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Feasibility of Psychoacoustic Testing on Hearing-Impaired Individuals with a Portable Device

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Feasibility of Psychoacoustic Testing on Hearing-Impaired Individuals with a Portable Device

Presenter: S. Adelaide Bock | Advisor: Dr. Anna Diedesch

**Introduction**

- Portable Automated Rapid Testing (PART) was developed at the University of California, Riverside Brain Game Center.
- PART expands on a traditional hearing test by measuring individuals' auditory processing abilities.
- PART also features an untraditional method of testing by conducting the testing on a portable device.
- Lelo de Larrea-Mancera and colleagues (2020) established PART normative data from 150 undergraduate students at the University of California Riverside (Data was collected before 2020).
- This study aims to evaluate PART’s feasibility in the mild-to-moderate hearing-impaired population.

**Methodology**

- **Participants**
  - Normal hearing (NH) subjects (n = 9, mean age = 21, SD = 2.5)
  - Hearing impaired (HI) subjects (n = 8, mean age = 65, SD= 12.5)
  - Eligibility: MoCA score 26 or higher (out of 30)
- **Equipment**
  - PART calibration at National Center for Rehabilitative Audiological Research (NCRAR) in Portland, OR.
  - iPad and Sennheiser 280 Pro headphones calibration: Bruel & Kjaer Head and Torso Simulator
  - Tympanometry testing: Grason-Stadler (GSI) tympanometer.
- **Procedure**
  - Psychoacoustic tests measured:
  - Test stimuli presentation: an adaptive Two down/one-up procedure.
  - “1/2 interval 2 alternative forced choice” (12AFC) method was used for subject’s target selection.

**Results**

<table>
<thead>
<tr>
<th>Subject</th>
<th>2 kHz Notch Noise</th>
<th>Dichotic FM</th>
<th>Gap</th>
<th>Dichotic FM</th>
<th>Spatial Release</th>
<th>Spectral Temporal Modulations</th>
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</thead>
<tbody>
<tr>
<td>NH Left Ear Audiometric Thresholds</td>
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<tr>
<td>Mask 400</td>
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**Discussion/Future Directions**

- PART has great potential for contributing to the field of clinical audiology practice by providing a fast, easy, and affordable addition to the current test battery.
- Significant differences found across groups can be valuable for future research.
- Significant differences were found in 2 kHz Notch Noise (Mask400) testing t(6)=2.73, (p=0.034 < 0.05). Dichotic FM testing t(8)=3.70, (p=0.006 < 0.05), and Co-located SRM testing t(15)=2.87, (p=0.012 < 0.05).
- These findings suggest that it is feasible to evaluate psychoacoustic tests using PART on a population with mild-to-moderate Hearing Loss.
- The implications of the app itself may further contribute to future research in hearing aids fitting where spectral and temporal processing ability is not currently considered.
- Due to the COVID-19 pandemic, some participants were not able to complete PART testing. Therefore, our findings are recommended to be re-tested for confirmation of the results in larger scale studies.

**Acknowledgements**

I am indebted to Western Washington University Research Department for supporting myonor’s capstone project by funding this research study. I am grateful for Dr. Diedesch’s initial consent of me writing a summary of this research project that was led by her and her colleagues. Especially, her long-term guidance and encouragement were indispensable to the completion of this paper. I want to thank Destine Halverson and Makayla Dordan for giving me a lot of helpful feedback on the paper’s editing and revision. I also thank Grace Young and Jess Mendiola who volunteered to collect participants’ data at the research lab. Lastly but most importantly, I want to thank all the research participants (some were my friends) for contributing their valuable time to the data collection. Their support was crucial in keeping the research running.

**References**

Picsures were retrieved from: https://braingamecenter.ucr.edu/games/p-a-a-c/.


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