

Optimal integration of optic flow and target egocentric direction

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Introduction

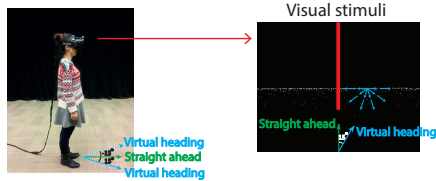
Walking toward a goal uses (1) target egocentric direction and (2) optic flow^{1,2}. Are these two cues optimally integrated?

Stimuli (3 display conditions):

- Head-mounted display (Oculus DK2, FOV: 100°)
- Fixed-size target (despite approach)

Two tasks

Walking: Walk toward target at 8 m with virtual heading specified by optic flow displaced $\pm 15^\circ$ from walking direction/straight ahead.



Passive: View simulation of the last quarter of walking optic-flow display. Indicate heading with mouse.

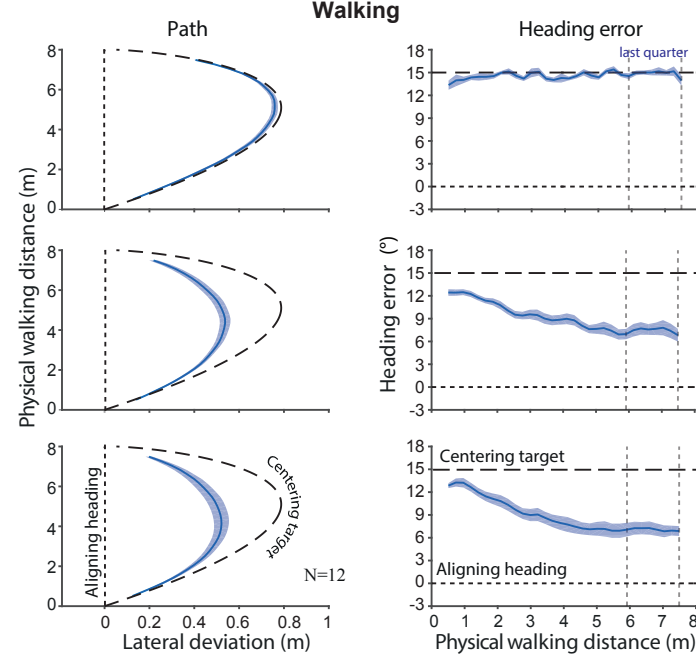
Analysis

- Walking task with empty environment → estimate of heading error and SD for target-direction cue
- Passive viewing task → estimate of heading error and SD for optic-flow cue
- Optimal integration → prediction for walking toward target with optic flow

Conclusion

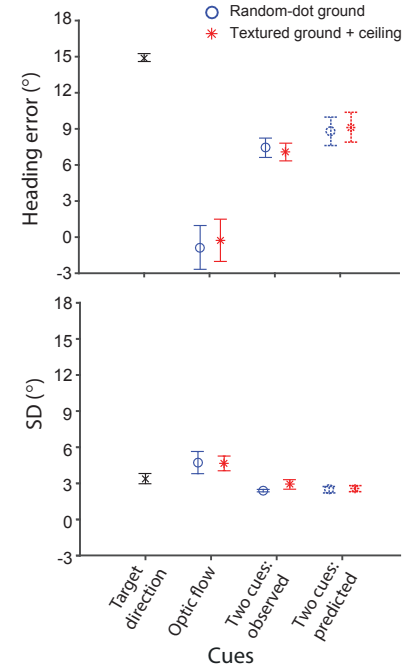
Optic flow and target egocentric direction are optimally combined for goal-oriented locomotion control.

Results



- Empty: curved path → use of target-direction cue
- Optic flow conditions: less curvature and more accurate → both cues used

Cue integration



References

1. Li & Niehorster, *J Neurophys*, 2014.
2. Warren et al., *Nat Neurosci*, 2001.

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