Aging And Sensitivity To Illusory Target Motion

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PERCEPTION AND ACTION IN COMPLEX ENVIRONMENTS

Introduction

Older adults (OA) 10.8% of the population in 2009, 22% by 2050[1]

Properly integrate sensory information to perform activities of daily living (ADL)

Systematic review[2]

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

Previous work[3]

- OA more affected by illusory target motion in a hitting task compared to younger adults (YA)
- OA were too fit to show possible relation between effect of illusion and problems in ADL

➢ Tablet version (portable), OA with varying levels of ADL performance

Methods

Participants: 24 OA (70-88 years old), 19 YA (20-32 years old)

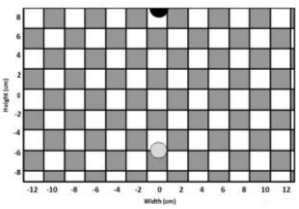
Experiment: Discs moving downwards in 3 directions, disappear after 150ms

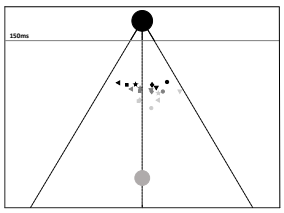
Illusion: Background moving horizontally at target's appearance inducing illusory direction of target motion

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

Feedback: Hit or miss

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



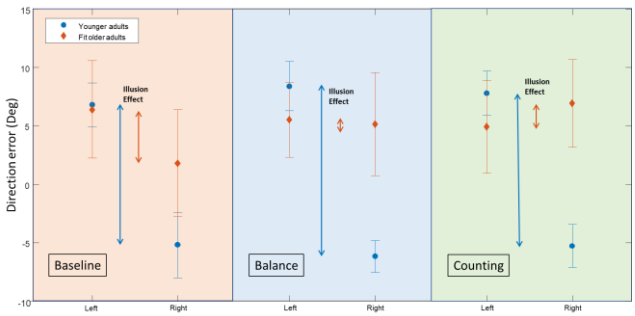


Pretests probing activities of daily living:
MMSE, m-CTSIB, SPPB, Nottingham ADL scale

Research questions

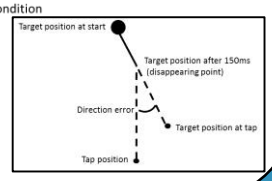
- Can we replicate the results of the large screen with a tablet version?
- Do hitting results relate to problems in ADLs as estimated using other validated tests?

Illusion effect

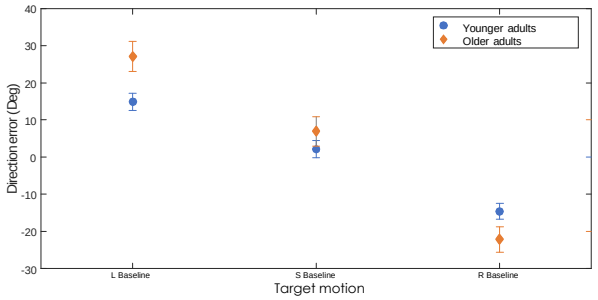


YA n=19
OA n=15

- Illusion effect *stronger* for YA than OA
- Dual tasks decreases the illusion effect in OA
- OA hit less targets than YA, particularly in the counting condition



Target direction effect



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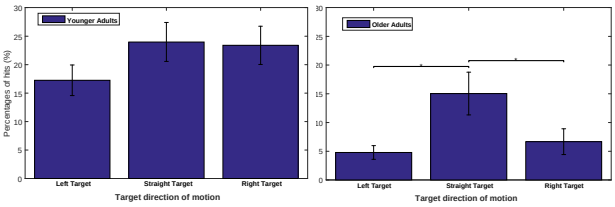

- All participants tend to tap in the middle of the screen without taking fully into account the target direction of motion
- Older adults tend to tap more in the middle than younger adults

Multiple regression analysis

- m-CTSIB: , p=0 (F=11.5, R^2=0.6)
- MMSE: p=0.546 (F=0.8, R^2=0.1)
- Chair stand speed: p=0.003 (F=4.6, R^2=0.4)
- Gait speed: p=0.03 (F=3, R^2=0.3)
- NEADL: p=0 (F=7.7, R^2=0.5)

Conclusions

- Illusion effect is *smaller* in OA than YA because they tap in the center of the tablet (task too difficult compared to large screen version?)
- Dual tasks decrease the illusion effect for OA: they tend to tap more in the center during dual tasks
- The task is associated with ADL: possible value for clinical practice

1. World Health Organization. (2015). World report on Ageing And Health.
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3. de Dieuleveult, A. L., Brouwer, A.-M., Siemonsma, P.C., van Erp, J. B. F., & Brenner, E. (2017). Aging and sensitivity to illusory target motion with or without secondary tasks. Multisensory Research

TNO innovation for life

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