

A Novel Eye-Tracking Approach to Cognitive Screening in Parkinson's Disease

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The Montreal Cognitive Assessment (MoCA) is widely used to screen for cognitive impairment and is considered a reliable tool for detecting cognitive decline in Parkinson's disease (PD). However, being a pen-and-paper test, the MoCA can be time-consuming, cognitively taxing, and stressful for patients, raising concerns about its ecological validity. To address these limitations, eye-tracking paradigms—such as prosaccade and anti-saccade tasks—have emerged as less demanding alternatives that still provide insight into specific executive functions.

Building on this approach, we propose a novel oculometric paradigm based on saccadic inhibition (SI): a reflexive suppression of eye movements in response to sudden visual transients, followed by a rapid rebound. SI is involuntary and requires minimal cognitive effort, making it particularly well-suited for clinical populations like PD.

We tested 15 patients with Parkinson's disease using an eye-tracking protocol that included prosaccade, antisaccade, and a visual search task featuring geometrical shapes and brief flashes designed to evoke SI. Each patient also completed the MoCA. While traditional eye movement metrics (e.g., latency, direction errors) did not significantly correlate with MoCA scores—likely due to high variability—SI parameters showed a robust and meaningful association with cognitive performance.

These results suggest that SI may serve as a reliable, low-burden biomarker for cognitive functioning in PD. Compared to conventional tools, SI-based paradigms offer a faster, more objective, and patient-friendly alternative for cognitive screening in clinical settings.

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