Listening Effort in Dysarthria

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Background

Dysarthria

- A motor speech disorder that impacts the muscles used for speech production [1]
- Intelligibility of speech is often impacted in dysarthria [2]

Listening Effort

- Listening effort is the amount of cognitive resources a listener uses to support listening to speech [3]
- Previous studies have indicated a relationship between listening effort and intelligibility of dysarthric speech [4,5]
- Not all measures of listening effort relate to the intelligibility of dysarthric speech [5]
- In accented speech perception, listeners exert more effort when listening to nonnative speakers, even intelligibility is preserved [6]

Measuring Listening Effort

- Subjective Listener Ratings [4, 5]
- Pupillometry [6, 7]
- Research has found weak to no correlations between measures of listening effort [8]

Listener Cognition

- Previous research has demonstrated a relationship between listener cognition and speech intelligibility [9, 10]
- Research has shown relationships between listener cognition and various measures of listening effort [8]

Research Questions

Do listeners expend more effort when listening to a speaker with dysarthria compared to a healthy control talker. even when listener intelligibility is preserved?

Do listeners expend more effort when they are unable to recognize the phrase (intelligibility) spoken by the speaker with dysarthria?

Do cognitive measures of working memory, inhibitory control, processing speed, and cognitive flexibility predict the amount of effort listeners expend?

Participants & Procedure

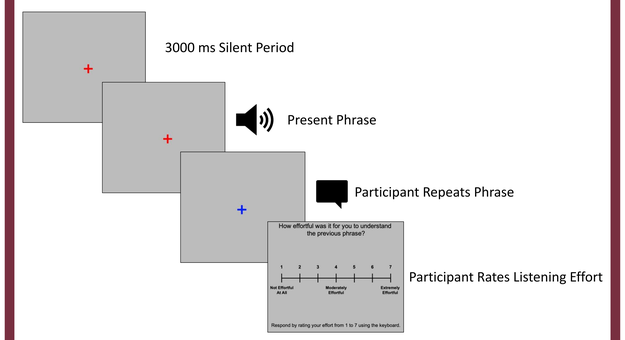
Speakers

- Healthy Control
  - 72-year-old male
  - No speech, language, hearing, or cognitive disorder
- Dysarthria Speaker
  - 80-year-old male
  - Diagnosed with dysarthria secondary to Parkinson's disease
  - Moderate severity [11]
  - Mild intelligibility impairment (83.6% intelligible) [12]

Listeners

- Approximate 50 listeners total
- 18 – 40 years old
- No speech, language, or hearing disorder
- Fluent in English

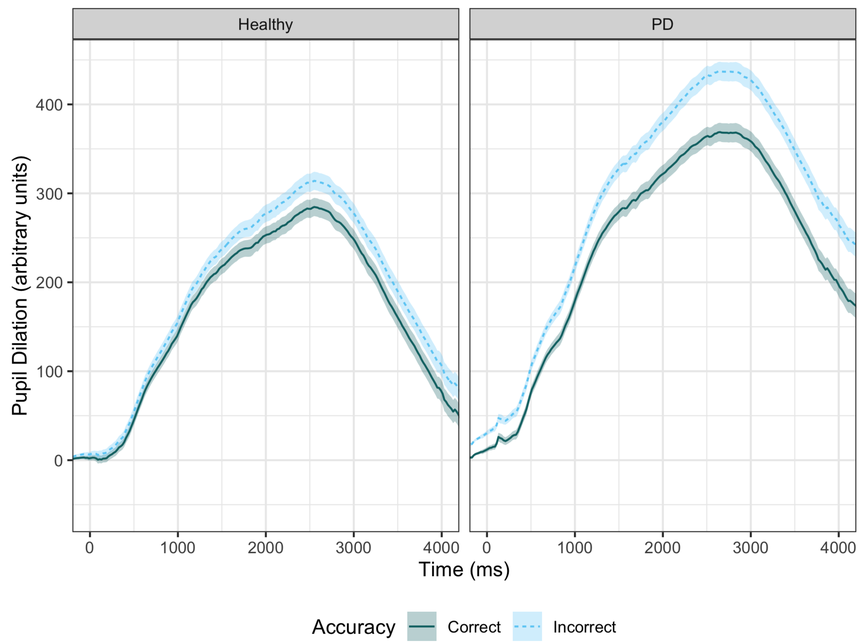
80 Phrase Trials Total
40 from Healthy Control
40 from Dysarthria Speaker



NIH Toolbox Cognitive Battery

- List Sorting Working Memory Test
- Flanker Inhibitory Control and Attention Test
- Dimensional Change Card Sort Test
- Pattern Comparison Processing Speed Test

Hypotheses & Future Directions



Data simulated based on the results from McLaughlin and Van Engen (2020). Current data collection is ongoing.

- Data collection recently started and is still ongoing
- Listening effort is hypothesized to be greater when listening to the speaker with dysarthria, even when the listener was able to recognize the phrase spoken (i.e. intelligibility is preserved)
- Listening effort is hypothesized to increase when the listener does not correctly recognize the phrase, especially when listening to the speaker with dysarthria
- Cognitive measures of working memory, inhibitory control, cognitive flexibility, and processing speed are hypothesized to be related to exerted listening effort.

References

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