# Deep-Brain Stimulation Improves Overriding but not Re-engagement of Actions in Parkinson's Disease

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**Abstract**

Recent fMRI work and patient studies have shown that the basal ganglia play a key role in a distributed brain network that controls the non-specific abortion of motor responses. The aim of the present study was to specify the involvement of the basal ganglia in selective action control of responses as a more fine-grained form of cognitive control. We employed the stop-change task (based on a horse-race model) to investigate the ability to interrupt and change an ongoing overt action. Our sample consisted of 17 patients diagnosed with Parkinson's disease who received deep-brain stimulation (DBS) in the subthalamic nucleus (STN). All patients performed the tasks on and off stimulation to address the question whether stimulation is effective in improving stop-signal RT in the stop-change task. DBS shortened go reaction time (RT) related to generating overt responses. In addition DBS yielded shorter stop-signal RT, pointing toward improved inhibitory control over overt responses. Interestingly stimulation did not shorten response latencies to the change signal. This pattern is interpreted to suggest a functional dissociation of the effects of DBS on generating and inhibiting voluntary actions.

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