The Whole Moves Less than the Spin of its Parts

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GOAL

Examine the effect of global form analysis on motion processing using stimuli inspired by Stuart Anstis.

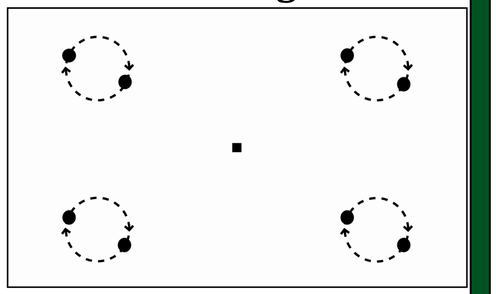
HYPOTHESES

1. When individually moving pairs of objects in a visual scene are perceptually grouped into a global, coherently moving percept, they can appear to slow down.
2. This slowdown effect is due to suboptimal activation of rotation-specific detectors, and will not occur in the absence of rotation.
3. The slowdown effect is a result of the so-called J.F. Brown-effect, where larger objects appear to move slower.

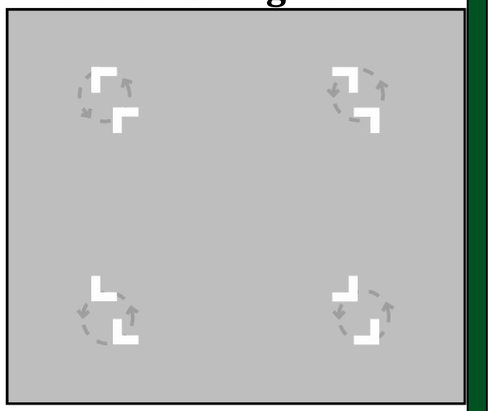
STIMULI

To create stimuli that were either strictly global or strictly local, we replaced the dots in Anstis' stimulus with Ls. In the global configuration, the Ls were oriented so that they would induce the global percept. In the local configuration their orientations were random.

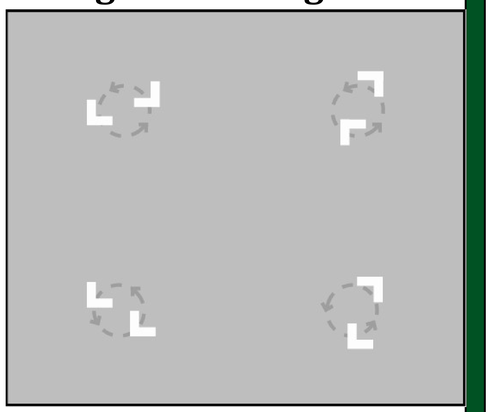
Anstis' original



Global Configuration



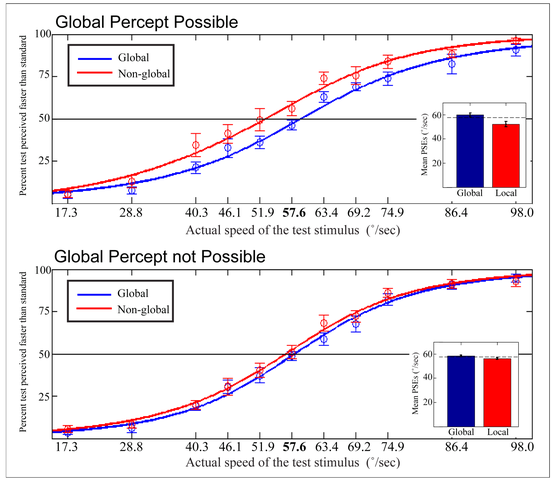
Non-global Configuration



EXPERIMENTAL DESIGN

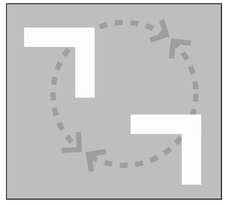
Experiment 1: Perceiving the illusion?

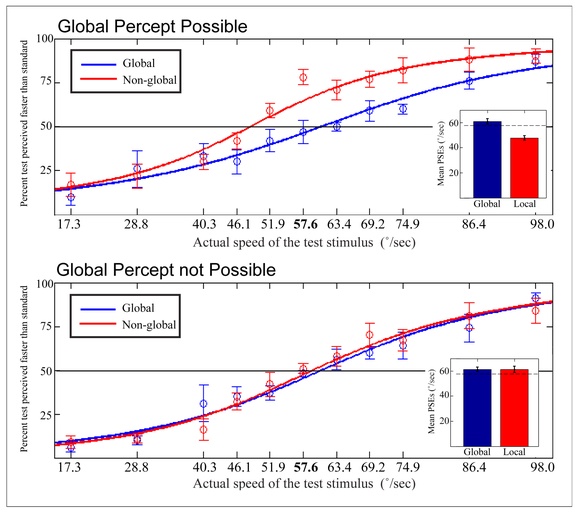
Subjects were presented with two stimuli on each side of the screen, a standard and a test. The standard was always the global configuration, and always had the same speed. The test could be either global or non-global and moved at one of a number of different speeds. After each presentation, the subjects were asked to indicate the stimulus that had moved the fastest. As a control, we ran the same experiment with only one pair of Ls, so that a global percept was not possible.



Experiment 2: Slowdown without rotation?

Same as Exp. 1, but the Ls now moved towards each other, and changed direction right before overlapping.

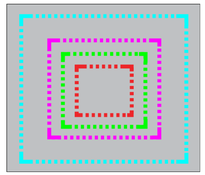


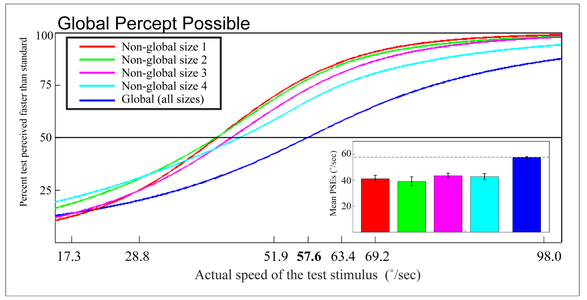


EXPERIMENTAL DESIGN

Experiment 3: Does size matter?

Same as Exp. 1, but with 4 different horizontal and vertical distances between the L-pairs, leading to 4 different illusory square sizes.





CONCLUSIONS

1. When individual rotating pairs of Ls are grouped together into a global percept of two large squares, they appear to slow down.

2. Slowdown occurs in the absence of rotation, and can not be a result of suboptimal processing by rotation-specific detectors.

3. The size of the slowdown is independent of the size of the illusory square, and the effect can not be a result of the J.F. Brown-effect.

REFERENCES

Verghese, P., & Stone, L. S. (1996). Perceived visual speed constrained by image segmentation. *Nature, 381*, 161-163. doi:10.1038/381161a0

Anstis, S. (2003). Levels of motion perception. In L. Harris & M. Jenkin (Eds.), Levels of perception (pp. 75-99). New York: Springer.