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Mobile Research Interface For Cochlear Implants

Author Block: Hussnain Ali, Ph.D., Feng Hong, Ph.D., Jun Wang, M.S., John H. L. Hansen, Ph.D.;
Electrical Engineering, The Univ. of Texas at Dallas, Richardson, TX.

Abstract:
Introduction: Improvements in sound processing technology have played a critical role in the advancement of cochlear implant (CI) technology. Since the inception of CIs, investigators have relied on research tools and interfaces to conduct perceptual studies with CIs. Research interfaces commonly provided by implant manufacturers either have limited functionalities or are not suitable for conducting a broad range of experiments. Portability, wearability, and ease of programmability limits existing research interfaces to benchtop/laboratory use only. Real-world subject testing is needed to better realize system advancements. The CRSS-CIL Costakis Cochlear Implant (CCI) research interface addresses these short-comings and provides researchers with a portable, wearable research device that can be used in field trials for long-term use. The research interface, currently compatible with devices from Cochlear Ltd., may be connected with a personal computer (PC) via USB for conducting benchtop studies or with a smartphone wirelessly for field trials in real-time. It can provide both electric and acoustic stimulation and can support synchronized bilateral stimulation.
Methods: Eight post-lingually deafened adult CI users participated in this study. The assessment of speech recognition was accomplished with the adult minimum speech test battery (MSTB) for adult cochlear implant recipients. Study participants were tested both in free-field and direct-connect modes with their clinical processor and the CCI research interface. Both devices were programmed with Advanced Combination Encoder (ACE) sound coding strategy.
Results: On all measures of test material, the CCI research interface produced equivalent performance levels to the clinical processor. Statistical analysis of the data revealed no significant difference between the two device types.
Conclusion: The CRSS-CIL CCI research interface may be used as a benchtop or free-field research tool for conducting acute and chronic experiments with implant users. Flexibility in programming and conducting a broad range of experiments makes it a useful tool for investigators interesting in exploring different research ideas in naturalistic settings.
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Author Disclosure Information:

H. Ali: None. **F. Hong:** None. **J. Wang:** None. **J.H.L. Hansen:** None.
Classifications (Complete): 05c-Cochlear Implant Hardware ; 05g-Sound Coding ; 08a - Miscellaneous
Keyword (Complete): Research interface ; research platform
Presentation Preference (Complete): Podium, will accept Poster
Disclosures (Complete):
: True
: True

Off-Label Use (Complete):
I anticipate discussing the unlabeled uses of a commercial product in this educational activity.: No
Does this research involve human or animal subjects?: Yes
If yes, Has this research been approved by the Institutional Review Board (IRB) and/or Institutional Animal Care and Use Committee (IACUC)?: Yes

Learning Objectives (Complete):
Objective 1*:
: evaluate speech recognition performance of CI users with the mobile research interface and provide a comparison with the clinical processors.
Key Words for Objective 1*:
: research interface

Status: Complete

ACI Alliance
P.O. Box 103
McLean, VA 22101

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