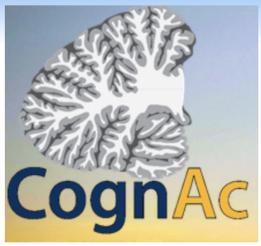




Parkinson's Disease does not impair implicit sensorimotor adaptation

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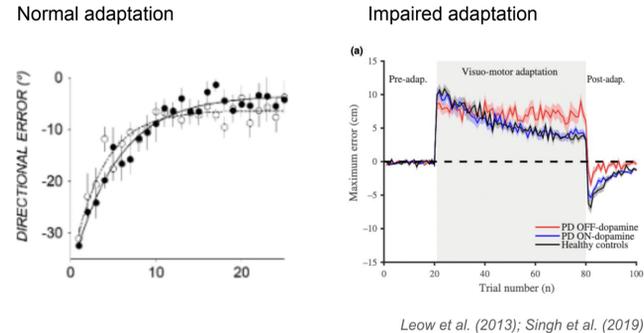
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INTRODUCTION

- Implicit motor learning is defined as the subconscious changes that take place in motor movements in response to an error signal.
- Parkinson's disease is characterized by a lesioned basal ganglia, which is a structure known to be involved in motor control and learning.
- Visuomotor rotation paradigms have traditionally been used to study implicit learning. However, they have yielded mixed results in Parkinson's Disease.

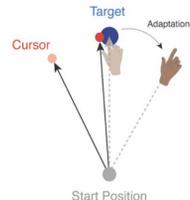
Mixed Results in Parkinson's Disease



METHODS

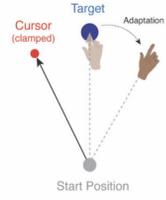
Problems with standard methods

1. Large perturbations do not isolate implicit adaptation
2. The error signal is not fixed
3. The asymptote of learning is elusive



Solutions provided by The Clamp

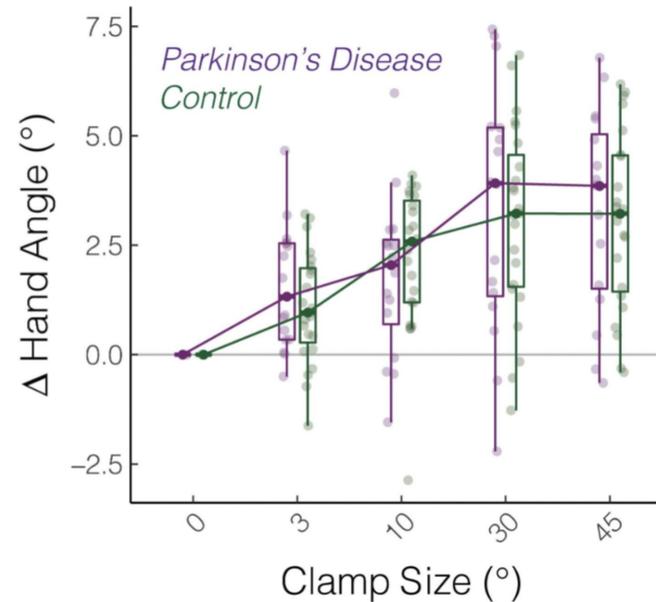
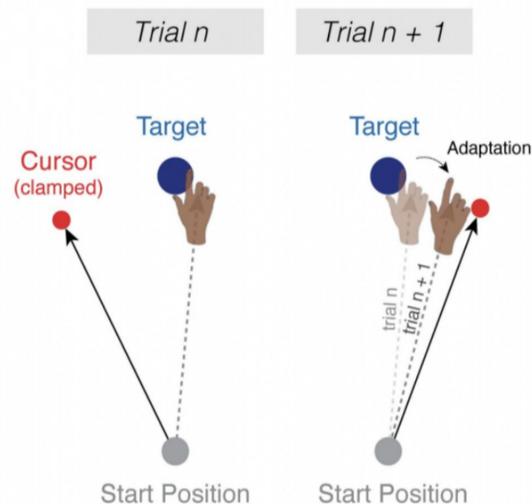
1. Large perturbations do isolate implicit adaptation
2. Error size is tightly controlled
3. The asymptote of learning is clear



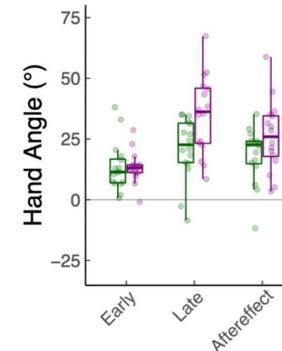
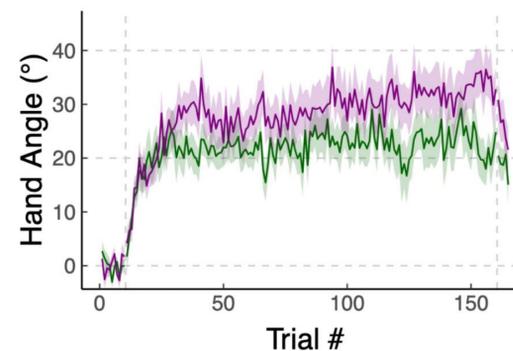
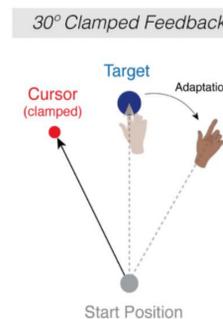
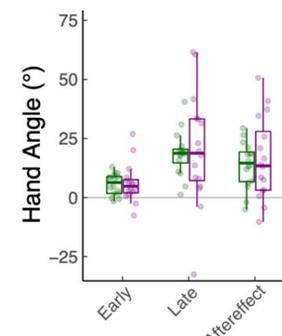
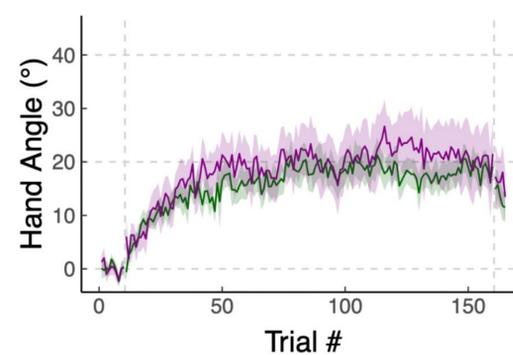
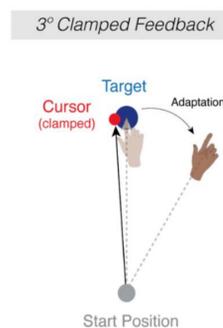
Morehead et al. (2017)

RESULTS

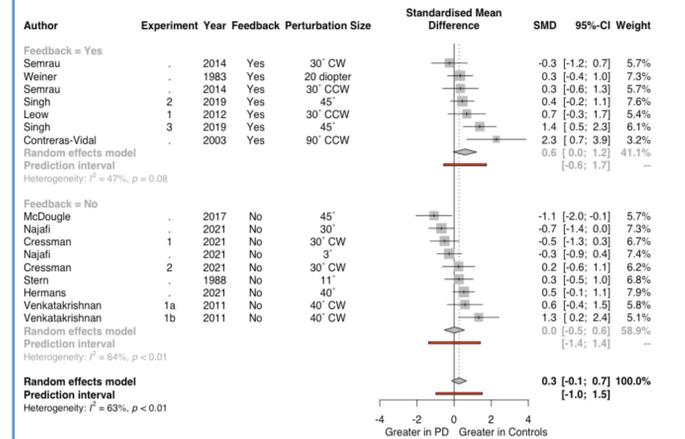
Exp 1: Trial-by-trial learning is preserved in Parkinson's Disease



Exp 2: Implicit motor learning is preserved in Parkinson's Disease



META-ANALYSIS



- For 11 studies, we looked at the aftereffect block, which is the purest measure of implicit adaptation.
- Our meta-analysis corroborates our experimental results, suggesting that there is no impairment in Parkinson's Disease for implicit learning.

DISCUSSION

- We considered several potential hypotheses which might explain this behavior...

Null Hypothesis: There is no deficit in implicit adaptation in PD across all error sizes, thus, the basal ganglia is not directly involved in implicit learning

Alternative Hypothesis: PD participants do have a deficit in implicit adaptation, and thus the basal ganglia plays a role in implicit learning

Compensation Hypothesis: A lesioned basal ganglia leads to the cerebellum working harder to compensate for certain functions, presenting normal implicit learning, and potentially hyper-adaptation

Inhibition Hypothesis: A lesioned basal ganglia leads to disinhibition of the cerebellum, causing the cerebellum to work in overdrive; leading to greater implicit adaptation levels

- Given that we found no significant differences in adaptation between Parkinson's participants and control participants, we conclude that the basal ganglia is not involved in implicit motor adaptation.

CONTACT

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