OPTIC FLOW AND SELF MOTION PERCEPTION
The contribution of different parts of the field.

Laurence R. Harris1, Rainer Herpers1, Michael Jenkin1, Robert S. Allison2, Heather Jenkin2, Bill Kapralos3, David Scherfgen1, Sandra Felsner1
1 Bonn-Rhine-Sieg University of Applied Sciences, Germany
2 Centre for Vision Research, York University, Toronto, Canada
3 University of Ontario, Institute of Technology, Ontario, Canada

BACKGROUND
Moving generates optic flow which contains important information about heading direction and distance moved.

For static cues, retinal regions’ contributions to self orientation are additive.

QUESTION
Does optic flow in different retinal regions contribute differently to the perception of distance traveled?

METHOD
Twelve subjects sat on a stationary bicycle in a “CUBE” display which provided a virtual reality presentation of moving in a corridor (8’ wide) from which various sections could be removed.

• BINOC dichoptic viewing.
  • MONOC one eye patched.
  • Targets simulated at 8, 16, 24, & 32m.
  • Display yoked to head tracker.
  • Optic flow compatible 1 or 2 m/s (forwards).
  • Different parts of the field blanked.

RESULTS

CONCLUSIONS

Optic flow compatible 1 or 2 m/s (forwards).

• Monocular optic flow was more effective at evoking self motion than binocular.
• Monocular viewing resulted in substantial errors in which subjects felt they had moved much further than the simulated motion (mean gain 1.3).
• Monocularly optic flow in the upper field (condition 4) was significantly more effective than in the lower field (at 1m/s) (condition 5).
• However, for movement in a closed corridor at high velocity, motion in the upper field (condition 3) was only marginally more effective than motion in the lower field (condition 2).
• Optic flow on the nasal retina (condition 9) was no more effective than motion in the lower field (at 1m/s) (condition 5).
• Optic flow in the temporal field (condition 2) was only marginally more effective than motion in the upper field (condition 3).

Unlike for determining orientation, different parts of the field and different areas of stimulation differ only marginally in their effectiveness at evoking self motion.

• Curiously viewing optic flow through one eye seems to evoke a larger over-estimation of travel distance than when viewing binocularly.
• The large spatial decay associated with monocular viewing contributes to the over-estimations for long simulated distances.

REFERENCES