Cochlear implantation for single-sided deafness improves speech perception in both CI and non-CI ears: A longitudinal EEG study

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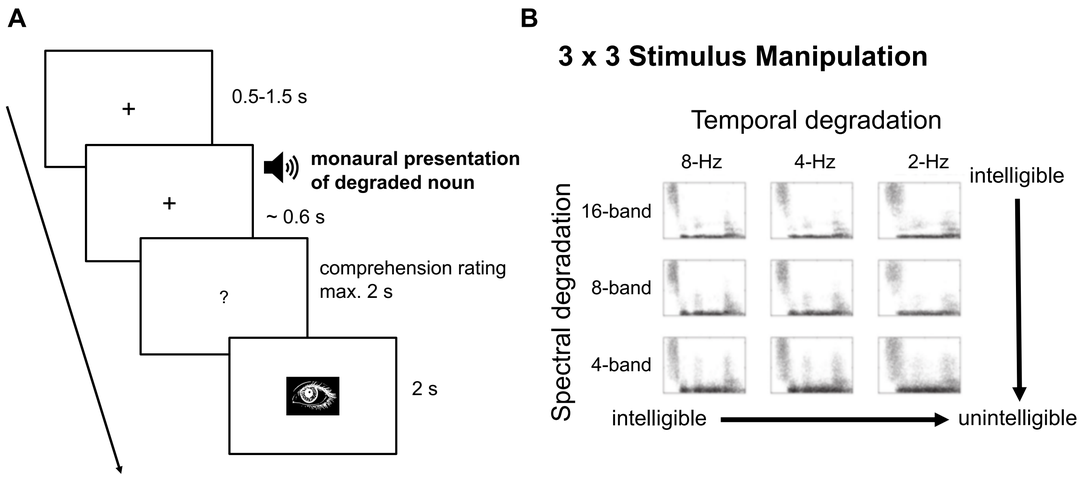
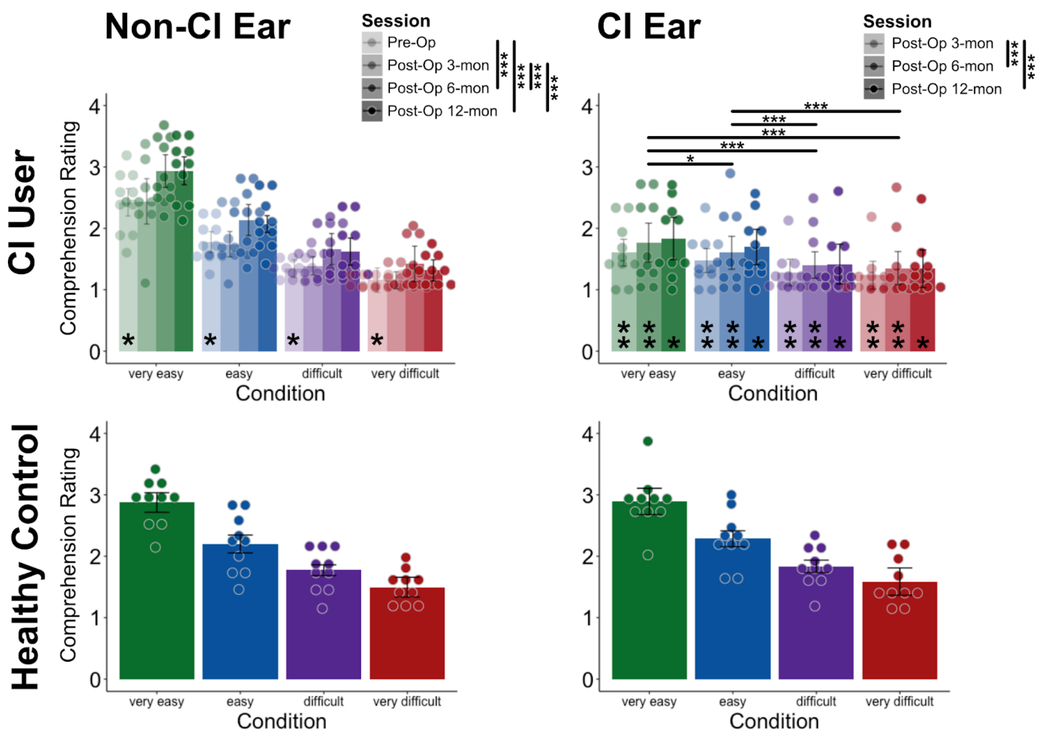
Introduction

- Studies have shown that individuals with a cochlear implant (CI) for treating single-sided deafness have experienced improved speech perception in noise.
- However, it is unclear how single-sided CI users' speech perception improves and how neural speech representation of speech intelligibility changes over time.
- Here, we applied representation similarity analysis (RSA) to depict how neural representation of degraded nouns changes over time.

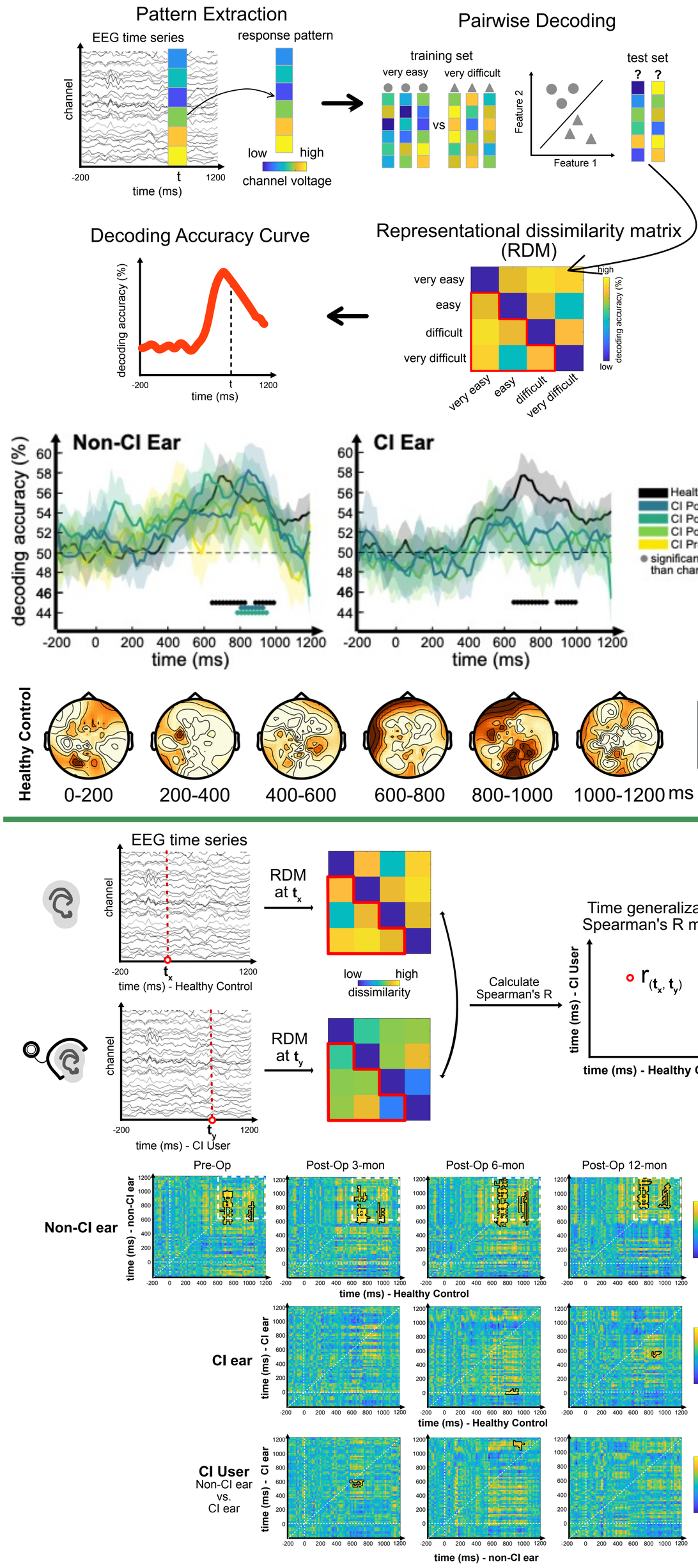
Methods



- Participant
  - 10 single-sided cochlear implant users (5 right-sided + 5 left-sided)
    - 4 female, mean age 46.9 (27-63)
  - 10 age-and-sex matched controls
    - 4 female, mean age 48.2 (29-61)
- Stimuli
  - 216 standard German nouns presented monaurally to each ear
    - 3 levels of temporal smoothing x 3 levels of spectral degradation
- EEG measurement
  - 128 channel EEG (ANT-Neuro system)
  - 1 session for healthy controls
  - 4 sessions for CI users
    - Pre-op (only healthy ear) & 3 Post-op (3, 6 & 12 months)

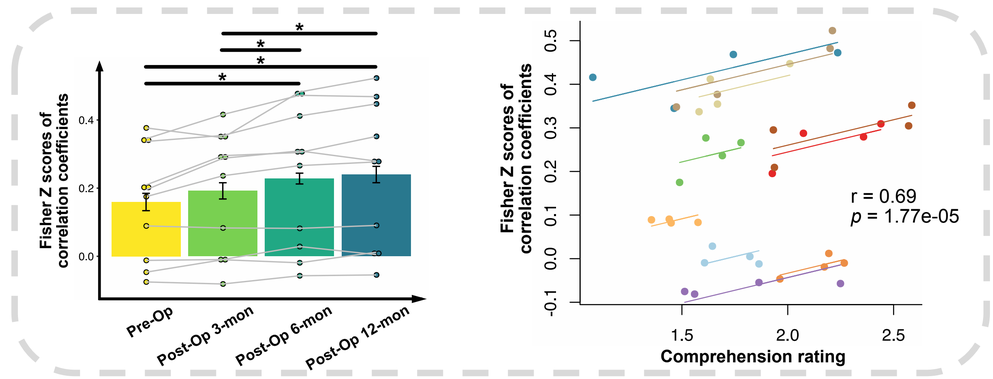


Results



Conclusion

- The present study shows that auditory cortical speech processing after CI implantation gradually normalizes towards generally normal functioning within months.
- The CI benefits not only the CI ear but also the non-CI ear.
- These novel findings highlight the feasibility of tracking neural recovery after auditory input restoration by advanced multivariate analysis methods like RSA.



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