*Student project in Visual Perception*

Human Recognition of 2nd Order Motion and the Associated Depth-Ordering

Background. Motion detection in humans as well as in animals has been studied very extensively and existing models account well for it. (Hassenstein & Reichardt 1956, van Santen & Sperling 1985, Borst et al. 1993) Generally, these methods are based on the idea that the cross-correlation of the image and a shortly afterwards taken image is calculated for small displacements: the best fitting displacement accounts for the movement.
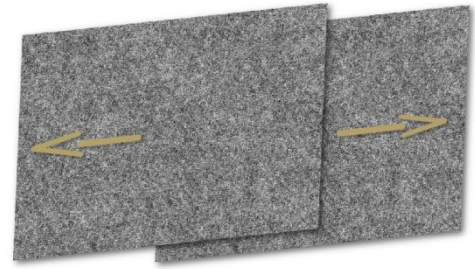
However, a distinctive impression of motion, denoted as 2nd order motion, arises for a class of stimuli not covered by these models. This stimulus almost exclusively appears at occlusion boundaries, i.e. at the borderline between two objects, the nearer one partially occluding the one further away, when both are moving with different speed relative to each other (e.g. Hegdé 2004, Yoonessi & Baker 2014). The extractable depth information is thought to be an important early cue in human spatial cognition. In first experiments we evaluated human performance in recognizing 2nd order motion and compared it with the recognition performance of depth order. Good results indicate a promising lead for further studies.

Project(s).

- Psychophysical tests of subjects' performance in recognizing 2nd order motion and the associated depth order (existing software) and additionally eye movement recording.
- Statistical evaluation of the results.

Methods. The already existing software is written in MATLAB, the eye tracking system has an interface to be integrated in the code.

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Level. The project is planned as BSc-project but can be extended to a MSc-project. First knowledge of MATLAB is of advantage but not necessary, since most of the code is already written.

References.

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3. Hegde, J., Albright, T. D. & Stoner, G. R. Second-order motion conveys depth-order information. Journal of Vision 4, 1–1 (2004).
4. van Santen, J. P. & Sperling, G. Elaborated Reichardt Detectors. JOSA A 2, 300–321 (1985).
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