Forced Choice (6AFC) Emotion Classification Task. An attempt was made to control for the confounding effect of talker gender, which could have operated as follows: If vocal expressions of only one talker were heard, then a higher mean pitch of an utterance might have cued anger and amusement, while a lower mean pitch might have cued sadness and relief.

Design: Emotion classification performance of 32 normal hearing (NH) and 30 hearing impaired (HI) listeners was test under quiet conditions. To avoid response biases based upon the gender of the talker producing the target utterances, a male and female version of each of 20 vocal expressions of emotion were manipulated via analysis/synthesis via LPC (Linear Predictive Coding) to produce 20 new utterances heard as if produced by talkers of the opposite gender. Thus, 20 pairs of utterances with matched prosodic pitch contours and modulation spectral features could be presented with varying talker gender. To be clear, the female-talker versions were given higher mean fundamental frequency and were spectrally modified to exhibit formant variation characteristic of a shorter vocal-tract length. Data analysis also was completed to test the experimental hypotheses that were posed relating to the prediction of emotional classification performance using conventional prosodic features (using additional acoustic variables such as those based upon modulation spectral features).

Results: Classification Sensitivity was measured via d' score on 6-Alternative Forced Choice (6AFC) task that provided a sensitive test of emotion classification abilities. The classification performance of 32 normal hearing (NH) and 30 hearing impaired (HI) listeners in quiet conditions: $t (df = 60) = 5.86$ ($p < .01$). Furthermore, the differences in classification performance between groups could be predicted by the listeners' average hearing level across two low frequencies (250 & 500 Hz). A second predictor that accounted for a substantial amount of the variance in classification performance was the self-rated difficulty that listeners had understanding vocal expressions of emotion (revealed by their responses on the EMO-CHeQ questionnaire).

Conclusions: Classification sensitivity that was measured via d' score on 6-Alternative Forced Choice (6AFC) task provided a sensitive test of the effects of hearing loss on emotion classification abilities. The results demonstrated the effectiveness of counterbalancing talker gender for the classification task, which avoided the influence of this possible confound.

PODIUM SESSION VI: HEARING MEASURES & ELECTROPHYSIOLOGY

Rapid Clicks for Comprehensive Auditory Peripheral Health Estimation

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Objectives: Congenital hearing loss is detected through universal newborn hearing screening (UNHS) programs. Although this is a successful program overall, a few problems persist. (1) UNHS programs largely only exist in developed nations as it is costly, and (2) even in successful UNHS programs the cause

for failing the test cannot be deduced, leading to slower triage. We have developed a click-evoked otoacoustic emissions (OAEs) and auditory brainstem reflexes-based screening tool that has the potential to outperform the current standard of care (e.g., auditory brainstem response) as it is cheaper, less invasive, and more informative. Our goal in this study is to (1) acquire proof-of-concept data to determine whether our test can identify the three most common types of hearing deficits in children, i.e., conductive, cochlear, and neural, and (2) expedite the test, i.e., reduce test time from 8 mins to less than 2 mins, using rapid presentation of clicks and deconvolving overlapping responses using a multi-response deconvolution approach.

Design: Two groups of participants - children (5-17 years) and normal-hearing adults (18-30 years) - are being tested in the study to address our two goals. Data collection is ongoing in the children group with a prospective recruitment of 60 participants with 15 each representing conductive, cochlear, and neural deficits with normal hearing children as controls expected. Twenty-five adults have completed the study. For both groups, we parametrically varied click level (70, 80, 90 dB ppSPL) and rate (64, 128, 204, 256 Hz) to identify an optimal rate-level combination that provided the best estimate of the OAEs and the brainstem reflexes. Due to time restrictions, only a subset of the level and rate were included in the children group. Accurate estimation of the brainstem reflexes relies on estimating the change in OAEs over a 1s period.

Results: Results from adult participants show that it is feasible to obtain OAEs at rates up to 256 clicks/sec and levels up to 90 dB ppSPL using deconvolution. A linear mixed-effects model revealed significant main effects and interaction of level and rate: OAEs increasing with level and decreasing with rate. Importantly, deconvolved OAEs presented residual noise derived from an inefficient characterization of the large-magnitude stimulus (~50 dB larger than the OAE). Consequently, the brainstem reflex could only be observed at the group level, as individual effects were contaminated by residual noise.

Conclusions: Our results provide the first successful application of multi-response deconvolution in the estimation of OAEs and brainstem reflexes at high rates and levels. With further refinement of the deconvolution algorithm, we expect to be able to estimate brainstem reflexes at the individual level. Combining data from adults and children, we will present proof-of-concept data for a click-based peripheral screening test capable of detecting different hearing deficits rapidly.

Cochlear Tuning Estimates Following Resolved Otitis Media in Children

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Objectives: Otitis media (OM) is the second most common illness in children that visit the doctor's office. Several studies in human and animal models suggest that conductive hearing loss due to OM is associated with poorer signal detection in noise even after the OM resolves. In humans, hearing-in-noise deficits associated with resolved OM are often attributed to upstream deficits in central auditory processes; in contrast, it is assumed that peripheral frequency tuning remains intact. Sharp frequency tuning is a critical component of speech recognition in both quiet and competing background noise. However, recent studies in animal models have shown that round window transmission of OM-generated bacterial endotoxins to the cochlea may result in subclinical cochlear damage. Thus, it is possible that cochlear tuning may be affected by OM and that cochlear tuning deficits could contribute to increased