Biology motion distorts size perception

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Introduction
- Size illusions occur on different levels of visual processing in a wide variety of contexts
- Spatial dimensions can be affected independently (Savazzi et al., 2012)
- Highest levels include social relationships (Duguid & Goncalo, 2012)
- The visual system treats biological motion as ecologically important (Troje & Westhoff, 2006)

→ Are ecologically valid biological motion stimuli perceived larger than similar motion stimuli without ecological validity?

Experiment 1 - Methods
Point-light walker is presented in middle of the screen, followed by a 15 fps random dot mask.
Task: Observe walker while fixating on fixation point. After the random dot mask, fit the rectangle as tightly as possible around the space occupied by the previously seen walker – both in width and in height.
- 15 participants
- Walker size varied in 10 conditions (0.05 × 2.44° to 2.7° × 7.86° visual angle), with 2 orientations (upright and inverted)
- 400 trials/participant

Experiment 1 - Results
Upright (U) walkers are estimated to be significantly larger than Inverted (I) ones, in width (t(14) = 4.19, p = 0.0009) and in height (t(14) = 4.7, p = 0.0003). This difference is larger in height than in width (in absolute value). Relative to the size of the walker, the opposite is true. (Figure 1)

Experiment 2 - Methods
Two walkers are presented above and below fixation (one of them upright, the other inverted). After a short blank interval, two target circles are briefly (100 ms) flashed.
Task: which of the target circles was larger? (Non-speeded button press)
- 16 participants
- Target size (diameter) difference: 0°, 0.08°, 0.16°; average target size: 0.76° visual angle
- 1000 trials/participant

Experiment 2 - Results
Analyses are based on fitted psychometric functions to responses with upright vs inverted cues.
- No difference in slope of curves (t(15) = 1.22, p = 0.24), indicating identical task performance
- Significant difference in position of curves: targets preceded by an upright walker are perceived smaller (t(15) = 2.37, p = 0.03)
- Extent of distortion in perceived target size: 0.04°, that is ~5%

Discussion & Conclusions
Point-light walkers are perceived larger when presented upright vs when they are presented inverted. This effect is greater in width than in height (relative to the size of the walker), which might reflect the social implications of biological motion.

The phenomenon also appears in the perception of simple targets preceded by biological motion, reflecting either a contrast effect or inhibition of return. These findings provide novel evidence for the relativity of size perception also at higher levels of processing. Furthermore, the hereby demonstrated effect provides one more supporting piece of evidence for the existence of a "life detector".

References

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