A comparison of voice amplifiers in Parkinson's disease

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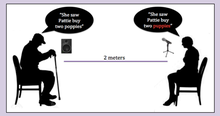
Background

- **Parkinson's disease** (PD): neurodegenerative movement disorder that affects approximately 3% of individuals over 60 (Nussbaum & Ellis, 2003).
- 70 – 90% of people with PD will eventually develop a speech disorder (Logemann et al., 1978).
- **Hypophonia**, or reduced vocal loudness, is one of the most prevalent speech symptoms associated with PD (Adams & Dykstra, 2009).
- While behavioral interventions are a promising solution for many individuals with PD and hypophonia, many others have great **difficulty transferring** increased loudness in their day-to-day lives due to cognitive and sensorimotor deficits associated with PD (Adams & Dykstra, 2009; Sapir 2014).
- **Voice amplification devices,** which increase the loudness of a person's natural voice, offer an alternative solution for many individuals. However, despite their availability, little research has been done on device options and efficacy (Bertrand, 2009; Andreeta et al., 2016)

Purpose: To compare the performance of three devices used to amplify vocal loudness of people with hypophonia

Methods

Participants	• 15 individuals with hypophonia and their primary communication partner participated • Hypophonia secondary to PD or parkinsonism in 14 individuals; secondary to MSA-C in 1
Phase 1: In Lab	• Participant with PD read aloud sentences in four device conditions (**No Device**, **Devices A, B, C**) and two noise conditions (***No Noise***, ***65dB Multitalker Noise***) • Communication partner, seated 2 meters away from person with PD, repeated sentences back aloud • At end of visit, couple took home one device to trial for a week
Phase 2: 1-week Trials	• One-week trial periods with each device, each followed by a visit with the first author • At end of trial week, participant dyads completed questionnaires related to device impressions and communication • At final visit, participant dyads elected whether or not to continue using a device



Outcome measures

- **Partner speech intelligibility:** % words correctly repeated
- **Speech-to-noise ratio:** How loud was the individual relative to the background noise levels?
- **Final device decision:** Did they want to continue using a device at the end?

Devices

Device A:
Wired belt pack amplifier

Chattervox
- Headset microphone
- Amplifier worn around waist

Device B:
Stationary wireless amplifier

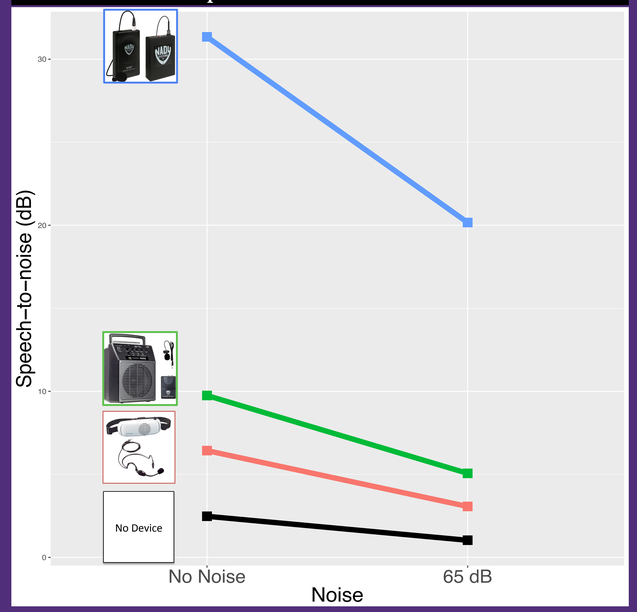
Nady WA120 BT
- Headset microphone
- Pocket-sized transmitter worn on belt/pocket
- Large stereo amplifier to be placed in one location

Device C:
Personal communication system

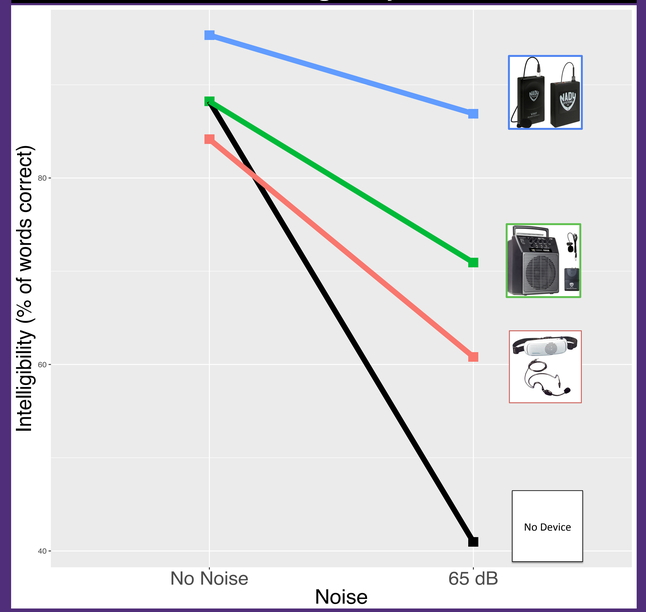
Nady 351VR
- Headset microphone
- Pocket-sized transmitter worn on belt/pocket
- Pocket-sized receiver connected to headphones worn by listener
- One-on-one communication

Results

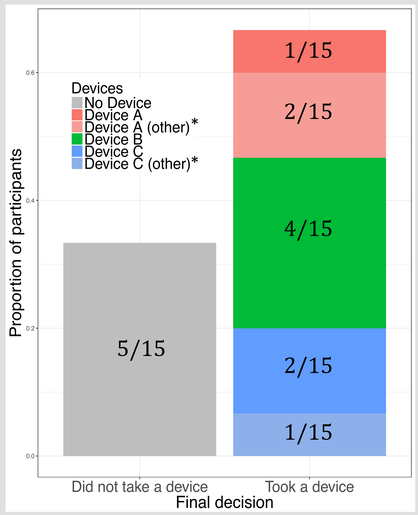
Speech-to-noise ratio



Intelligibility



Final decision



- Majority of participants (7/15) chose to continue using a device after the study was completed, however, there was considerable individual variability
- 6-month follow-ups are currently being completed.

* Some participants (3/15) chose slightly different devices than A, B, and C; of these, 2 were similar in function to Device A, and one was similar to Device C.

Discussion

- Clear device hierarchy for speech intelligibility and speech-to-noise ratio:

- Majority of individuals elected to continue using a device, *however…*
- Individual preferences did not necessarily align with hierarchy observed in laboratory speech tasks
- Discrepancy exists between device performance measures and final preferences
- Results indicate the promise of speech amplification and communication device use for hypophonia, but highlight a need to explore factors that influence preference and long-term use

For references, please take handout

References

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