

The Origin of Working Memory Deficits in Parkinson's Disease

Eun-Young Lee

Dr. Steven A. Hackley, Dissertation Supervisor

ABSTRACT

Two experiments were conducted to examine the mechanisms underlying deficits of visual working memory in Parkinson's disease (PD). One study combined behavioral methods with event-related potentials (ERPs), the other, behavioral methods with structural and functional magnetic resonance images (MRIs). In both experiments, participants viewed an array of colored rectangles, some of which were task-irrelevant. Then, after a brief delay, they reported whether the orientation of any relevant figures had changed.

By comparing trials with and without task-irrelevant items, it was shown that poor attentional filtering contributes to poor memory, both in people with and in those without PD. Measures of basal ganglia activation prior to the retention interval were generally consistent with claims that this structure serves as a "gate-keeper" to working memory. Structural analyses identified three regions for which disease-specific atrophy was negatively correlated with capacity—the right intraparietal sulcus (IPS) and the left and right pre-supplementary motor area (pre-SMA). Thus, converging evidence from behavior, electrophysiology, and MRI indicate that lowered capacity and poor attentional filtering both underlie deficits of working memory in people with Parkinson's disease.