



Influence of hearing-aid experience on behavioral and electrophysiological measures of speech detection, discrimination, and comprehension



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INTRODUCTION

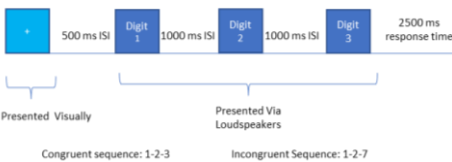
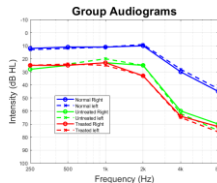
It is well known that sensory deprivation and stimulation can induce clear changes in brain structure and function ((Rauschecker, 2006)). Literature findings regarding the effects of sensorineural hearing loss and hearing-aid treatment on cortical speech processing are mixed, however (e.g., Glick & Sharma, 2017; Lavie et al., 2021; McClannahan et al., 2019).

AIM

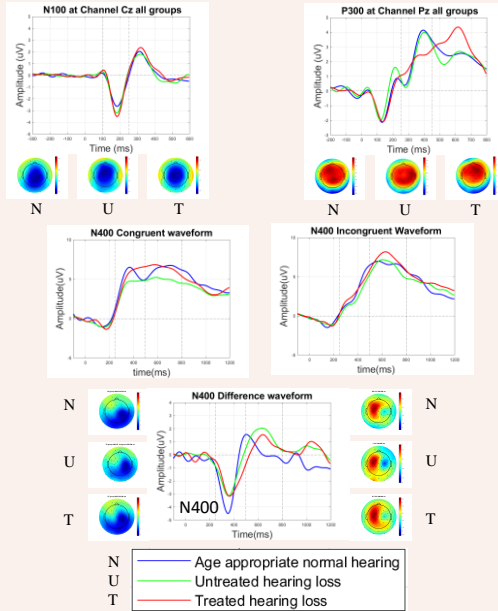
To investigate the effects of auditory deprivation and stimulation on detection, discrimination, and semantic processing of speech sounds in individuals with sensorineural hearing loss (SNHL) using behavioral and electrophysiological measures

MATERIALS & METHODS

- Participants: Native Danish speakers aged 55-75
- Cross-sectional study design ($N = 3 \times 15$)
 - Group 1: Age-appropriate normal hearing
 - Group 2: Untreated mild-to-moderate SNHL
 - Group 3: Treated mild-to-moderate SNHL
- Test protocol
 - Pure-tone audiometry
 - Real-ear measurements with new test hearing aids fitted to NAL-NL2 gain targets
 - Aided speech audiometry
 - Aided multi-channel electroencephalography (EEG): N100, P300 and N400 responses
- Aided speech audiometry and EEG measurements performed with Dantale-I-digit materials (Elberling et al., 1989) in 67-dB-SPL speech-shaped noise
- N100 and P300 evoked with an active oddball paradigm (standard: \null, deviant: \fem)
- N400 evoked with congruent and incongruent digit triplets



RESULTS



Statistical analyses

- No group differences in terms of mean amplitude or latency values for the N100, P300 and N400 responses (all $p > 0.05$)
- For the condition-specific (congruent and incongruent) EEG responses from the N400 paradigm, effect of condition on amplitude ($F = 5.9, p < 0.03$) and latency ($F = 9.2, p < 0.009$), with larger mean amplitudes and latencies for the incongruent compared to the congruent condition

CONCLUSION

When good speech audibility is ensured, cortical responses reflecting detection, discrimination, and semantic processing appear 'intact' in individuals with untreated and treated SNHL

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