

Dynamics of multistable biological motion perception

Louisa Stingl, Leonid Fedorov², Tjeerd Dijkstra², Howard Hock³, Martin Giese²

1 Department of Cognitive Science, University of Tuebingen

2 Center for Integrative Neuroscience, HIH, UKT, University of Tuebingen

3 Center for Complex Systems and the Brain Sciences, Department of Psychology, Florida Atlantic University

The dynamic stability of percepts has been extensively studied in low-level motion (Hock et. al. 2003, 1996). A manifestation of dynamic stability is the perceptual hysteresis shown for a pair of mutually exclusive motion stimuli. So far hysteresis effects have not been investigated in biological motion perception. Its measurement requires a parameter that controls the relative bias of perception for the two alternatives. We developed such a stimulus for biological motion perception and investigated dynamic stability. **METHODS:** Our stimulus is based on the fact that body motion perception from two-dimensional movies can be bistable (Vanrie et. al. 2004), alternating between two different percepts. We developed a new stimulus by random sampling two shaded volumetric walkers covered with 1050 circular discs. The fraction of discs drawn from either walker is a hysteresis parameter that allows to vary gradually the preference for two perceived walking directions. We realized two experiments: I. Measurement of the times before the first perceptual switch as function of the hysteresis parameter. II. Measurement of a hysteresis loop, varying the hysteresis parameter gradually up and down. This experiment adapted the Modified Method of Limits by (Hock et. al. 1993). **RESULTS:** Experiment I shows that, dependent on the hysteresis parameter, the new stimulus can induce both an unambiguous perception of walking direction and perceptual bistability. The average switching time is smallest if both percepts are equally likely and it depends systematically on the hysteresis parameter ($p < 10^{-15}$). Experiment II measured the percept probabilities as function of the hysteresis parameter. These probabilities are significantly dependent on previous values of the parameter (i.e. whether it was increasing or decreasing), implying perceptual hysteresis ($p < 0.01$). **CONCLUSION:** We demonstrated that body motion perception, like low-level motion perception, shows indicators of dynamic multistability.

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