UNIVERSITY of WASHINGTON

Undergraduate Research Symposium May 18, 2018 Mary Gates Hall

Online Proceedings

POSTER SESSION 1

Balcony, Easel 96

11:00 AM to 1:00 PM

Does Rating Task Affect Reliability of Auditory-Perceptual Ratings of Voice Quality?

Amanda Jean Opuszynski, Fifth Year, Speech & Hearing Sciences
Mentor: Tanya Eadie, Speech & Hearing Sciences
Mentor: Mara Kapsner-Smith, Speech and Hearing Sciences

Speech-language pathologists (SLPs) evaluate voice quality using perceptual judgments, an important method for assessing voice disorders. Ideally, perceptual judgments exhibit both intrarater reliability, in which one listener rates voices consistently, and interrater reliability, in which different listeners rate the same voices similarly. In practice, several sources of perceptual variability confound reliability, including the scaling method itself. SLPs typically use visual analog scales (VAS), in which a response is recorded along a continuous scale between two endpoints (e.g., normal to severely breathy). While other scaling methods may be more reliable than VAS, they present challenges for practical application. Visual sort and rate (VSR) is a promising scaling method, in which a listener rates voice samples using a VAS, and each voice sample serves as a perceptual reference point for other samples in the set. My study will determine 1) whether VSR yields greater intrarater and/or interrater reliability than traditional VAS in ratings of speakers with voice disorders by inexperienced listeners, and 2) whether this effect occurs for both overall severity (OS) and an isolated perceptual dimension (breathiness). I recruited five SLPs ("expert listeners") and 20 inexperienced listeners. I sorted fifty voice samples into six sets, with a variety of severity levels in each set based on ratings by the expert listeners. To measure intrarater reliability, I repeated 20% of the samples. I instructed the inexperienced listeners to rate the samples for OS and breathiness, using both VAS and VSR. I varied task order (VAS/VSR) and dimension order (OS/breathiness) to control for learning effects. I will analyze the inexperienced listeners' ratings to determine whether VAS or VSR yields greater intrarater and interrater reliability. I hypothesize that VSR will produce more reliable ratings of OS and breathiness. Results of my study may support clinical application of VSR for voice assessment.

POSTER SESSION 2

Commons West, Easel 21

1:00 PM to 2:30 PM

Using Linguistic Knowledge to Resolve Ambiguity in Speech Perception When Hearing is Degraded

Siuho Gong, Senior, Speech and Hearing Sci (Com Disorders)
Mentor: Matthew Winn, Speech & Hearing Sciences
Mentor: Steven Gianakas

Sometimes speech sounds (phonemes) can be ambiguous, and people have a tendency to interpret the ambiguous phoneme differently in different contexts so that they perceive a real word, as opposed to a non-word. This effect is called "lexical bias." For example, when there is ambiguity between whether /m/ or /n/ is heard, /m/ is more likely to be perceived if it is followed by "uch," because "much" is a word, but "nuch" is not (and vice versa if the context is "udge"). We hypothesized that for people who have hearing loss or use a cochlear implant, there will be additional ambiguity in hearing speech, and that the lexical bias effect would be stronger. We simulated degraded hearing using vocoded speech played to listeners with normal hearing. Participants heard speech continua that gradually morphed from /m/ to /n/ in the "uch" and "udge" contexts, and either had a clear spectral quality or a degraded spectral quality. Results suggest that the lexical bias is stronger when the speech signal quality is less clear, which is consistent with the hypothesis because of the increased phonemic ambiguity in these conditions. By understanding how signal degradation impacts the perception of phonemes, audiological tests for speech reception can be improved to separately acknowledge the effects of hearing from the adjustments that the listener makes to maintain lexical biases in speech perception.

POSTER SESSION 2

Commons West, Easel 20

1:00 PM to 2:30 PM

Investigating the Presence of Sensory Modulation in Children

Samantha Elsbeth (Sam) Krahling, Senior, Bioengineering
Elizabeth Rylance, Junior, Pre-Major (Arts & Sciences)
UW Honors Program
Mentor: Ludo Max, Speech & Hearing Sciences

Stuttering is a speech disorder that prevents people from communicating effectively. Stuttering is characterized by disfluencies that disrupt normal speech such as repetitions or prolongations of sounds or syllables. While approximately seventy million people suffer from stuttering worldwide, the cause of stuttering remains unknown. However, researchers have found a neurological difference between people who stutter when compared to people who do not stutter. Our lab has recently discovered that people who stutter do not exhibit a phenomenon called pre-speech auditory modulation. This phenomenon, observed in typical speakers, refers to the differential response of the auditory cortex to probe tones that are presented immediately before speaking as compared with the control condition of probe tones presented with no speaking. We hypothesize that pre-speech auditory modulation reflects adjustments in auditory processing in preparation for monitoring auditory feedback during speech production. Disruptions in this feedback monitoring process may play a role in causing the speech disfluencies observed in the speech of people who stutter. To test this hypothesis, we are investigating the presence or absence of pre-speech auditory modulation in children. Children will perform speech tasks while probe tones are administered through earphones. Non-speech control tasks will also be performed for comparison. The response of the auditory cortex to these sounds during the two test conditions will be recorded using electroencephalography (EEG). A difference in response would indicate pre-speech auditory modulation is occurring. During early speech development, children rely on auditory feedback more than adults whose speech motor system is fully developed. Hence, if pre-speech auditory modulation reflects preparation for monitoring auditory feedback during speech production, then the phenomenon should also be observable in the speech of young children. Results will advance our understanding of typical speech development and provide control data for future studies involving stuttering children.