AB073. Correlations between control of saccadic eye movements and performance in other cognitive tasks in younger adults, older adults and patients with Parkinson's disease

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Background: Cognitive control is defined as the ability to act flexibly in the environment by either behaving automatically or inhibiting said automatic behaviour and it can be measured using an interleaved pro/anti-saccade task. Decline in cognitive control has been attributed to normal aging and neurological illnesses such as Parkinson's disease (PD) as well as decline in other cognitive abilities. This parallel might highlight the role played by cognitive control in information processing and working memory. However, little is known about the relationship between cognitive control and other cognitive processes such as visual memory, decision making, and visual search. We thus propose to correlate the incidence of impaired cognitive control with deficits in visual memory, decision making and visual search in three groups: younger adults, older adults and patients with idiopathic PD.

Methods: Seventy-one participants, namely 34 adults (M =22.75, SD =3.8), 22 older adults (M =67.4, SD =8.3), and 20 PD patients (M =65.59, SD =8.2) performed four tasks: interleaved pro/anti-saccade, visual memory, decision making, and serial and pop-out visual search.

Results: Results show that within each group, anti-saccade error rate (ER) were significantly and negatively correlated with visual memory ER ($r_{younger}$ =–0.378, P=0.036; r_{older} =–0.440, P_{older} =0.046; r_{PD} =–0.609, P=0.016). On the other hand, correct decision-making reaction times (RT) were significantly correlated with anti-saccade ER, and RTs only in older adults (r_{ER} =0.529, P=0.014; r_{RT} =0.512, P=0.018) and PD patients (r_{ER} =0.727, P=0.012; r_{RT} =0.769, P=0.001). For visual search, PD patients showed a significant relationship between RTs for correct pro-saccades and pop-out (r=0.665, P=0.007), and serial (r=0.641, P=0.010) search RTs. Furthermore, there was a significant correlation between MoCA scores and anti-saccade RTs (r=–0.559, P=0.030) and ER (r=–0.562, P=0.029) in PD patients. Taken together, these results support the hypothesis of PD patients' reliance on bottom-up processes as top-down processes decline. For younger adults, there was a significant correlation between serial search performance and both anti-saccade ER (r=0.488, P=0.005), and correct pro-saccade ER (r=0.413, P=0.021). In older adults, this relationship was absent, but anti-saccade ER significantly correlated with pop-out search times (r=0.473, P=0.030).

Conclusions: We found significant relationships between cognitive tasks and cognitive control as measured through the interleaved pro/anti-saccade task across and within participant groups, providing evidence of the appropriateness of the use of the interleaved pro/anti-saccade task as a measure of overall cognitive control.

Keywords: Saccade; cognitive control; Parkinson's disease

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