Narrow Phonetic Transcription of Voicing Ambiguity in Stroke Survivors

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Purpose

The overall objective of this research is to understand voicing ambiguity in stroke survivors with aphasia and coexisting phonemic paraphasia (APP) or apraxia of speech (AOS). In the present study, the objective was to develop an effective method of training to improve reliability of narrow phonetic transcription of voicing ambiguity.

Background

APP and AOS

- APP is reported to impact “phonological-linguistic retrieval or assembly,” leading to more instances of substitutions. A substitution is reported when the phoneme produced by the speaker is entirely different from the intended phoneme.
- AOS is classified as a “phonetic-motor disorder of speech production,” leading to more instances of distortions. Distortions are sounds that are altered, but still with the boundaries of the target phoneme.

Cunningham and colleagues (2016)

- Researchers used narrow phonetic transcription and transcriber training that consisted of reviewing IPA symbols, establishing operational definitions of distortions, and practicing the coding of motor speech evaluations. Their coding system consisted of 35 diacritics, with two separate diacritics for voicing and devoicing. For voicing distortions, they observed an intraclass correlation of 0.63 for stop consonants and 0.57 for fricatives and affricates.

Voicing

- Many studies have reported distorted voicing control patterns in speech of stroke survivors with APP or AOS, which corresponds to how voicing distortions were the second most commonly noted distortion in Cunningham’s study.
- The use of a single diacritic for voicing ambiguity simplifies the coding system and the perceptual task of the transcriber. This corresponds to the idea that “the most efficient and reliable coding system is one that is closely matched to the capacity of auditory discriminations and auditory memory.”
- Focusing on voicing ambiguity enables the transcriber to subdue the tendency to categorize sounds as substitutions because language biases rather than hearing the distortions of the sound.
- The frequent occurrences of voicing ambiguity heard in everyday speech, such as the word-final stop in “gap” and word-medial stop in “zipper,” were discussed to emphasize that not all instances of voicing ambiguity are an example of distorted speech.

Method

- Four speech evaluations were transcribed independently and compared for agreement of voicing distortions.
- Point-to-point agreement was defined as the number of sound segments agreed upon as having a voicing ambiguity divided by the total number of segments (agreements + disagreements). We discussed coding discrepancies, re-listened jointly to any speech samples that we did not agree on, and either came to a consensus after listening to it twice, or settled on a disagreement and noted potential explanations and remediation strategies.

Results

- Stop consonant agreement was defined as substitutions based on language biases rather than hearing the distortions of the sound.
- The frequent occurrences of voicing ambiguity heard in everyday speech, such as the word-final stop in “gap” and word-medial stop in “zipper,” were discussed to emphasize that not all instances of voicing ambiguity are an example of distorted speech.

Conclusions

Our strong percent agreement suggests that the transcription training protocol was effective in identifying voicing ambiguity in stroke survivors with AOS or APP. The training and reliability estimation experiences indicate that targeted exercises and subjective input from transcribers may be used constructively to shape future training methods, so that researchers and clinicians accurately document salient sub-phonemic speech properties.

Acknowledgments

We would like to express our sincere gratitude to our co-author Dr. Haley. She provided us with a great research opportunity, allowing us to learn so much about narrow phonetic transcription and distortions with her continued guidance and support.

Suggested for Future Training

- Fricative production practice and fricative voicing continuum analysis to help improve agreement for sub-phonemic voicing variations in fricatives.
- Targeted training for the word-medial consonants.
- Ongoing reliability calculations to help transcribers acknowledge the differences in perception among individuals and to gain confidence in defending sounds they hear as ambiguously voiced.

References