Perception of depth and asynchrony during eye movements

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Introduction

We investigate the perceptions of two-dimensional (2D) images painted on the retina during eye movements (saccade-induced images).

- The images were presented using “Saccade-based display”. (See below)
- Saccade-induced images are: - painted sequentially.
  - only on the retina.

How are the saccade-induced images arranged in space and time?

We found that:
1. The spatially separated elements could be grouped even during saccades.
2. The different perceptual groups could be arranged (a) on different depth planes, and (b) at different timings.

Method

- Apparatus
  Saccade-based display (Resolution: 128x128 dots)
  (In a completely dark room)

- Procedure
  - Sketched the perceived groups.
  - Evaluated the magnitude of perceived depth (DP) and asynchrony (AS).
  - DP: The number of perceived depth planes
  - AS: 2 (All circles are clearly asynchronous)
    - 1 (Some circles are not simultaneous)
    - 0 (All circles are simultaneous)

Result

Mean and standard error of reported DP and AS.

Exp.1 Grouping by proximity

(9 subjects)

Exp.2 Grouping by closure

(7 subjects)

Discussion

1. When the conditions allow the saccade-induced image to be clearly visible, the spatio-temporal arrangement can be perceived during saccades.
2. The perceptual grouping during saccades can influence the reconstructed spatio-temporal arrangement of saccade-induced images.

Acknowledgements

This work has been supported by "Foundation of Technology Supporting the Creation of Digital Media Contents" project (CREST, JST), Japan.