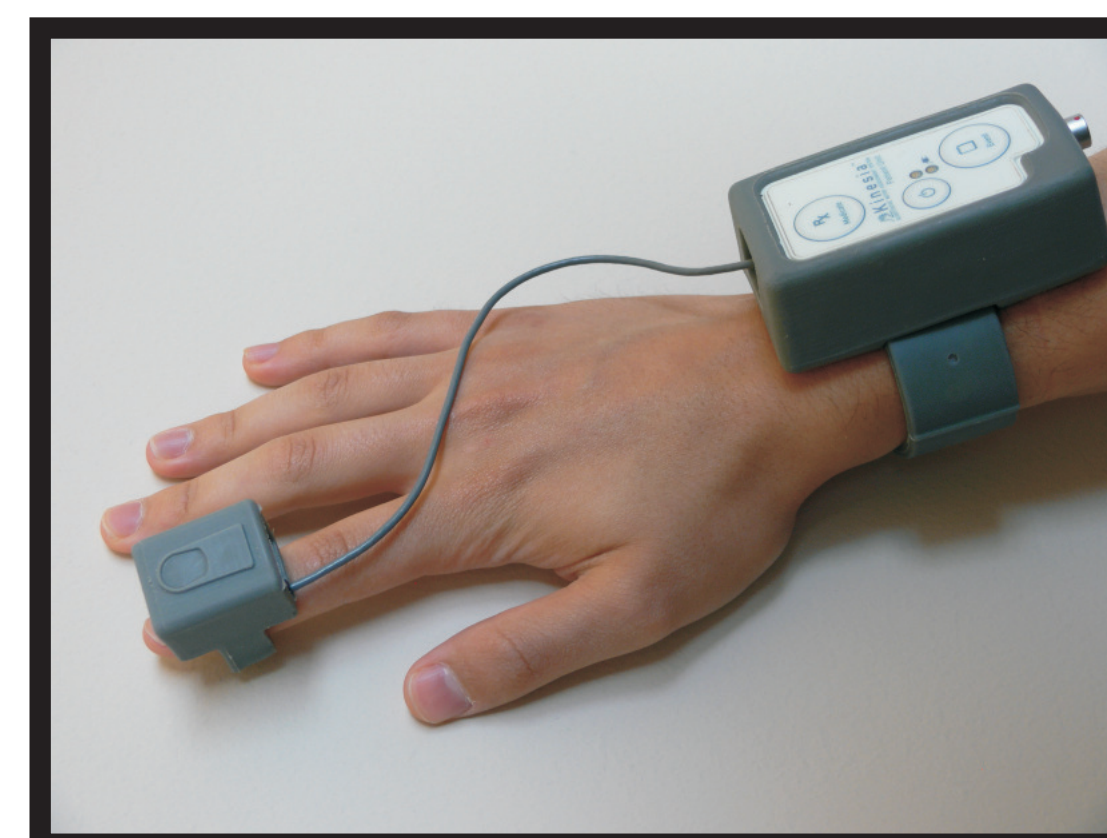


INTRODUCTION

Parkinson's disease (PD) can be characterized by its cardinal motor symptoms including tremor and bradykinesia. Once side effects of drug intervention outweigh therapy benefits, patients may consider receiving deep brain stimulation (DBS) surgery. Patients must then undergo extensive and frequent programming sessions to adjust stimulation settings for optimal therapeutic benefit. CleveMed's Kinesia™ motion sensor system has shown high correlation to clinician Unified Parkinson's Disease Rating Scale (UPDRS) severity scores of tremor and bradykinesia while evaluating PD symptom improvement in response to DBS.

GOALS & METHODS

Goal: Demonstrate the varied response across PD motor symptoms resulting from DBS programming and the potential clinical utility of the Kinesia system in this application.



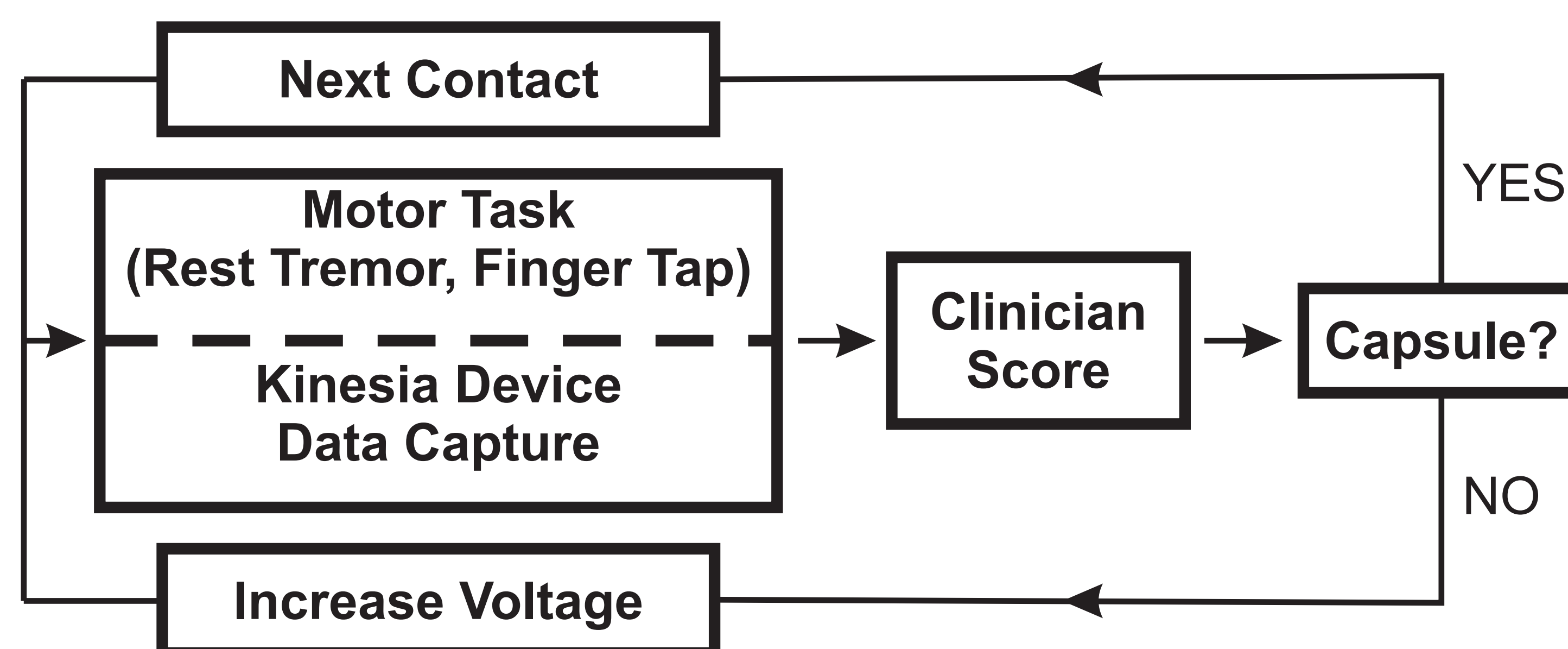
Kinesia consists of a finger-worn sensor unit that contains accelerometers and gyroscopes, and a wrist-worn command module that wirelessly transmits data to a computer.

Methods

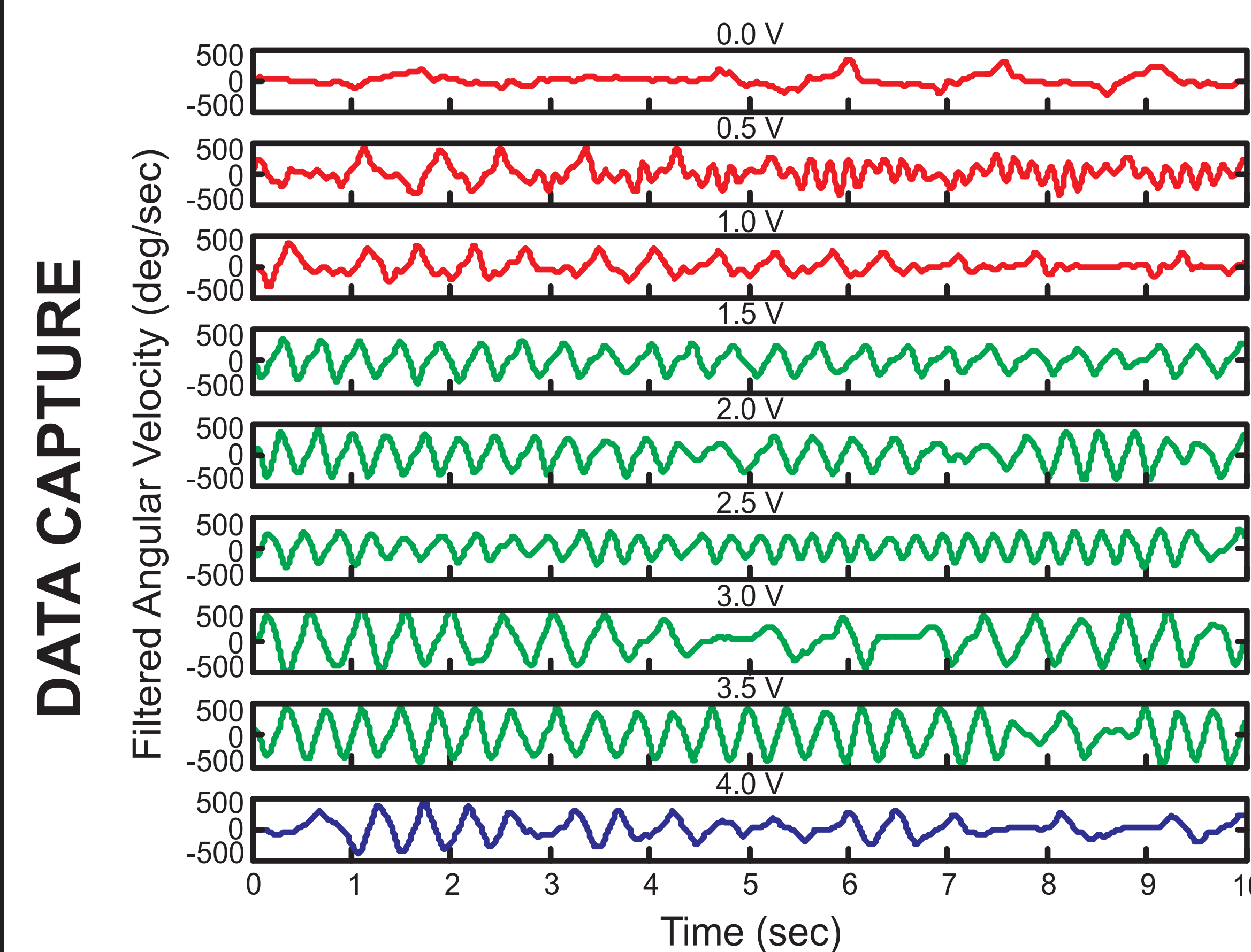
A 75 year old female diagnosed with PD was evaluated during her first outpatient programming session one month following DBS surgery targeting the right sub thalamic nucleus (STN). The subject was rated moderate severity (3) for both rest tremor (UPDRS #20) and finger tap bradykinesia (UPDRS #23). The clinician performed a mono-polar review by adjusting stimulation contact and amplitude. The finger-worn Kinesia unit collected and stored motion data while the subject performed UPDRS motor tasks at each stimulation setting. This information was processed into programming, or 'tuning', maps to not only assess individual motor symptoms, but also the effect of stimulation across tremor AND bradykinesia.

DBS Parameters

- Contact (0-3/C⁺)
- Amplitude (0-5 V)
- Frequency (135 Hz)
- Pulse Width (60 μsec)

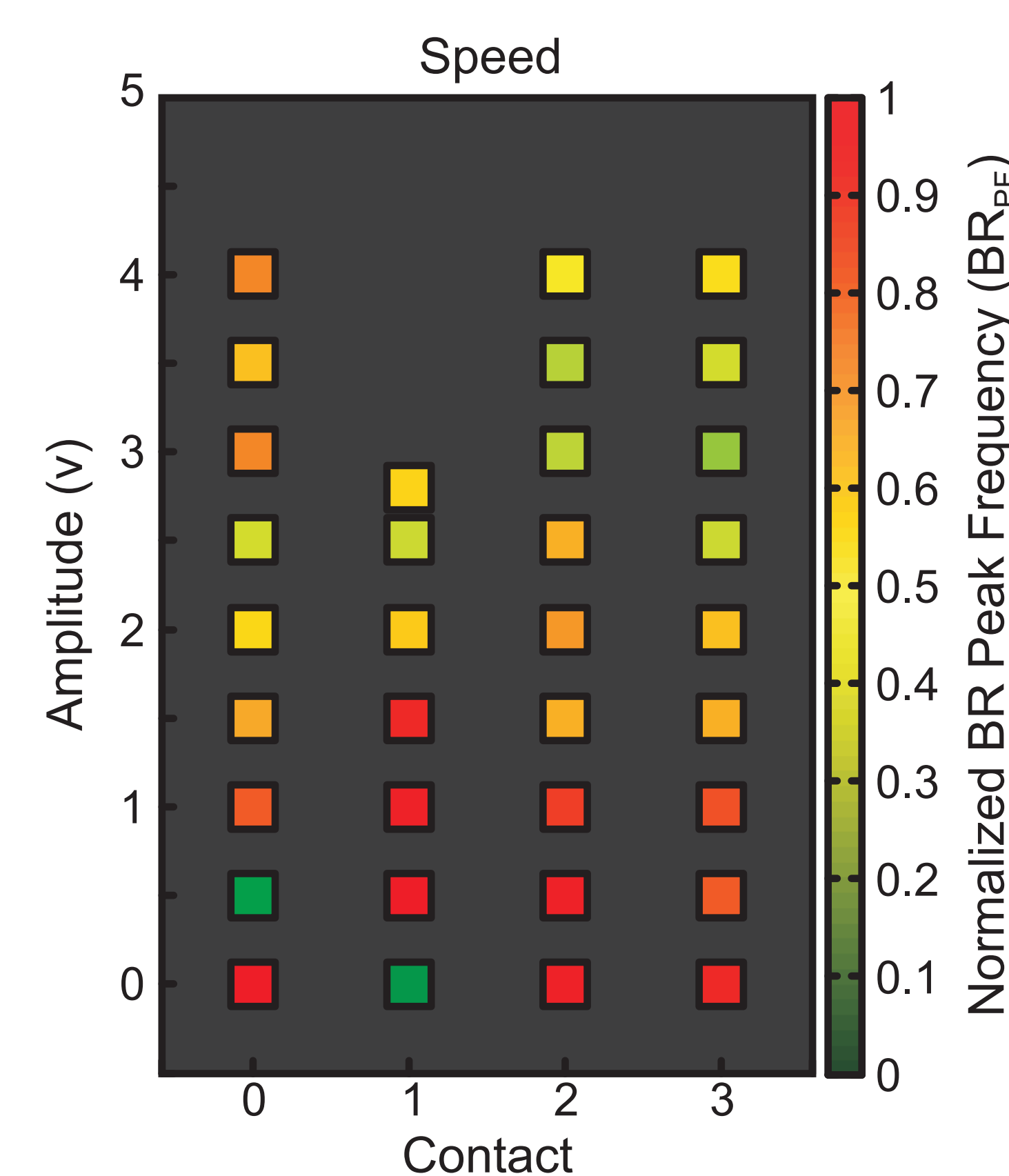
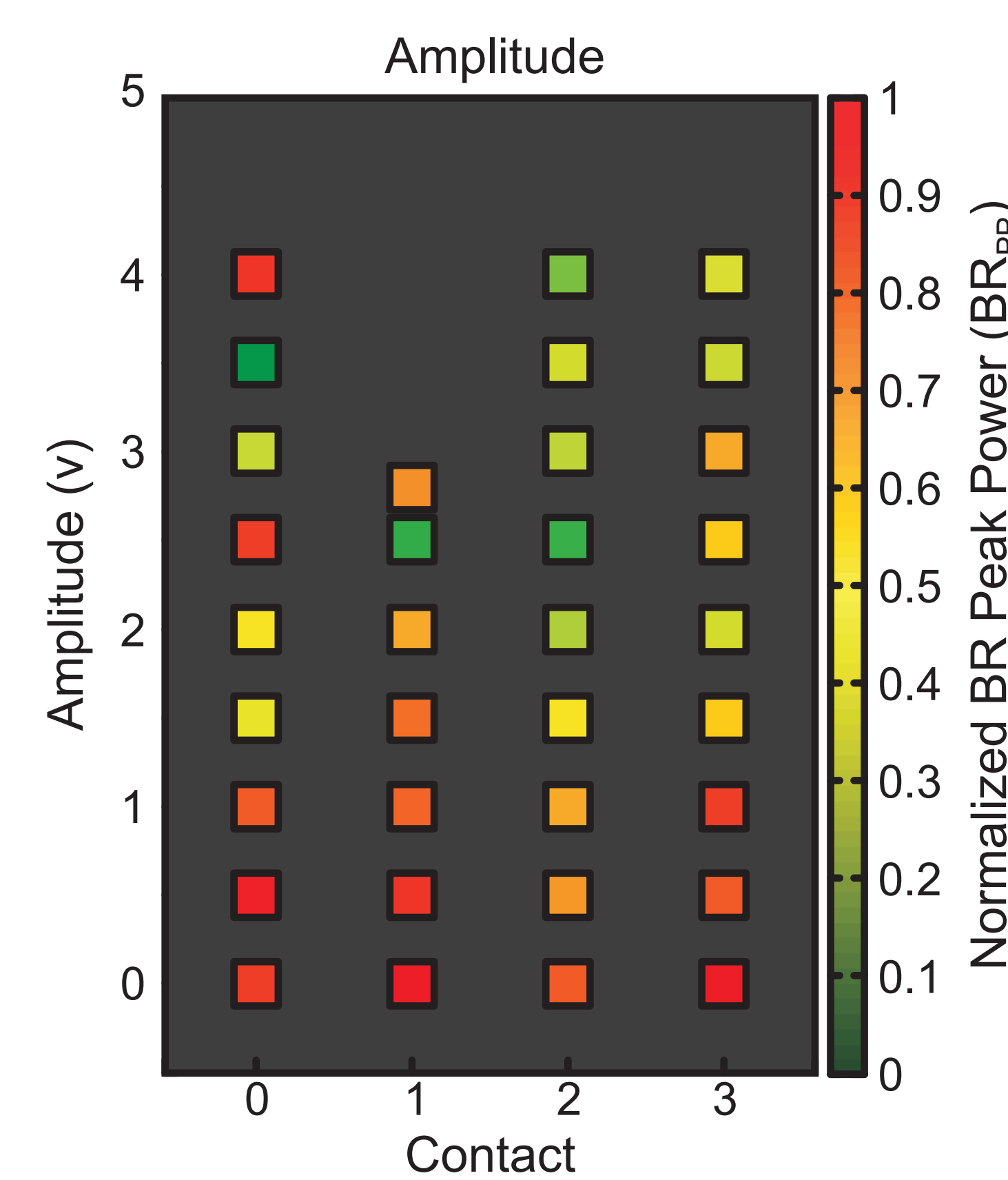


BRADYKINESIA

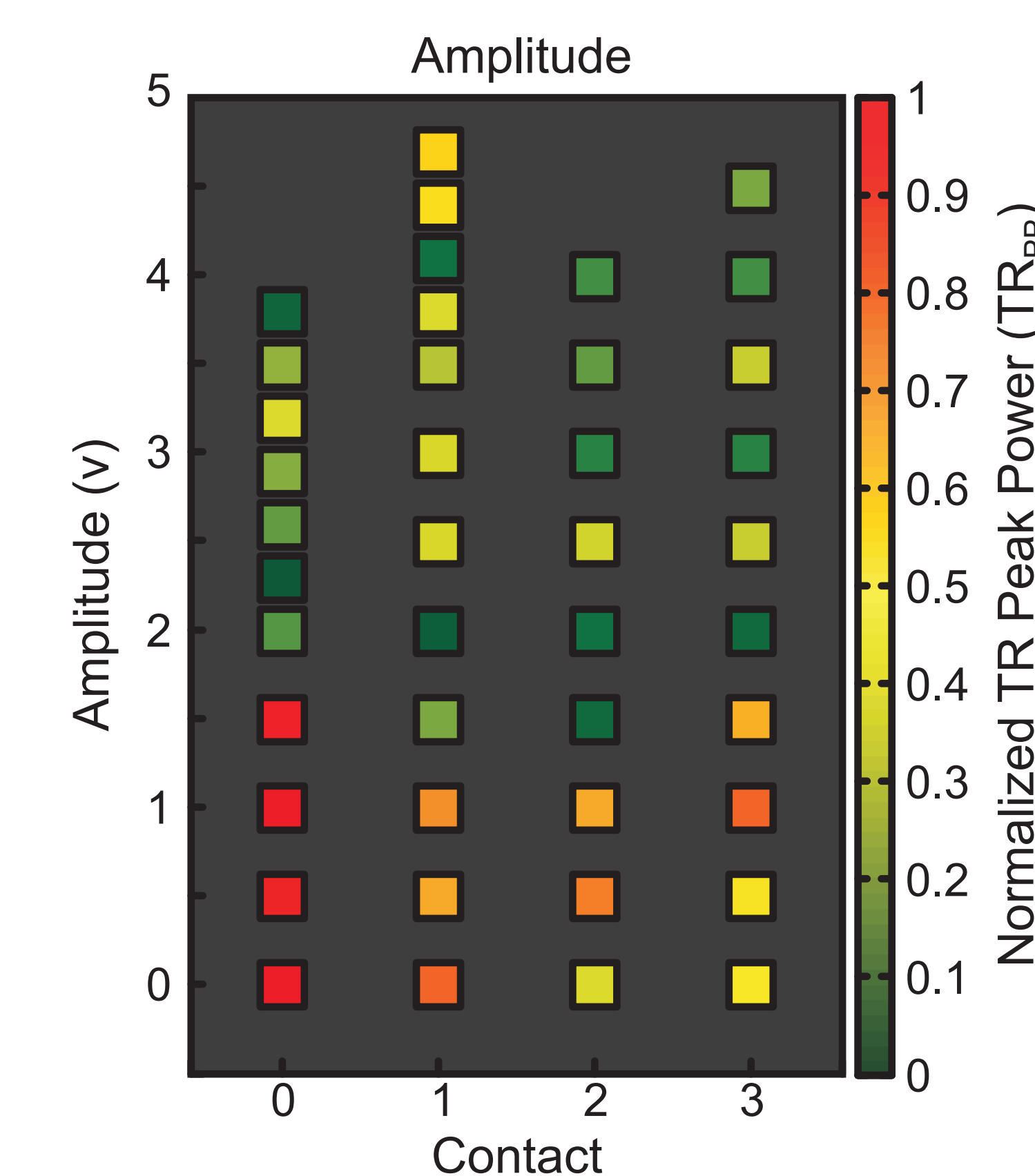
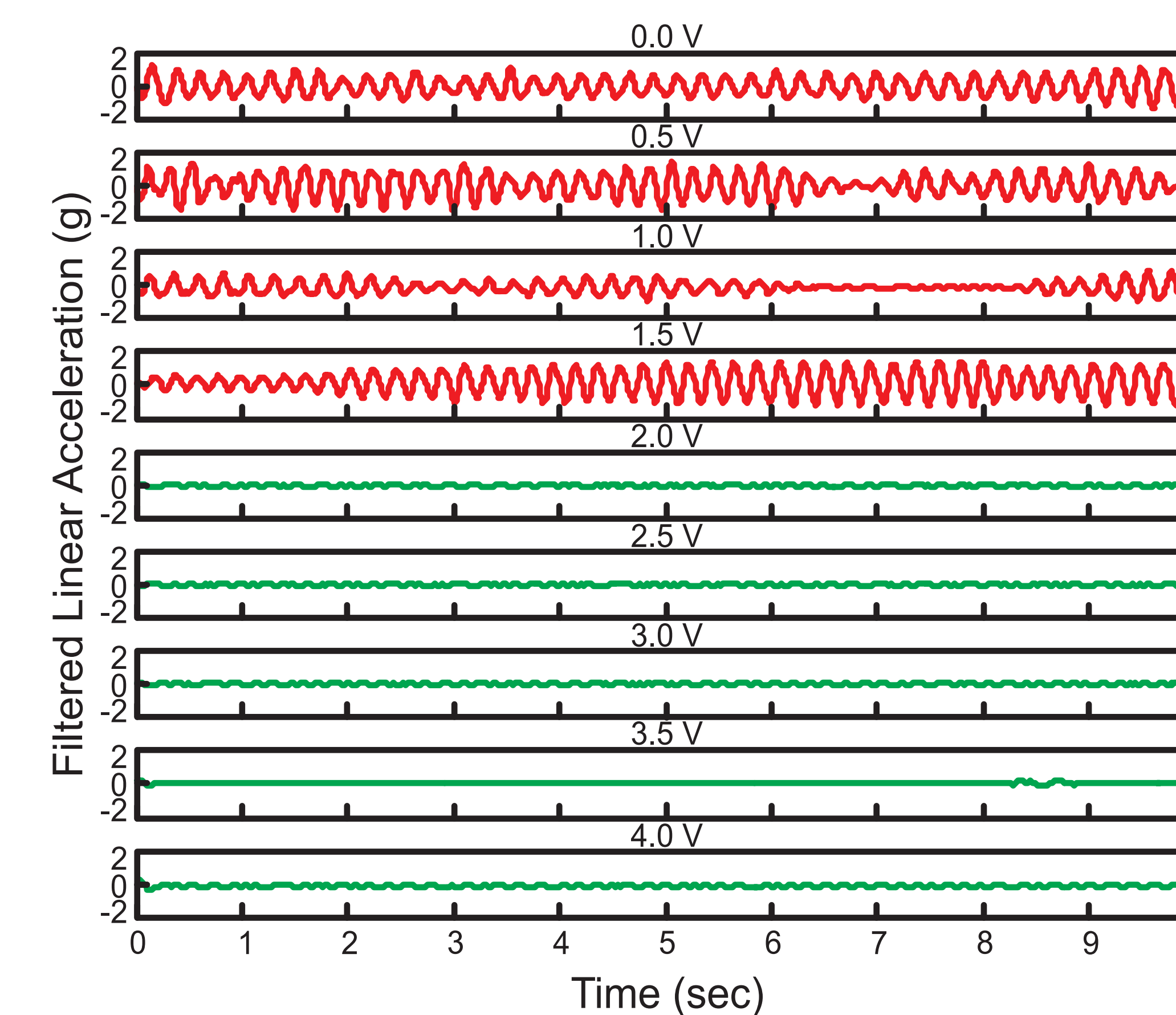


- Motor Symptom Present
- Motor Symptom Reduction
- Motor Symptom Return

TUNING MAP



TREMOR



CONCLUSION

→ The Kinesia system effectively captures motion data collected during PD outpatient DBS programming sessions.

→ Motor symptom improvements exhibit unique trends when stimulation is administered to the STN. While tremor severity was suddenly reduced at an effective stimulation level, bradykinesia improvement was more gradual with increasing voltage.

→ Bradykinesia improvement required a higher stimulation voltage than tremor to effectively alleviate motor symptom severity.

→ The tuning map provides a clinician with a simple and intuitive plot to assess DBS effectiveness across multiple PD motor symptoms.