Letter

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Performance on the matrix reasoning by Parkinson's disease patients: strategy is in the eye of the beholder

Desempenho de pacientes com doença de Parkinson no raciocínio matricial: a estratégia está nos olhos de quem vê

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Dear Editor,

Matrix reasoning (MR) task is made up of a series of visual pattern completion and analogy problems. When compared with healthy controls, patients with Parkinson's disease (PD) performed significantly worse on the MR task[1]. The objective of the current study was to provide insight into possible strategies used by PD participants (by tracking eye movements during the MR task) compared with healthy controls.

We recruited 45 participants: 15 PD with normal cognition (PD-N), 14 PD with mild cognitive impairment (PD-MCI; according to MDS Task Force criteria[2]), and 16 healthy controls. The majority of participants were male: 81%, 81%, and 88%, respectively. The median age of participants was as follows: PD-N 66.1 years (range, 49.3–80.6 years), PD-MCI 71.8 years (range, 45.7–77.8 years), and controls 72.9 years (range, 56.4–81.4 years). Participants with PD had similar clinical staging according to the modified Hoehn and Yahr scar: PD-N 2.2±0.6, and PD-MCI 2.0±0.6 (p=0.58).

Details on the eye-tracking system and study setup have been published elsewhere[3]. MR items were chosen from the Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV). Participants were presented with one practice trial, followed by 10 test items (in an ascending order of difficulty).

All participants correctly identified the missing pattern in the practice trial. Scores in the test trials did not differ significantly among the three groups: PD-N 78% correct (±19), PD-MCI 67% correct (±17%), and controls 77% correct (±14). The number of incorrect responses increased as the test trials became more difficult (R^2=0.86, p<0.001).

A general trend of fixation density, across the MR test trials, was observed regardless of the group or the response given. The proportion of time spent fixating on the Scanning Area was longer than that on the Working Area. Within the Scanning Area, participants fixated longer on the visual pattern horizontally next to the missing one compared with the two visual patterns above or below it. Fixation behaviour on the Working Area differed according to the response given. The correct group fixated on the correct choice the longest, and not much else. Fixation durations

This study was approved by the Upper South B Regional Ethics Committee, New Zealand (reference URB/11/06/010).

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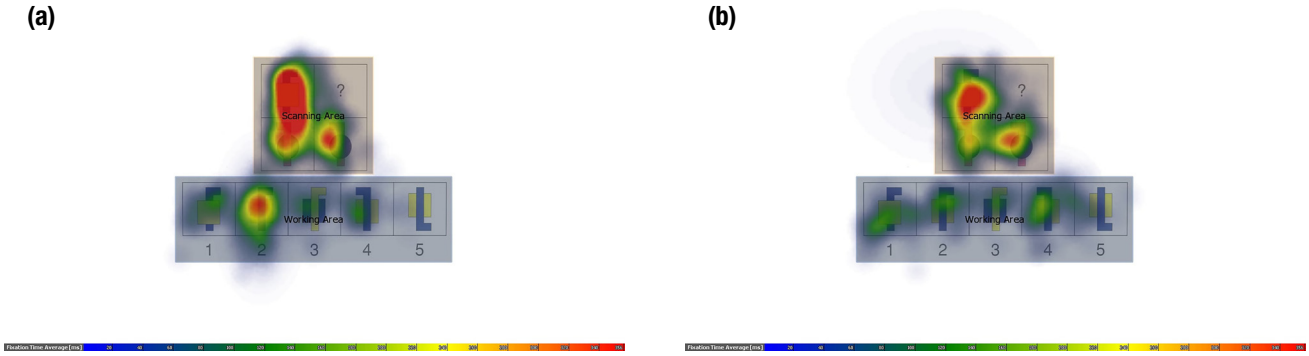

Figure 1. Heat maps of the fixations by the correct (a) and incorrect (b) participants.

of the incorrect group, in contrast, were divided almost equally between two or three choices (Figure 1).

Differences in the proportions of correct responses among the three study groups did not reach statistical significance. Our findings are contrary to the published literature, in which PD patients obtained significantly lower scores on the MR task[4]. However, our findings from eye-tracking provide novel insights into the strategy, by which participants navigate visual and analogy problems. Whilst deficits in visual search tasks have been reported in PD patients[5,6], the nature of these tasks (often highlight one or two salient features of a shape) differs from that of the MR task (i.e., complex visual pattern completion).

REFERENCES

1. McKinlay A, Grace RC, Dalrymple-Alford JC, Roger D. Characteristics of executive function impairment in Parkinson's disease patients without dementia. J Int Neuropsychol Soc. 2010;16(2):268-77. https://doi.org/10.1017/S1355617709991299
2. Litvan I, Goldman JG, Tröster AI, Schmand BA, Weintraub D, Petersen RC, et al. Diagnostic criteria for mild cognitive impairment in Parkinson's disease: Movement Disorder Society Task Force guidelines. Mov Disord. 2012;27(3):349-56. https://doi.org/10.1002/mds.24893
3. Pascoe M, Alamri Y, Dalrymple-Alford J, Anderson T, MacAskill M. The symbol-digit modalities test in mild cognitive impairment: evidence from Parkinson's disease patients. Eur Neurol, 2018;79(3-4):206-10. https://doi.org/10.1159/000485669
4. Basić J, Katić S, Vranicć A, Zarevski P, Babić T, Mahović-Lakusić D. Cognition in Parkinson's disease. Croat Med J. 2004;45(4):451-6. PMID: 15311418
5. Wong OW, Chan AY, Wong A, Lau CK, Yeung JH, Mok VC, et al. Eye movement parameters and cognitive functions in Parkinson's disease patients without dementia. Parkinsonism Relat Disord, 2018;52:43-8. https://doi.org/10.1016/j.parkreldis.2018.03.013
6. Landy KM, Salmon DP, Filoteo JV, Heindel WC, Galasko D, Hamilton JM. Visual search in Dementia with Lewy Bodies and Alzheimer's disease. Cortex. 2015;73:228-39. https://doi.org/10.1016/j.cortex.2015.08.020