

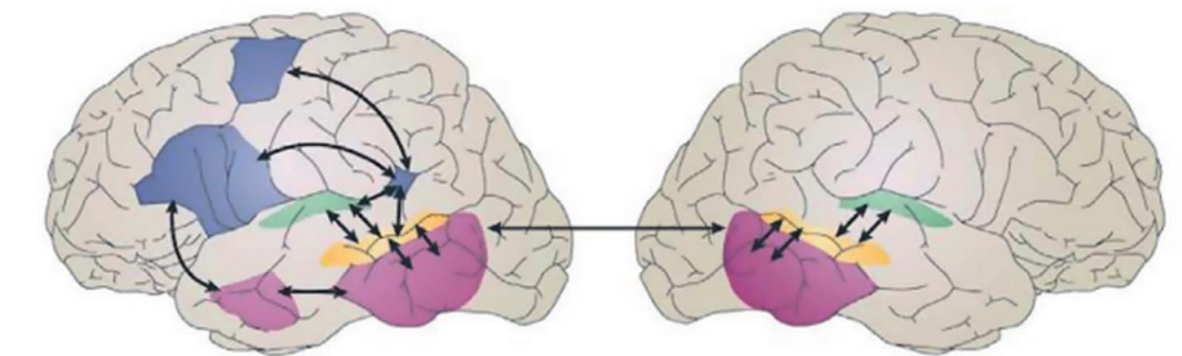
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INTRODUCTION

Poorer speech performance in age-related hearing loss has been associated to abnormal neural representations of speech processing in the brain. However, is not well understood if it contributes to adaptive plasticity of cortical regions and how it interacts with functional responses of high-order centers associated with cognitive function.



Can untreated ARHL trigger maladaptive plasticity, which consequently affects speech processing?

METHODS

All participants completed a hearing assessment with pure tone average ≥ 25 dB defining hearing loss. Auditory oddball responses to a consonant-vowel stimuli, comprising /ba/ as standard and /ga/ as deviant stimulus, was administered while EEG was recorded. Grand average event-related potentials (ERPs) waveforms for the normal hearing (NH) and hearing loss (HL) groups were achieved.

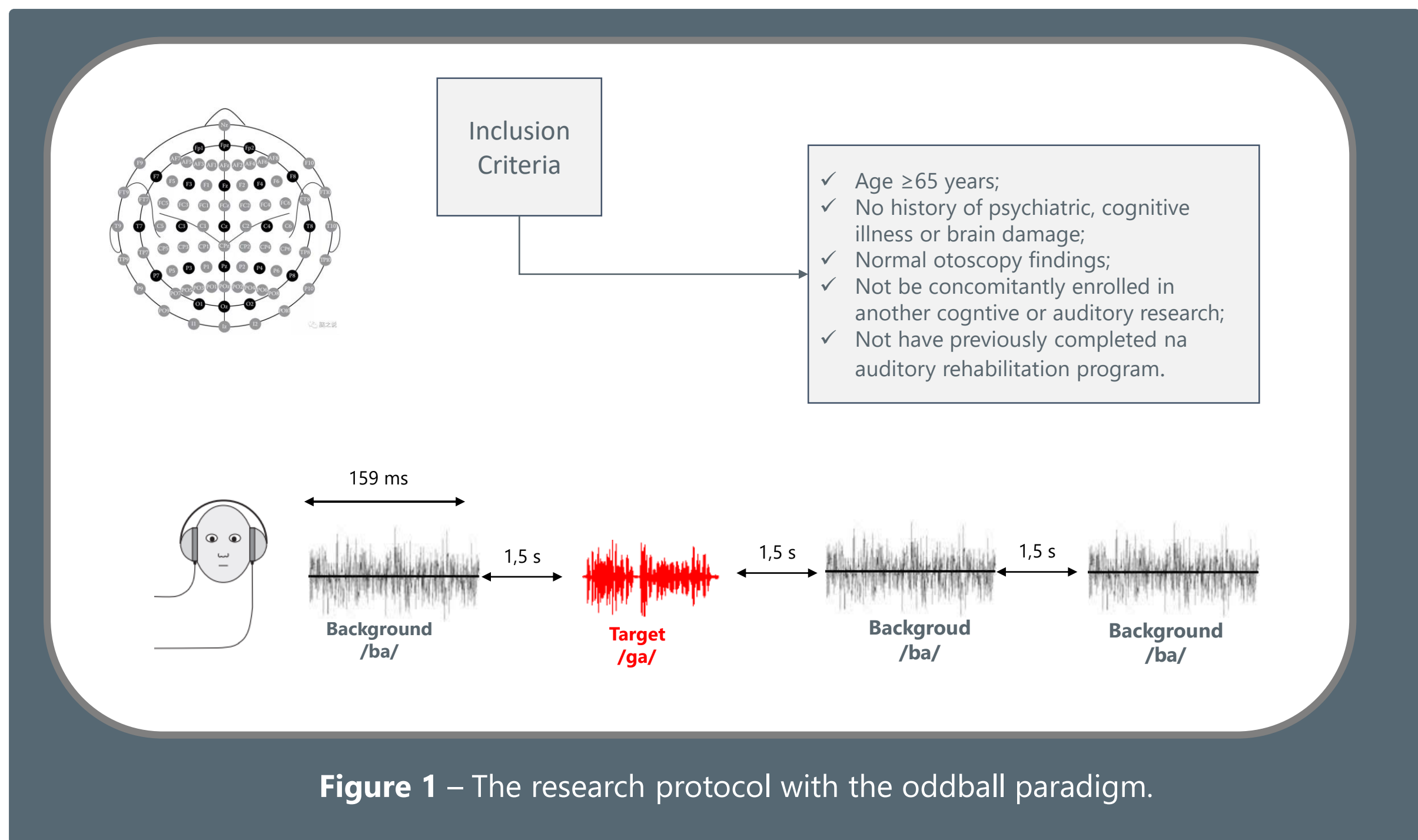


Figure 1 – The research protocol with the oddball paradigm.

NH group (N=14, mean age = 72.50 years, SD = 5.98)
 HL group (N=17, mean age = 75.00 years, SD = 6.96)

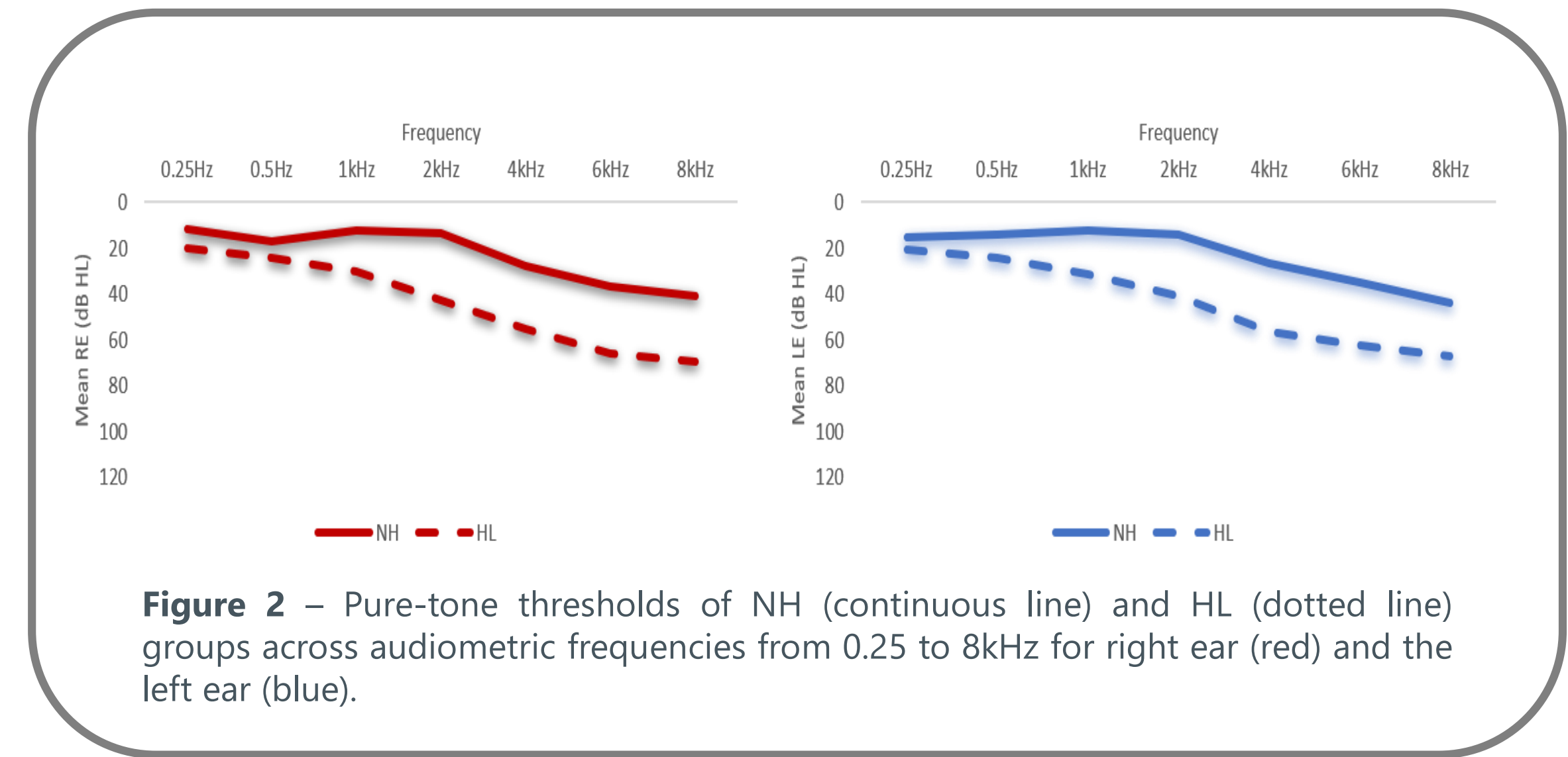
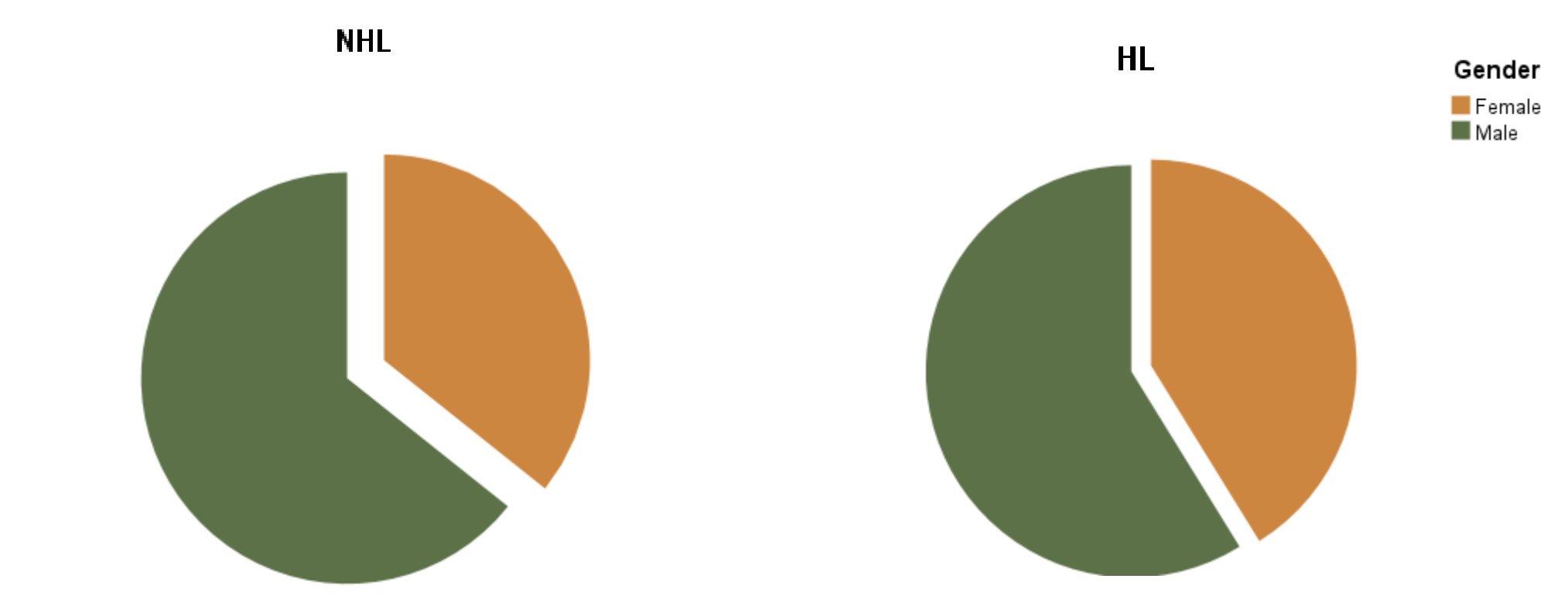


Figure 2 – Pure-tone thresholds of NH (continuous line) and HL (dotted line) groups across audiometric frequencies from 0.25 to 8kHz for right ear (red) and the left ear (blue).

CONCLUSIONS

- 🧠 Findings of a positive **P2'** component in ARHL suggest that an **additional mechanism may operate to decode the degraded auditory signal**.
- 🧠 An atypical cortical plasticity in cognitive-related auditory tasks were observed by **decreased responsiveness of P3** component.
- 🧠 Absence or diminished amplitude of P3 in hearing impaired older adults suggests a **disruption in neural detection of speech** due to impairment of auditory sensory-memory traces for acoustic features of speech.

RESULTS

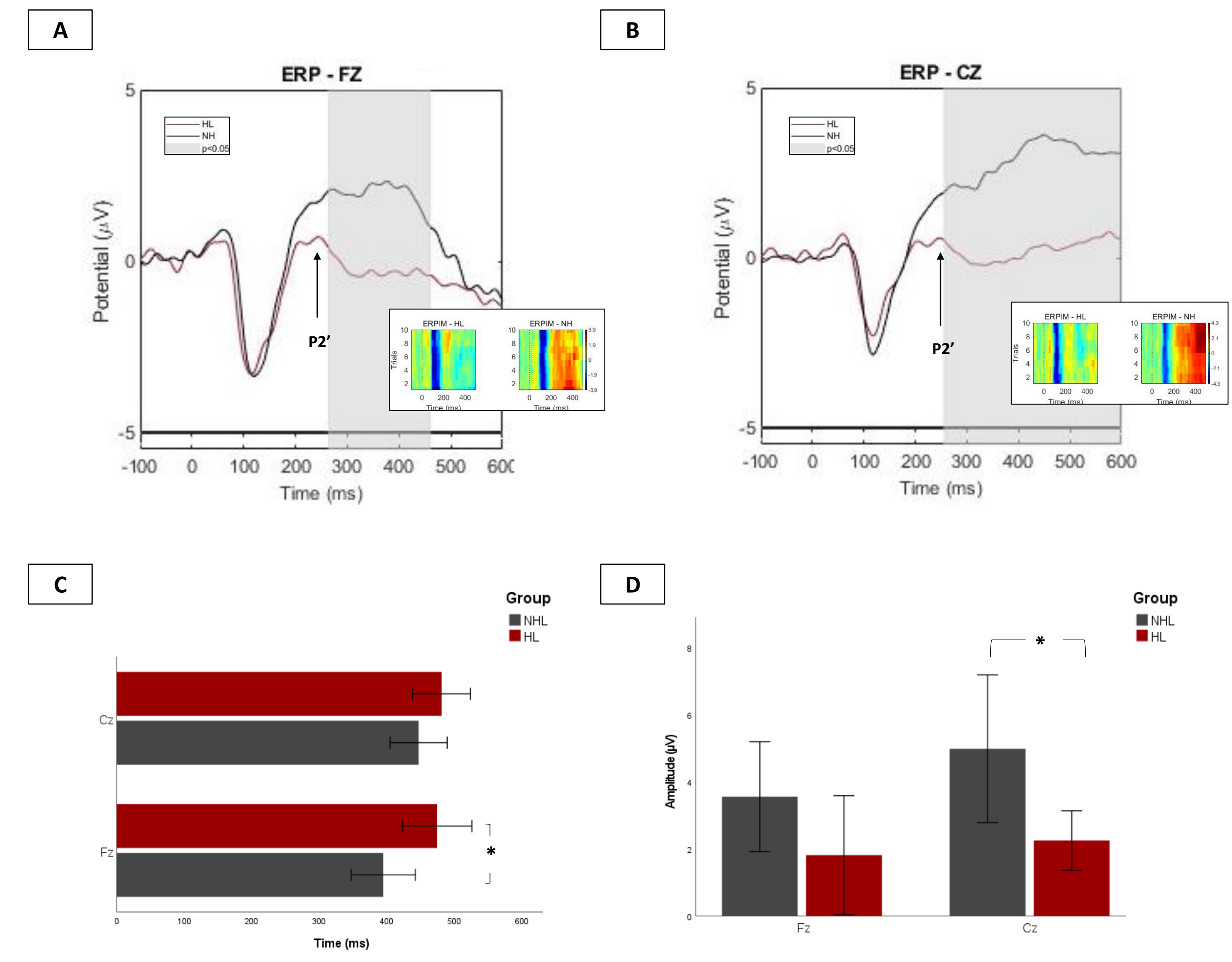


Figure 3 – (A) and (B) Grand averaged ERPs and ERPing for individuals with NH (black) and with HL (red) shown in Fz and Cz. A positive component (P2') following P2 was observed exclusively in HL group. P3 component responses were present in all participants in the NH group, while they were recorded in only 58.82% of HL older adults. Gray colored regions indicate the timeframe at which the waveforms between the groups differed significantly ($p < 0.05$). (C) Results of unpaired t-test with Bonferroni-corrected post hoc analysis between P3 latency of individuals who presented a peak within the timeframe (270-550 ms) in NH (N=12) and HL groups (N=9) at Fz and Cz. Error Bars: $\pm 2SE$. (D) Results of unpaired t-test with Bonferroni-corrected post hoc analysis between P3 amplitude of individuals who presented a peak within the timeframe (270-550 ms) in NH (N=12) and HL groups (N=9) at Fz and Cz. Error Bars: $\pm 2SE$.