Aging And Sensitivity To Illusory Target Motion

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Introduction

World population 60+ years old: 10.8 percent of the population in 2009 to almost 22 percent by 2050

Need to properly integrate sensory information from environment to perform activities of daily living and live independently

Systematic review

Older adults maximize the use of multiple sources of information
Older adults use sensory information even if not relevant
A dual task decreases task performance

Berard et al.3 found that younger adults were able to down-regulate inappropriate optic flow during walking, while older adults were not: they showed larger systematic deviations in their walking trajectory

Does this effect generalize to another paradigm that would be easier to implement as a portable test: hitting targets on a moving background

Methods

Participants: 24 healthy older adults (60-82 years old), 20 healthy younger adults (18-34 years old)

Experiment: Discs moving downwards on a screen in 5 directions, disappear after 150ms

Illusion: checkerboard-like background moving horizontally at target’s appearance or at 250ms inducing illusory direction of target motion

Task: Hit virtual targets as quickly and as accurately as possible

Feedback: Hit or miss

Conditions:
- Baseline
- Balance (proprioceptive dual task)
- Counting (cognitive dual task)

Pretests probing activities of daily living:
- MMSE, m-CTSIB, SPPB, IADL questionnaire

Research questions

- Stronger effect of illusion in older adults compared to younger adults?
- Do dual tasks increase such effects in older adults?

Results Illusory Target Motion

Stronger effect of the illusion for older adults compared to younger adults
No difference in effect between the conditions

Older adults hit less targets and have more no tap trials compared to younger adults
Less hits and more no tap in counting compared to baseline condition

Variability larger for older adults compared to younger adults
No difference in variability between the conditions

No significant effect of age on time between target appearance and tap on the screen
Times shorter for balance condition and longer for counting condition compared to baseline condition

No effect of age nor condition on the response to late background motion

The larger effect of the illusion on older adults is not due to a generally different response to background motion

Conclusions

Older adults are more affected by an illusion created by background motion compared to younger adults.

Dual tasks did not amplify the background’s influence for both younger and older adults.

Older adults find it more difficult to ignore the relative motion when it is unreliable than do younger adults. This may reflect overall difficulties in ignoring clearly irrelevant sensory information or an increased reliance on relative target motion caused by a decrease in the quality of proprioceptive and vestibular information in older adults.

References