



The Roles of Altitude and Fear in the Perception of Height



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Abstract

While the perception of distance on the ground has been extensively studied, the perception of vertical extents (or heights) is a relatively understudied aspect of spatial layout. In a series of experiments, we show that the perception of vertical extents are slightly overestimated when viewed from the ground, but largely overestimated when viewed from the top. The following three measures were used to assess the perception of vertical extents: 1) visually matched estimates of apparent distance, 2) visually matched estimates of apparent size, and 3) a triangulation by walking estimate. When viewing from the top, participants overestimated the distance to the ground by as much as 60%, the size of targets on the ground by 22%, and triangulated walking estimates by 13%. When looking up, participants only overestimated the distance by 23%, but size and triangulated walking estimates for targets viewed from below were accurate. Results obtained from both the real world and virtual reality will be discussed. Furthermore, a non-optical variable — fear — was positively correlated with participants' overestimation of height. We suggest that the overestimation of height that occurs when looking down from a high place is due to both the altitude and a fear of falling.

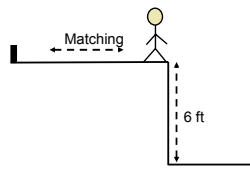
Introduction

“Whenever [the phobic] felt extremely fearful, the bridges appeared to be longer and far higher than he knew them to be.”

- Rachman & Cuk (1992, pp. 583)



Yang, Dixon, & Proffitt, 1998

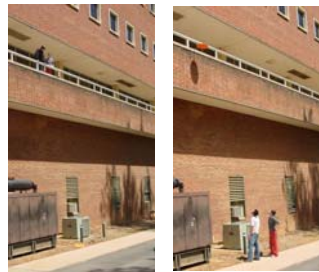


Sinai, Ooi, & He, 1998

Are heights grossly overestimated from the top?

Does fear modulate this overestimation?

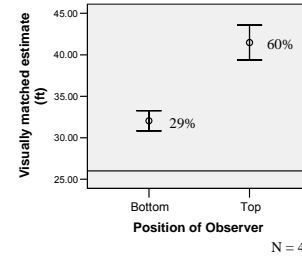
Experiment 1: Distance Measure



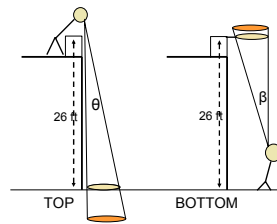
TOP or BOTTOM



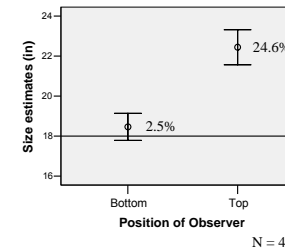
Visual Matching Task



Experiment 2: Size Measure



If distance is overestimated, size should be overestimated.



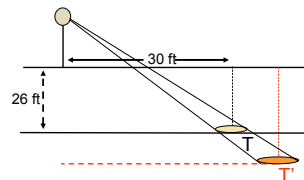
Experiment 3: Triangulation Measure



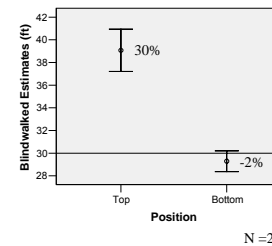
View from Top



Blindwalking Task



If distance is overestimated (T'), then people should overshoot the target.



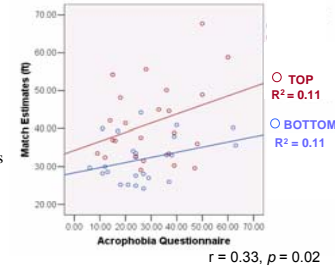
Fear Measures & Results

Trait-level Measure of Fear of Heights:

ACROPHOBIA QUESTIONNAIRE

20 Likert Scale Questions

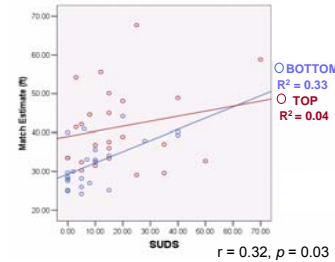
(Cohen, 1977)



State-level Measure of Fear of Heights:

SUBJECTIVE UNITS OF DISTRESS SCALE

0-100 rating of anxiety



Conclusions

Heights are grossly overestimated when viewed from the top.

Perception of the environment is influenced by the emotional state of the observer.

References

- Cohen, D. C. (1977). Comparison of self-report and behavioral procedures for assessing acrophobia. *Behavior Therapy*, 8, 17-23.
- Rachman, S., & Cuk, M. (1992). Fearful distortions. *Behavioral Research Therapy*, 30, 583-589.
- Sinai, M. J., Ooi, T. L., & He, Z. J. (1998). Terrain influences the accurate judgment of distance. *Nature*, 395, 497-500.
- Yang, T. L., Dixon, M. W., & Proffitt, D. R. (1999). Seeing big things: Overestimation of heights is greater for real objects than for objects in pictures. *Perception*, 28, 445-467.

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