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Exploring the cognitive workload during a visual search task in Parkinson's Disease

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Background

- ✓ Visual search impairments in patients with Parkinson's Disease (PD) may negatively affect daily life activities, such as driving^{1,2}
- ✓ The index of cognitive activity (ICA) is a pupillary response that accurately estimates cognitive workload during various tasks in individuals with cognitive decline^{3,4,5}

Objective

- ✓ To investigate cognitive workload during a visual search task in patients with PD

Methods

- ✓ 20 patients with PD (69 yrs-old \pm 8; 16 Males) and 15 controls (61 yrs-old \pm 11; 8 Males)

VISUAL SEARCH TASK

- ✓ Participants were instructed to search for a target stimulus (road sign) among distractor stimuli (other road signs) (Figure 1)

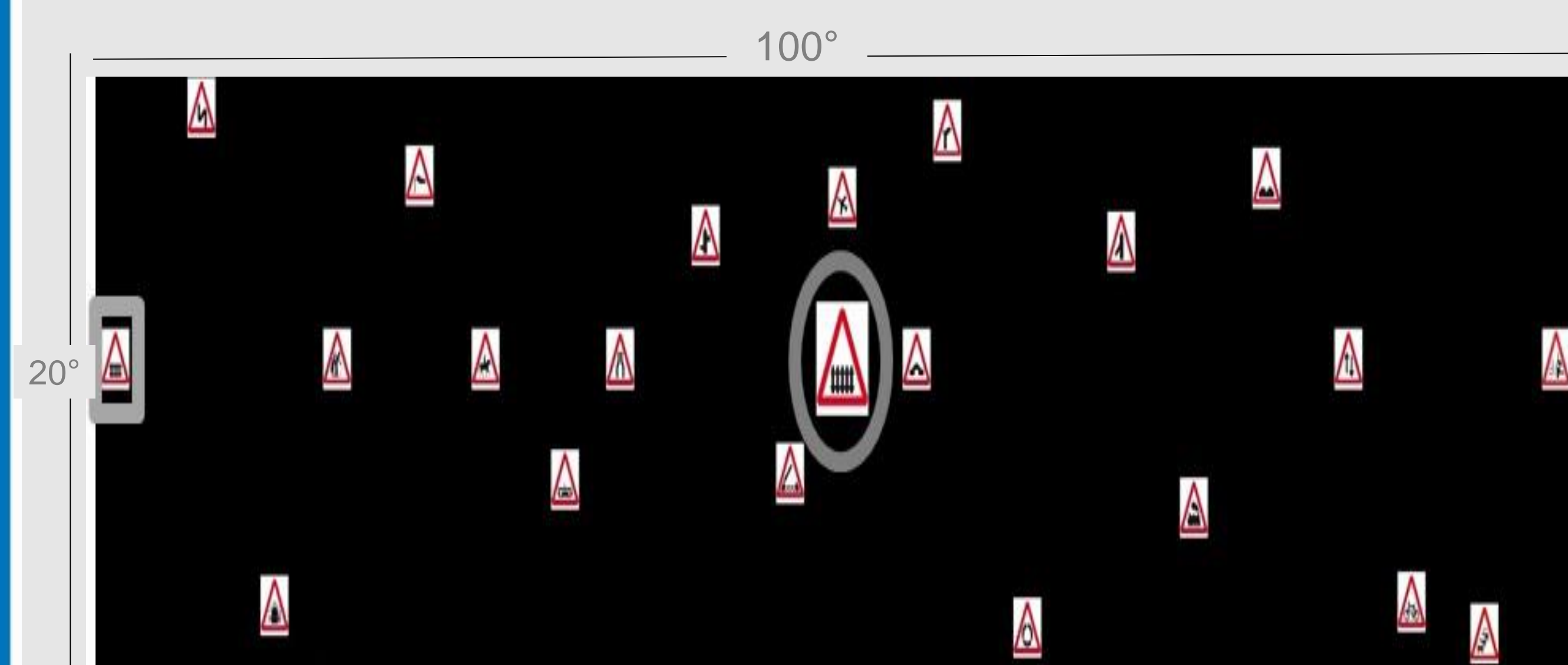


Figure 1. Example of a target-present trial. Gray circle represents the pre-identified target and the gray square represents the target.

- ✓ The task included 42 trials (half of them had the target present)
- ✓ ICA was recorded by two synchronized, remote eye trackers (FOVIO, SeeingMachines Inc, Canberra, Australia) at 60 Hz. Values ranged between 0 and 1
- ✓ Cognitive workload (ICA) over the course of the visual search task was explored

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Results

- ✓ PD patients were slower than controls to detect correctly the target (7s. \pm 2 vs 5 s. \pm 1, $p = 0.004$) and missed more targets than controls ($p = 0.04$)

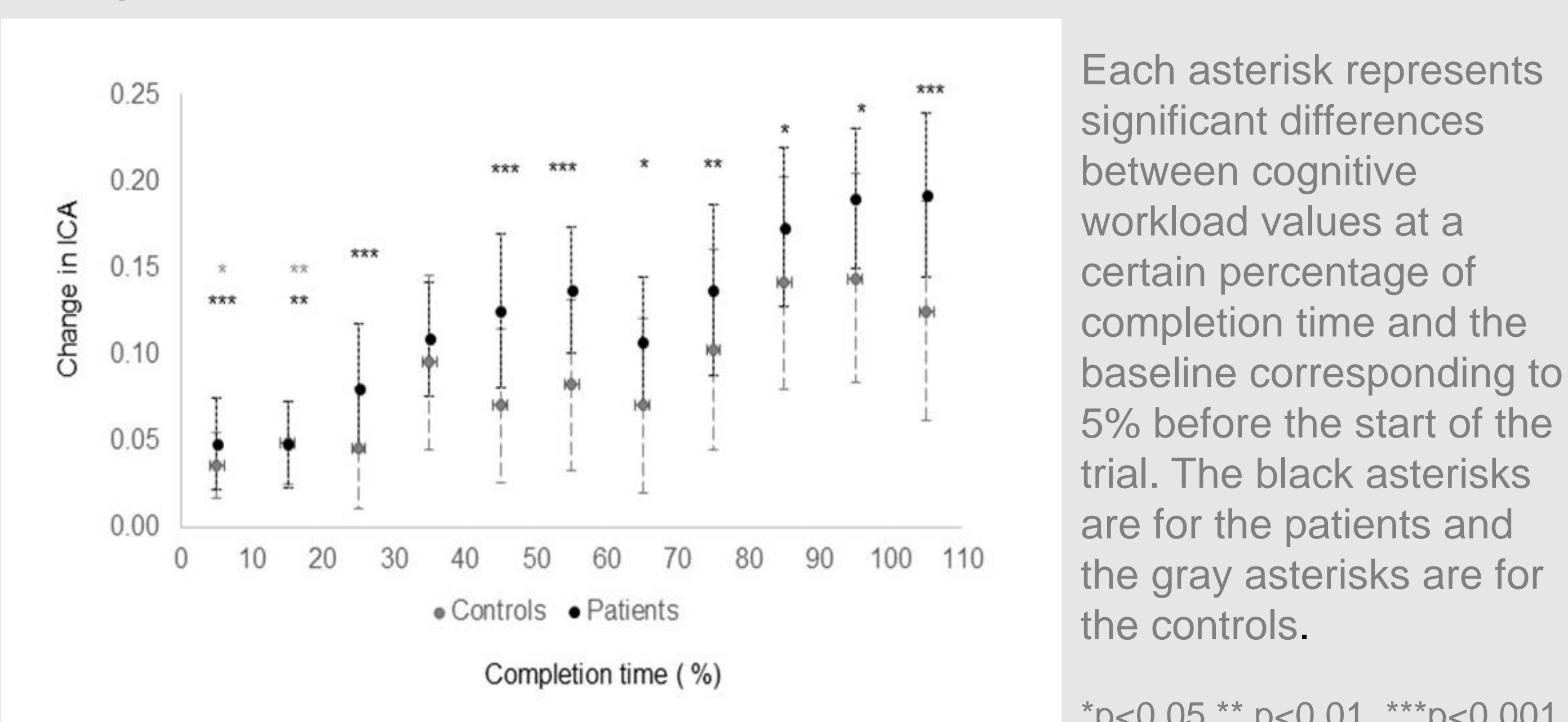


Figure 2. Change in ICA from baseline to completion of the visual search of all target-present trials for the left eye

- ✓ PD patients had increased values in cognitive workload throughout the entire duration of the task when compared to baseline ($p < 0.05$). By contrast, few significant differences were observed in controls (at 5% and 15%).

Conclusion

- ✓ PD patients required increased and longer effort to correctly perform the visual search task compared with baseline cognitive workload
- ✓ The use of ICA in patients with PD while performing a static visual search task provides new information into the effort (cognitive workload) required by patients on a moment-to-moment basis

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