Exploring the Time Course of Egocentric Distance Perception with Visual Masking of a Real-World Environment

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Results & Discussion

Background

Humans are able to walk without vision to previewed targets with equal accuracy under brief (150 ms) and extended (>5 sec) viewing conditions (Philbeck, 2000), suggesting that the extraction of egocentric distance information is quick.

Here we developed a method for masked, tachistoscopic presentation of real-world environments and began investigating the time course for accurate distance perception in full and reduced cue contexts using the blindwalking paradigm.

General Method

• Target viewing time controlled with liquid crystal shutter window
• Masking stimulus reflected into beamsplitter for 1 sec (ISI = 0)
• Apparatus pushed to the side after presentation of the mask
• Participants walked without vision to remembered location of target

Experiment 1: Full-Cue Context

• Participants binocularly viewed an orange cone placed on the floor
• 3 Viewing Durations (50, 100, & 200 ms)
• 2 Mask Conditions (Pattern Mask or None)
• 5 Distances (3.0, 3.5, 4.0, 4.5, & 5.0 m)

Results & Discussion

• Effect of distance (response slopes) did not depend on viewing duration or the presence of a mask
• Planned analyses revealed a marginal mask effect at 50 ms only - the effect of distance was greater without the mask (increased slope)

Exp 2: Reduced-Cue Context

Participants binocularly viewed ball targets hung at eye level. Ball size varied with distance - angular size and decination were both held constant.

• 2 Subexperiments
• 3 Viewing durations each
  Exp 2A: 50, 100, & 200 ms
  Exp 2B: 50, 200, & 1000 ms
• 2 Mask Conditions (Pattern Mask or None)
• 3 Distances (2.7, 3.9, & 5.4 m)

The mask effect was more compelling in the reduced cue context. Participants showed no distance sensitivity in the 50 ms masked condition and performance continued to improve with extended viewing duration. Experiment 2 determined the time required to extract useful information in a reduced-cue context.

Conclusion

The outcome of the study demonstrates 1) the utility of masking real-world scenes, 2) the efficiency of information extraction in the full-cue context, 3) that information extraction can unfold over extended time periods when the cues are reduced, and 4) that information extraction can be speeded by previous experience.

Reference