

Characteristics of ambient and focal processing during the visual exploration of dynamic stimuli

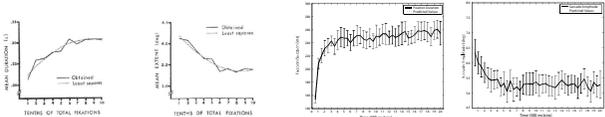
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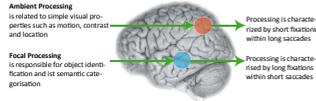
Introduction



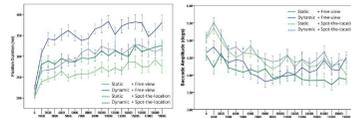
Antes (1974) was one of the first who reported an increase in fixation durations while saccade amplitudes decreased over the time course of picture inspection.

Unema et al. (2005) further investigated the systematics in information processing during scene perception, demonstrating a nonlinear relationship between fixation durations and saccade amplitudes.

One possible explanation for the fixation and saccade behaviour refers to the two visual systems approach (e.g. ambient vs. focal, Trevarthen, 1968) and suggests a direct influence on patterns of eye movements (cf. Velichkovsky et al. 2005).



Question: Are there distinct features of ambient and focal processing when exploring dynamic stimuli? What happens around scene changes?



Smith & Mital (2013) reported a similar relationship for fixation durations and saccade amplitudes for the exploration of static and dynamic material.

Experiment

Scene cut



Same



Other

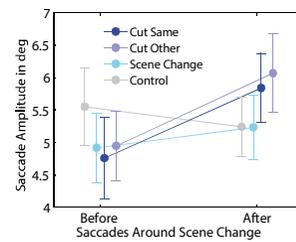
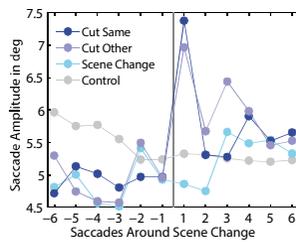
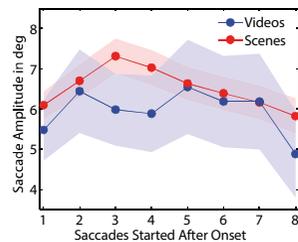
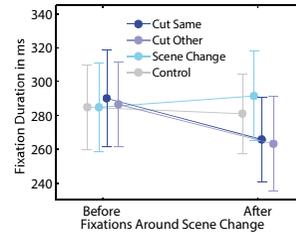
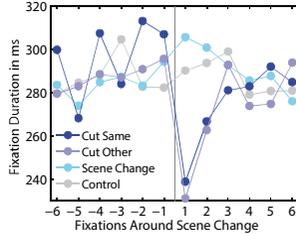
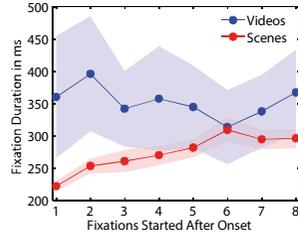


- 21 student participants (11 females)
- free visual exploration of 3 video sequences without sound (about 10 minutes each)
- indoor scenes of rooms, corridors and staircases (no humans)
- clips contained scene changes ($n = 54$) and scene cuts ($n = 51$)
- following the exploration of the 3 video sequences, subjects had to categorize static scenes as part of the video sequences or not
- SR EyeLink 1000 (1 kHz sampling)

Scene change



Results



Discussion

The ambient-to-focal strategy (increasing fixation durations and decreasing saccade amplitudes) can also be found in video sequences. Viewing behavior following rapid changes (i.e. scene cuts) was found to be similar as after the onset of a static image. After smooth changes (i.e. scene changes) no such characteristics were observed.

In contrast to our expectations, viewing similarity was higher before than after scene changes. A further analysis of the saliency of the inspected locations of the individual frames before and after the changes might clarify, how visual attention is distributed.

References

Antes, J. R. (1974). The time course of picture viewing. *Journal of Experimental Psychology*, 103(1), 62-70.

Cristino, F., Mathot, S., Theeuwes, J., & Gilchrist, I. D. (2010). ScanMatch: a novel method for comparing fixation sequences. *Behavior Research Methods*, 42(3), 692-700.

Smith, T.J., & Mital, P.K. (2013). Attentional synchrony and the influence of viewing task on gaze behavior in static and dynamic scenes. *Journal of Vision*, 13(8):16, 1-24.

Trevarthen, C. B. (1968). Two mechanisms of vision in primates. *Psychologische Forschung*, 31(4), 299-337.

Unema, P. J. A., Pannasch, S., Joos, M., & Velichkovsky, B. M. (2005). Time course of information processing during scene perception: The relationship between saccade amplitude and fixation duration. *Visual Cognition*, 12(3), 473-494.

Velichkovsky, B. M., Joos, M., Helmert, J. R., & Pannasch, S. (2005). Two visual systems and their eye movements: Evidence from static and dynamic scene perception. In B. G. Bara, L. Barsalou & M. Bucciarelli (Eds.), *Proceedings of the XXVII Conference of the Cognitive Science Society* (pp. 2283-2288). Mahwah, NJ: Lawrence Erlbaum.

