Improving the Reliability and Accuracy of Categorical Loudness Scaling

Although abnormal loudness perception drives dissatisfaction with hearing aids, loudness measurements are not performed during hearing-aid fitting, partly due to concerns regarding reliability and test time. Categorical loudness scaling (CLS) may provide useful information; however, current methods for analyzing CLS data consider inter-subject variability as measurement noise, which leads to less reliable results. We have developed a probability model of CLS perception that uses a multi-category psychometric function (MCPF) to model the statistics of a listener’s response. Here, we (1) extend the MCPF approach by using Bayesian inference to select stimulus parameters that are predicted to yield maximum expected information (MEI) during data collection, and (2) assess the test-retest reliability and accuracy of an adaptive procedure for MCPF-MEI, which utilizes a limited number of trials. Reliability was assessed relative to the International Standards Organization (ISO) adaptive procedure. The fixed-level CLS procedure, which utilizes numerous trials, served as the estimate of the “true” CLS function for accuracy assessment. Based on data from 45 participants, reliability and accuracy of the MCPF-MEI test were similar to that of the ISO test. Improving the reliability and accuracy of CLS will enhance the clinical acceptability of loudness measurements. [Work supported by NIH-NIGMS]

Daniel M. Rasetshwane, Sara E. Fultz, Tessa Culbertson, Judy G. Kopun, and Stephen T. Neely

*Boys Town National Research Hospital, Center for Hearing Research, 555 N 30th St, Omaha, Nebraska 68131*