Biological motion targets have to be further away in virtual space for older versus younger adults to maintain good performance

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Introduction

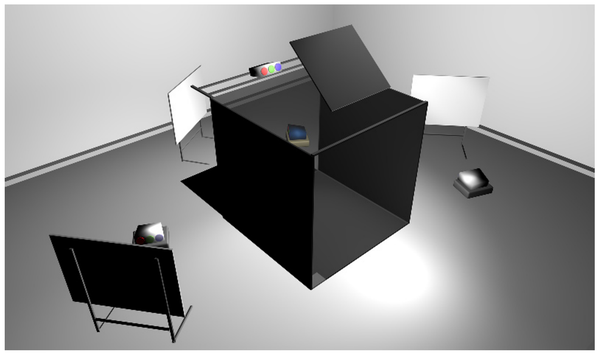
Human ability to perceive biological motion pattern is well established. Furthermore, it has been shown that older observers can be quite efficient at detecting biological motion (Billino, Bremmer & Gegenfurtner, 2008, Norman, Payton, Long & Hawkes, 2004, Piotrowski, A., Jakobson, L., & Troje, N. F. 2007). Recently, Legault & Faubert (VSS 2008) showed that young adult biological motion perception is influenced by distance in virtual space. Observers obtained good performance when a biological motion target of standard human height was located 1 meter or further but performances decreased dramatically at the shorter distance (less than a meter).

Purpose

Determine if there is a difference between younger and older adult's performances when biological motion patterns are presented at different distances in virtual space.

Methods

Biological motion perception was assessed using a fully immersive virtual environment (CAVE). The CAVE is an 8 X 8 X 8 feet room that includes three walls (one frontal and two lateral) and an epoxy floor that all serve as surfaces for image projection. The CAVE is equipped with a magnetic motion trackers system (Flock-of-birds)



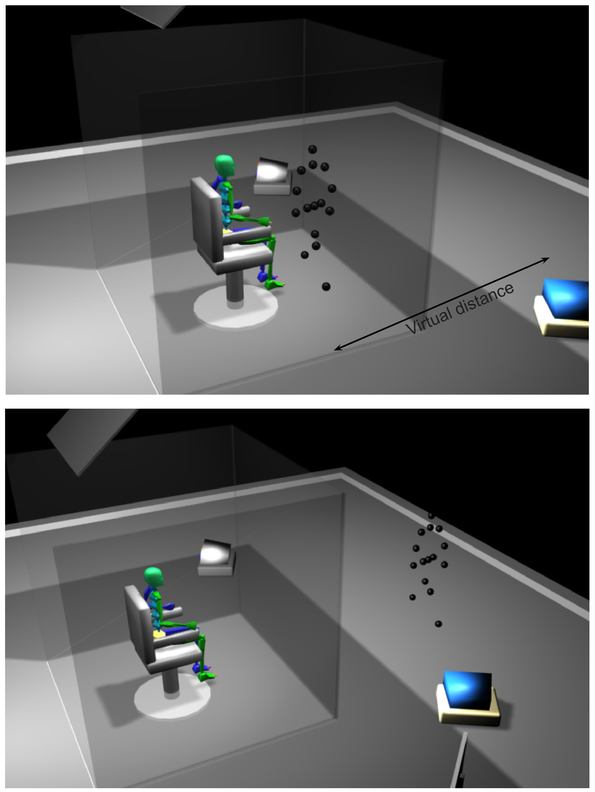
capable of measuring head position and therefore correcting for the individual's viewing perspective in real-time.

For more information on the CAVE system and its provider companies, please visit the following website: http://vision.opto.umontreal.ca/English/index.html

Procedure

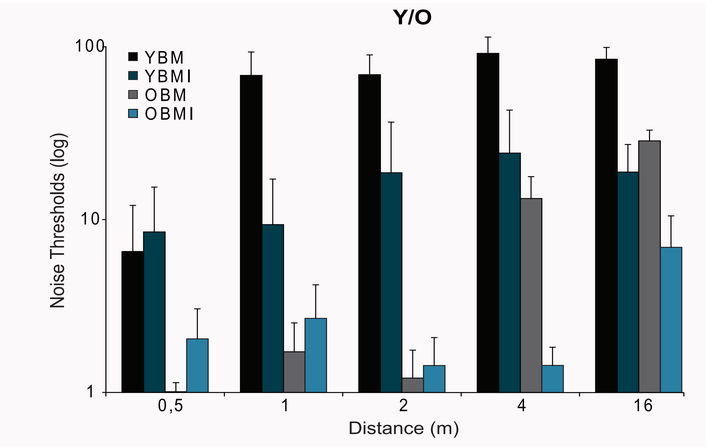
- 10 young observers (mean age 28.3, SD 5.48) and 6 older adults (mean age 67.6, SD 3.78) participated in this study.
- Stimuli consisted of a 15 point-light walker in profile view, in either upright or inverted orientations.
- Size of the walker was 1.80 meters positioned at a virtual distance from the observers of 0.50, 1, 2, 4 & 16 meters.
- A single-interval, two-alternative-forced choice procedure in combination with a direction discrimination task.
- Participants answers whether the walker was walking to the left or right.
- The stimuli were shown in a scrambled walker mask.
- Noise density was the dependent variable.

Stimuli



Results

- Older individuals obtain lower performances compared to the younger group. Generally, older adults are more affected by the presence of noise.
- For the younger adults, performance became dramatically worse when the walker distance was at 0.50 meter. Older adults' performance became dramatically worse when the walker distance was less than 4 meters. For both groups, inverted pattern condition responses did not significantly differ as a function of distance.



Discussion and Conclusion

Biological motion detection in noise, in upright and inverted conditions, critically depends on how far the walker is positioned in 3D virtual space. The critical distance where biological motion judgments break down highly depends on observer age. This may imply a limited capacity of older observers of integrating equivalent information over larger areas supporting the notion that age-related effects are more apparent when larger neural networks are required to process simultaneous information (Faubert, 2002).

Reference

- Billino, J., Bremmer, F., & Gegenfurtner, K.R. (2008). Differential aging of motion processing mechanisms: evidence against general perceptual decline. Vision Res, 48 (10), 1254-1261.
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