Misestimations of object size in depth during body tilt

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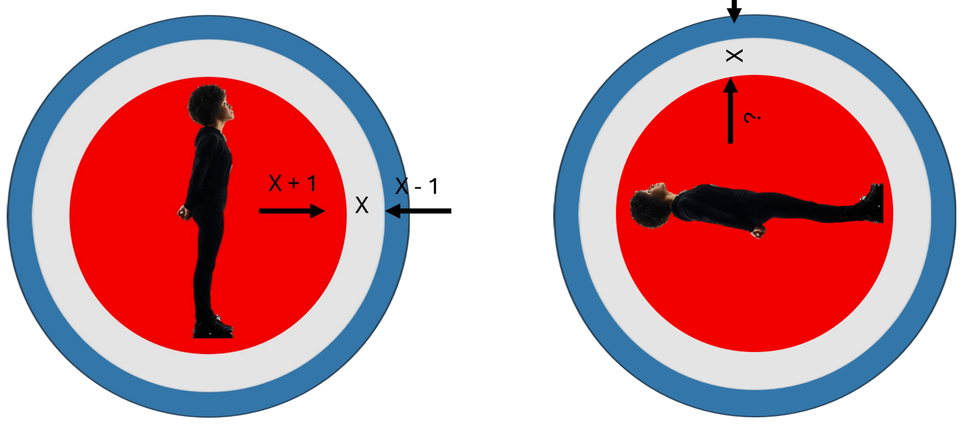
Introduction

- The vestibular system might be involved with encoding a representation of the space around us[1], with respect to gravity[2]. Tilting away from gravity might lead to distortions[3,4,5]
- Distortions in size/distance might also vary based on the distance of the object from our body[6,7]
- **If visual space is compressed while supine this might result in far space compressing towards reach space leading to a reduction in any distortions seen while standing**

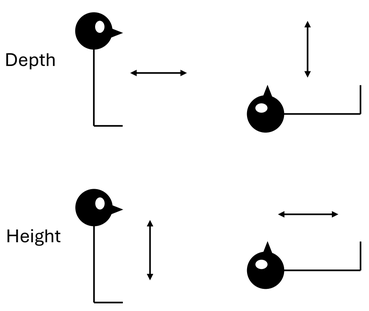


Methods

- Participants task was to estimate the size of a wave object displayed on a screen using their thumb and index finger
- Estimates were done in height and depth, while standing or supine (blocked)
- The screen could be near (N, 0.30m), far (F, 0.55), or very far(V, 1.70m) from the head

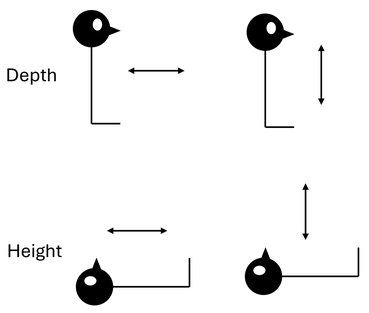
Results

Measures relative to: Body



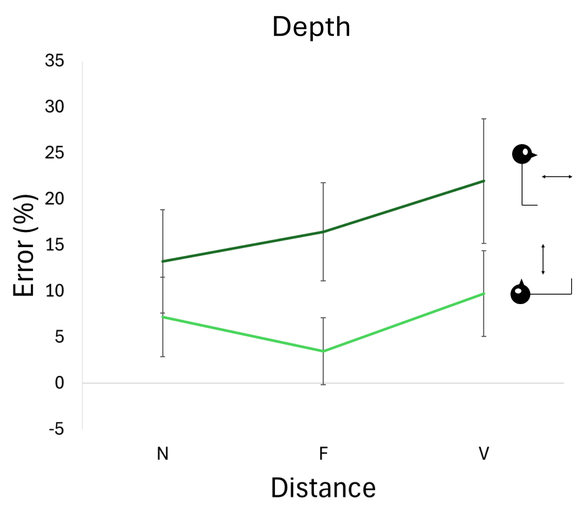
Theoretically differences between postures and distances

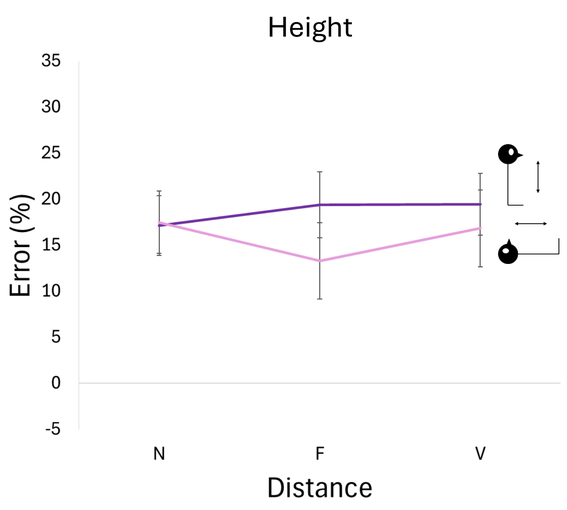
Gravity

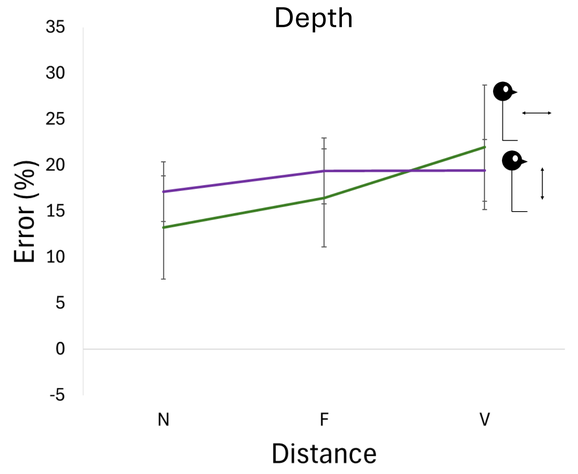


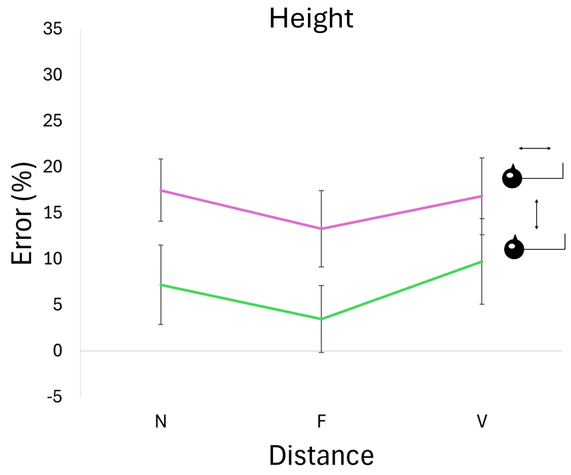
Theoretically NO differences between measures but between distances

Errors

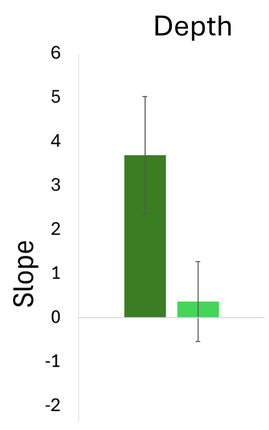


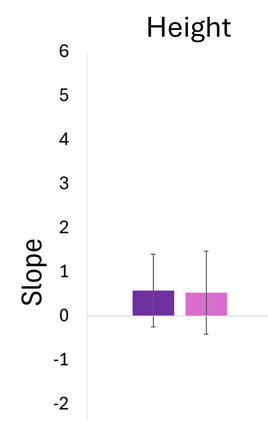


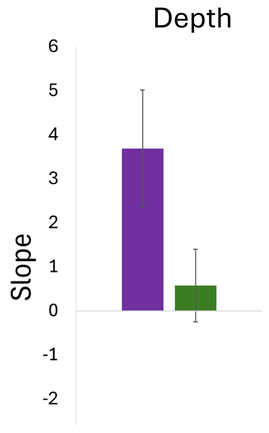


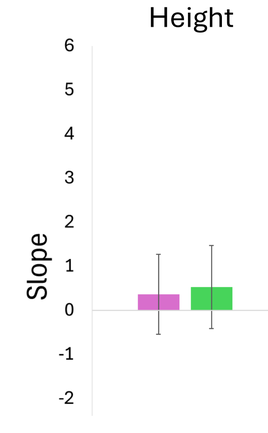


Slopes









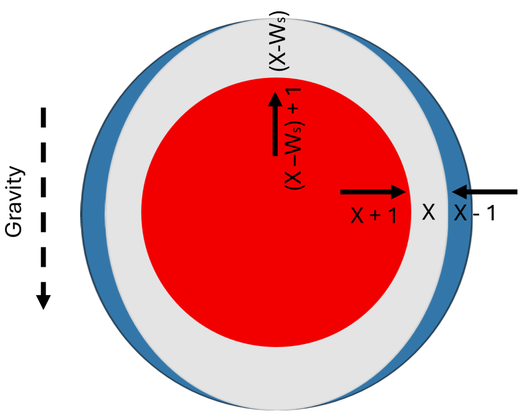
Discussion

Relative to the body:

- Objects appear smaller while supine but only for depth
- Effect of distance only for depth[7]
- When supine the slope of the depth estimate no longer differs from 0
- This might suggest that far space has compressed towards near space reducing any distortions in depth

Relative to gravity:

- No difference between measures in either posture
- Effect of distance for both postures
  - No comparisons survive correction for height
- Distortions in perceived size with distance might only occur along the depth axis



Other

Acknowledgments

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References

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2. Clement et al., 2016
3. Kim, McManus, and Harris, 2022
4. Harris and Mander, 2014
5. Campagnoli et al., 2019
6. Morfoisse et al., 2024
7. Campagnoli et al., 2017

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