



REPETITIVE FINGER MOVEMENT IN PEOPLES WITH PARKINSON'S DISEASES FOLLOW-UP STUDY

Lindsay Ebeling, Amos Kotz, Abby Crimmins, and Elizabeth L. Stegemöller, PhD

INTRODUCTION



The performance of repetitive finger movements is a clinical tool used to assess severity, progression, and treatment efficacy of Parkinson's disease (PD) and related disorders.



Impaired control of repetitive finger movements can significantly impact the performance of daily living activities, such as writing and buttoning clothing.



Early on movement disorders often have overlapping clinical features and present with similar deficits in repetitive finger movements, making diagnosis difficult.

Persons with PD demonstrate movement festination at rates near to and above 2 Hz which is NOT improved with dopaminergic medication (Figure 1).

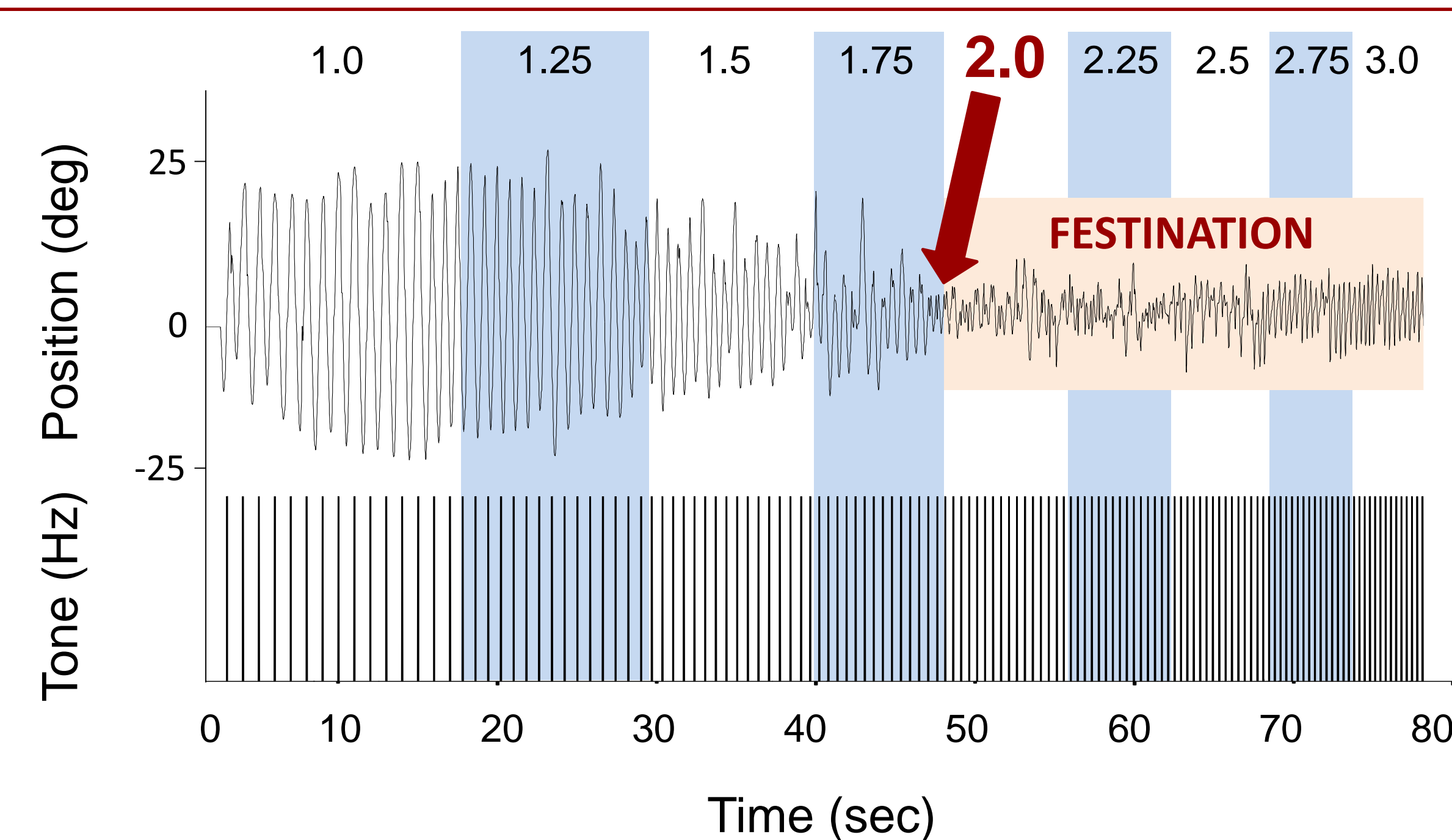


Figure 1. An example of festination at rates near to and above 2 Hz in a person with PD. **Movement festination is a change in movement rate and movement amplitude accompanied by frequent hesitations in movement.**

PURPOSE

- To examine how performance of repetitive finger tapping changes as the disease progresses in persons with PD.
- Hypothesis:** Since PD is a progressive disease, we hypothesize that movement amplitude will decrease and movement rate difference will increase at follow-up.

METHODOLOGY

Participants:

- 20 Persons with PD were tested twice. Once at baseline and again at follow-up trial with at least 6 months between data collections.
- Participants with PD were tested on medication using their most affected hand.

Table 1. Participant Demographics (at baseline trial)

GROUP	PD
Number of Participants	20
Age (Mean)	67
Handedness (%R)	95%
Hand Tested (%R)	50%
Gender (%F)	65%
Disease Duration (Mean)	5.8

Data Collection:

- Participants completed an unconstrained finger flexion-extension movement in time with a series of acoustic tones presented at 1 Hz for 15 intervals, and then increased by 0.25 Hz every 15 intervals until reaching 3 Hz (Figure 1).
- The forearm, wrist, thumb, and fingers 2-4 were supported by a brace, and position was collected using a goniometer (Figure 2).

Outcome Measures:

- Normalized Peak Amplitude (finger movement)
- Movement Rate Difference (between tapping and tone frequency)

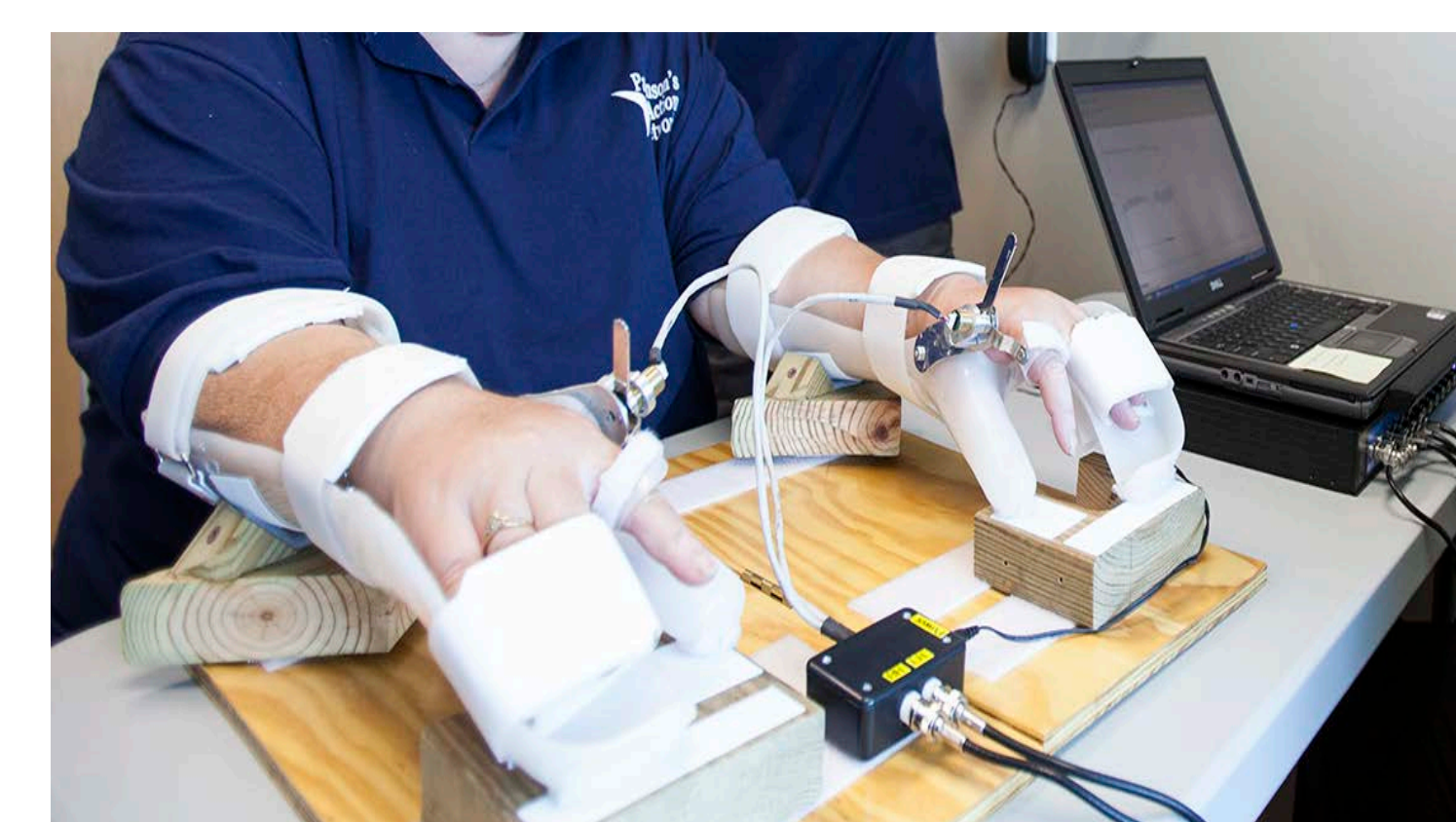


Figure 2. Data collection set up.

Statistical Analysis:

- A 2x9 Repeated Measures ANOVA was applied for each outcome measure. (Baseline vs. Follow-up, and 9 Tone Rates)

RESULTS

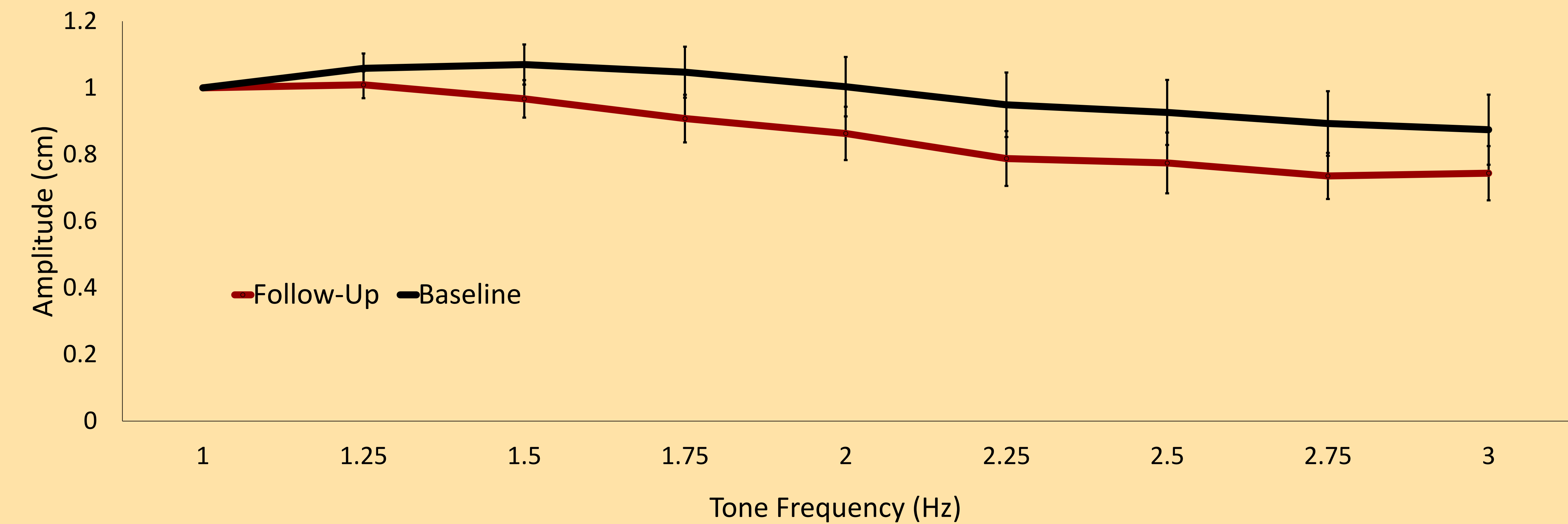


Figure 3: Normalized Amplitude across all tone rates baseline test to follow-up. Statistical analysis revealed a main effect of tone rate ($F(8) = 9.16, p < 0.001$). Normalized amplitude decreased by 13% in the follow-up trail. However, statistical analysis did not reveal a main effect of data collection time ($F(1) = 1.27, p = 0.267$) No interaction effect was revealed.

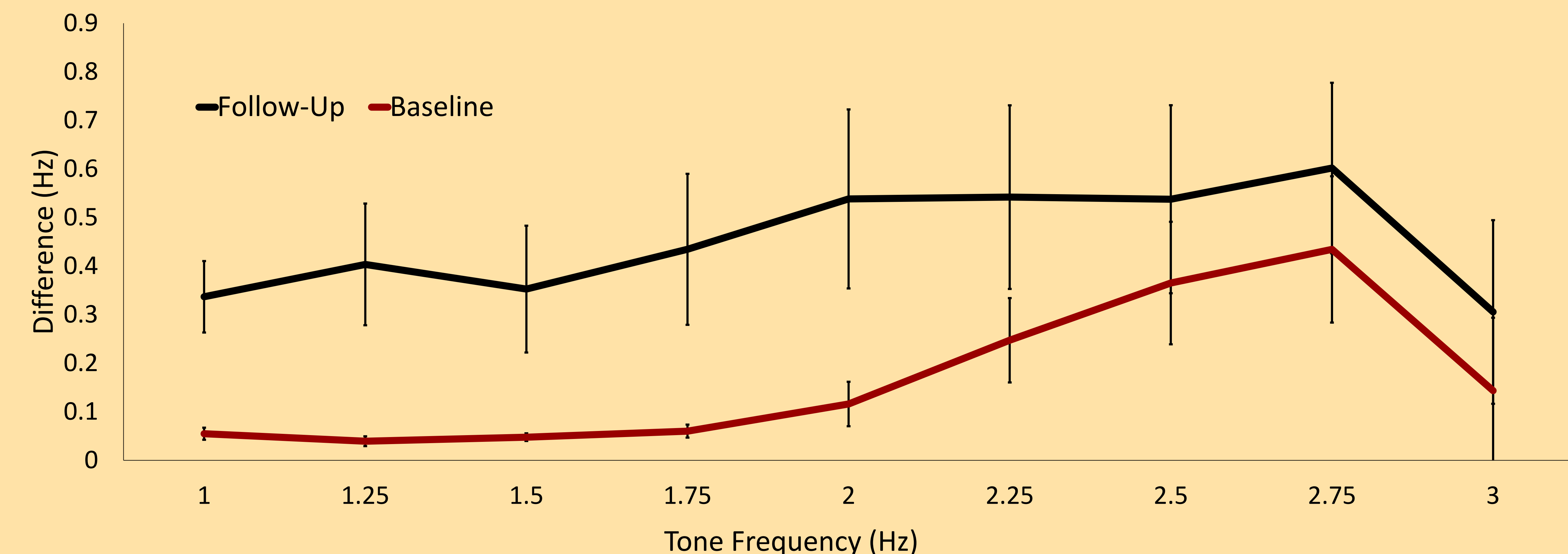


Figure 4: Movement Rate Difference across all tone rates from baseline to follow-up. Statistical analysis revealed a main effect of tone rate ($F(8) = 4.73, p < 0.001$). Movement rate difference increased by 169% in the follow-up trail. However, statistical analysis revealed a trend towards a main effect of data collection time ($F(1) = 3.90, p = 0.056$) No interaction effect was revealed.

DISCUSSION

- Results show that with progression of Parkinson's Disease, repetitive finger movement performance deteriorates. However, no significant differences were revealed.
- Sample Size of 20 participants could be increased in future studies.
- We will evaluate the contribution of time between baseline and follow-up data collections in future studies.
- Results from this study may help guide diagnosis and potential therapy techniques for persons with Parkinson's Disease.