Introduction

Individuals with hearing loss commonly suffer compromised speech perception, particularly in noisy group environments (Harkins & Tucker, 2007), leading to significant problems in verbal communication. Auditory training programs for adults harness the plasticity of the neural system to enhance this function in response to training. In this study, we focused on ReadMyQuips (RMQ): http://www.seasenynergy.com/readmyquips/, a representative example of a structured auditory training program. RMQ implements an adaptive procedure to tailor the pace of auditory–visual speech perception training in noise to individual performance levels. A cognitive skill targeted by auditory training in noise is that of selective attention, the ability of listeners to focus on task-relevant sounds (targets) while suppressing task-irrelevant sounds (distractors). In the context of speech perception, targets are normally the words emitted by an identified speaker or a person spoken or unspoken, that interfere with speech detection and comprehension. Selective attention is known to modify cortical function (Fritz et al., 2007) and electrophysiological techniques are well suited to the non-invasive investigation of these changes (Luck, 2014). Here we present the effects of amplification and auditory training using RMQ on auditory selective attention. Electrophysiological and behavioral outcomes data are discussed.

Materials and Methods

Participants
- Male to moderate hearing loss
- First time users of hearing aids (i.e., had not used hearing aids in the 12 months prior to beginning the experiment)
- Two groups: (1) experimental and (2) control
- Age range of participants: Experimental group: 60-85 years, control group: 49-85 years
- Gender: 5 males and 5 females in both groups
- Participants in the experimental group completed RMQ training
- Participants in the control group listened to audiobooks

EEG stimuli
- Standards (best ear or right ear): 1000 Hz
- Deviants (best ear or right ear): customized for each participant to achieve a d′ of 2.5 (Ranged in frequency from 1008 Hz to 1036 Hz)
- Distractors (opposite ear): 1400 Hz
- All stimuli presented at approximately 60 dB SL re: threshold at 1000 Hz.

Schematic of timeline of ERP experiment

Discussion and Conclusions

Results

Effects of amplification (N = 20)

- Figure 1: Grand average waveforms of deviant (P3b) and distractor (P3a) from Session 1 to Session 2
- Deviant-minus-standard difference waves (P3b) and distractor-minus-standard difference waves (P3a)

- Figure 2: d′ and criterion for Sessions 1 & 2
- Figure 3: Correlation P3b–d′ change from Session 1 to Session 2

Effects of auditory training

- Figure 4: Grand average waveforms of P3b for experimental (N = 10) and control groups (N = 10)

AUDITORY EVENT-RELATED POTENTIAL OUTCOMES WITH READMYQUIPS AUDITORY TRAINING PROGRAM

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References