MSc in Cognitive Computational Neuroscience

Goldsmiths
UNIVERSITY OF LONDON

Investigating pseudoneglect in healthy adults using a VR environment and identifying the neural correlates of backspace representation with EEG.

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BACKGROUND AND RATIONALE

- Neglect is a neurological condition where patients who experienced cerebral injury or stroke are unable to address stimuli from the contralesional space.
- These patients may, for example, draw only one side of an object or bisect a line by misplacing the midpoint toward one direction.
- Previous studies suggested that healthy patients may also slightly misrepresent the space around them in a non-pathological phenomenon called pseudoneglect.
- Cocchini et al, 2007, suggested that up to 83% of participants underestimate the right space behind them.
- This study aims at investigating pseudoneglect in a cohort of healthy participants using a VR environment and to identify the cortical areas involved in space representation in the brain.

RESEARCH QUESTIONS

1

Does the estimated size of space vary across the four quadrants?

Front left (FL) vs. back left (BL) vs. front right (FR) vs. back right (BR)

→ PSEUDONEGLECT

2

What cortical areas are associated with space representation?

and in which EEG frequency band do they oscillate?

→ NEURAL CORRELATES OF SPACE REPRESENTATION

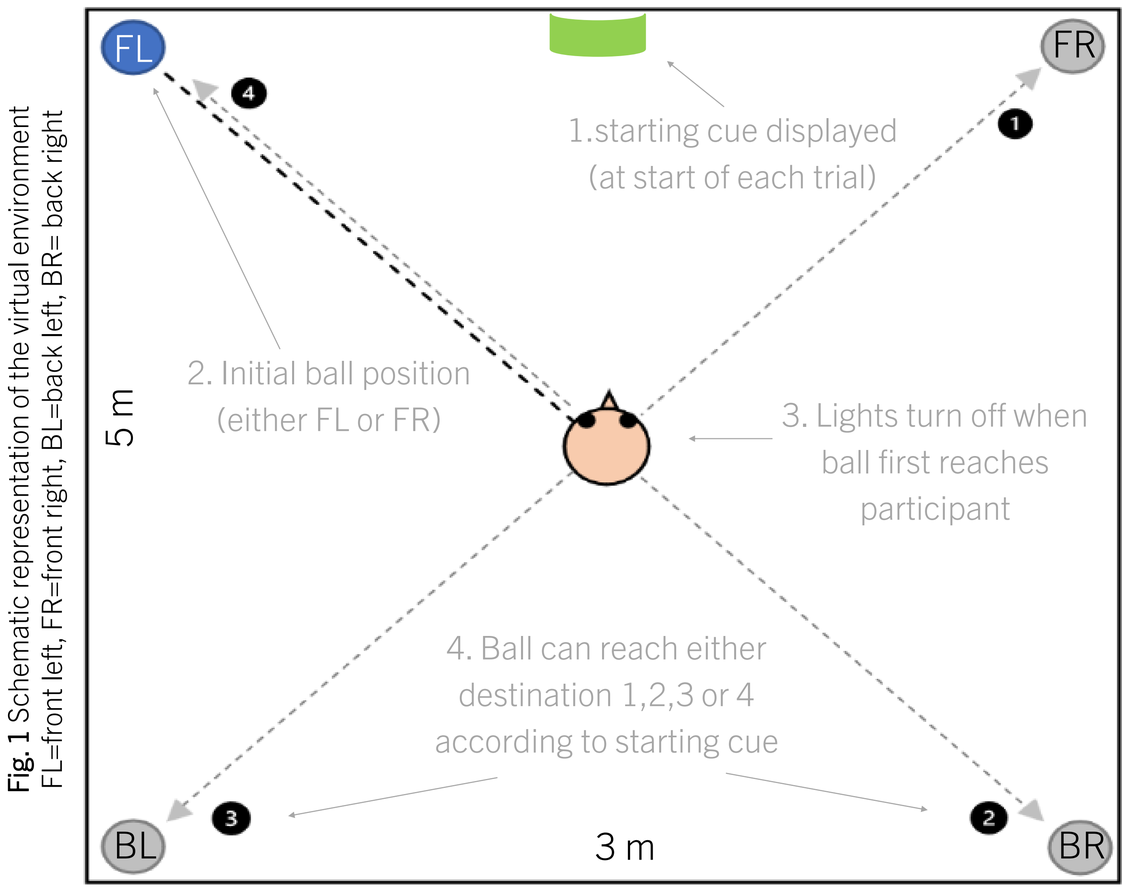


Fig. 1 Schematic representation of the virtual environment
FL=front left, FR=front right, BL=back left, BR= back right

OCULUS META QUEST 2
(Meta Platforms, USA)

EXPERIMENT

1 The participant is cued as to the final direction of the ball at the start of the trial

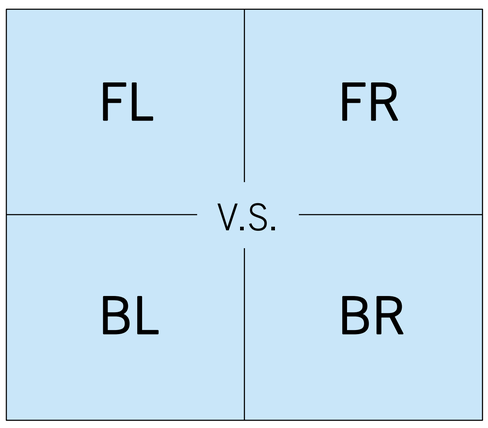
2 The participant presses the controller button, and the ball begins travelling toward them until it reaches the centre of their virtual person.

3 When it reaches their chest, the participant presses the button again and the room's lights go off.

4 The participant will have to imagine the ball reaching the cued corner of the room and press the button again when they feel the ball has reached it.

15-20	4 speeds	2 hours	128
total participants	ball moves at 2, 1.5, 1, 0.5 m/s	estimated time per participant	tot. No. of trials per participant

DATA ANALYSIS



1. The time each participant estimates the ball takes to reach one of the room's corner is a measure of the estimated size of the space in that quadrant.
2. Statistical analyses will be performed on these data to determine whether there is a significant difference across the four quadrants.

→ REPEATED-MEASURES ANOVA

3. Statistical methods will be applied via specialized software to investigate the frequency domain of the EEG data in each quadrant.

→ SPECTRAL ANALYSIS

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Cocchini G, Watling R, Della Sala S, Jansari A, 2007. Pseudoneglect in back space. *Brain and Cognition* 63 p. 79-84. Available online at www.elsevier.com .