

024 WHY DOES DOPAMINE DEPLETION HAMPER MOVEMENT?

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The mechanisms by which dopamine depletion leads to paucity of movement in Parkinson's disease (PD) are poorly understood. In animals, dopamine signals reward and also promotes effortful actions. An intriguing recent hypothesis is that PD represents a disorder of vigour: bradykinesia is caused by increased "cost" of movement.

We used a saccade task to investigate whether dopamine invigorates movement. Participants looked towards a visual target while avoiding a bright distractor. Critically, we varied the incentive before each movement, and offered greater rewards for faster movements. In healthy people, higher incentives led to increased response vigour, indexed by increased peak saccade velocities, shorter reaction times, and less distractibility. Furthermore the dopamine agonist cabergoline increased sensitivity to rewards, as manifest by greater effect of incentives on saccade velocity.

PD patients (N=15) had slower velocities than controls, but also consistently displayed reduced sensitivity to rewards: attenuated modulation of velocity, reaction time and distractibility by incentives. Although movement velocity was improved by tonic dopaminergic replacement therapy, it was not normalized, and sensitivity to rewards was unaffected. It is possible that the effects of reward on movement vigour requires phasic dopamine and that tonic replacement is insufficient to overcome the reward: cost imbalance observed in PD.