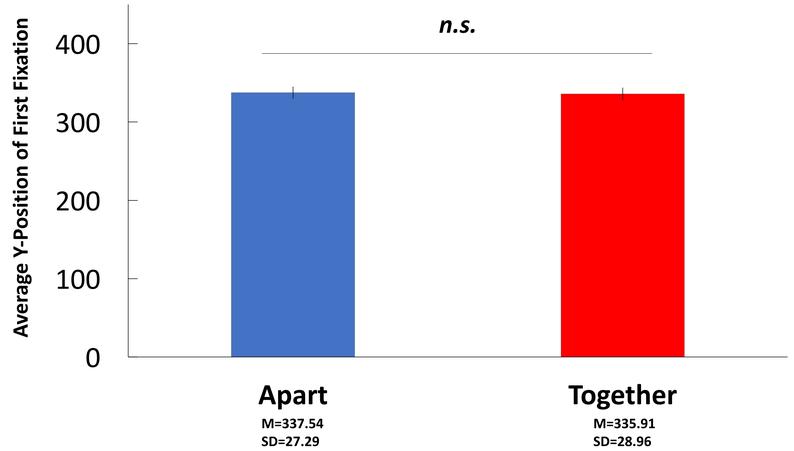
Stimulus Screen
Until participant looks at left stimuli



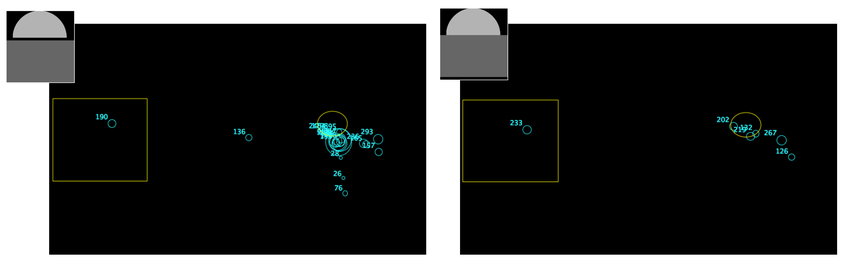
Question Screen
Until Y/N response

RESULTS

No significant difference between participants' first fixation on the semi-circle across the two conditions; $t(11) = 1.003$, $p=0.337$.



These results are in favor of the **retinal-space** hypothesis.



Apart trial Together trial

CONCLUSION

An object's **perceived size** does **not** seem to influence our initial representation of an object's structure.

Further research is necessary to tell whether perceived-size influences object perception in **subsequent processing**, even if it may not be prioritized for the initial percept which guides eye movements.

REFERENCES

1. Melcher, David, and Eileen Kowler. "Shapes, surfaces and saccades." *Vision research* 39.17 (1999): 2929-2946.
2. Vishwanath, Dhanraj, and Eileen Kowler. "Saccadic localization in the presence of cues to three-dimensional shape." *Journal of Vision* 4.6 (2004): 4-4.
3. Schloss, Karen B., Francesca C. Fortenbaugh, and Stephen E. Palmer. "The configural shape illusion." *Journal of vision*14.8 (2014): 23-23.
4. "Walking Men Size Illusion." *The Weekly Show*, 15 Jan. 2014.
5. "Size Constancy Visual Optical Illusion." *Weird Optics*, 10 Feb. 2011.

CONTACT

adinacianciotto2018@u.northwestern.edu