T39a: SUBJECTIVE EVALUATION WITH UT-DALLAS RESEARCH INTERFACE FOR COCHLEAR IMPLANT USERS

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Improvements in sound processing technology have played a critical role in the advancement of cochlear implant (CI) devices. Research tools/interfaces commonly provided by implant manufacturers generally have limited computation power to support sophisticated signal processing strategies in real-time and are not suitable for conducting a broad range of experiments. Portability, wearability, and ease of programmability limits existing research interfaces to benchtop/laboratory use. The CCi-MOBILE platform, developed by our center at UT-Dallas, aims to address these shortcomings by providing the research community with an open-source, software-flexible, and a highly flexible re-configurable research interface suitable for acute and take-home chronic studies with CI devices manufactured by Cochlear Corporation.

In order to assess the efficacy of the research interface, subjective evaluations were carried out with CI users. The aim of the study was to evaluate speech recognition performance of CI users with the CCi-MOBILE research interface and compare performance with their clinical processor. Ten post-lingually deafened adult CI users participated in this study. The assessment of speech recognition was accomplished with AzBio and IEEE sentences presented in quiet, 10dB, and 5dB signal-to-noise ratios as well as with CNC words/phonemes. Study participants were tested in free-field, both with their clinical processor and the research platform. Both devices were programmed with standard ACE sound coding strategy. On all measures of test material, our custom-built mobile research interface produced equivalent performance levels (μ=54.348±6.163) to each individual's clinical processors (μ=52.276±6.318). Repeated Measures Analysis of Variance (ANOVA) revealed no statistically significant difference between the two processor types. The results from this study indicate that performance levels with the research platform are comparable to the clinical processor, and therefore able to accurately duplicate the user's existing clinical configuration. This result suggests great potential for conducting reliable speech assessments in future studies with the CCi-MOBILE research platform.

The CCi-MOBILE research platform is intended as an open-source contribution to the cochlear implant field and will be freely distributed to the research community. This one-of-a-kind research platform is orders of magnitude more flexible and computationally powerful than existing clinical processors/research interfaces with corresponding software suite and development support. It can be used for conducting scientific studies not only in laboratory settings but also in real world environments for extended periods of time. This is likely to facilitate true chronic assessment of novel sound processing strategies and help researchers to realize their scientific ideas that are not presently possible. The platform holds potential for rapid and easier transition of academic research to commercial assimilation.

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