Niyazi Arslan, Amanda Vecellio & Xin Luo
Auditory Implant Lab
College of Health Solutions
Arizona State University

Hearing History may Influence the Music-Remixing Benefit in Electrical Hearing

Introduction

Music appreciation through electrical hearing in **postlingually deaf** cochlear implant (CI) users often faces limitations, given their prior acoustic-hearing experience. Research has shown that this group benefits from music remixing techniques, such as amplifying vocals, drums, and beats, while attenuating spectrally complex instruments to enhance enjoyment (e.g., Buyens et al., 2014; Pons et al., 2016). However, the optimal adjustment levels in musical sources vary among individuals and studies.

In contrast, **prelingually deaf** individuals who received implants early in life have developed their musical neural networks entirely through electrical hearing. This unique development may enhance their music appreciation. Yet, the effectiveness of music remixing techniques for this group remains an open question, highlighting a gap in our understanding of how hearing history may affect the appreciation of remixed songs. Additionally, familiarity with the songs and the perceived pleasantness of the vocals may impact the effectiveness of music remixing techniques.

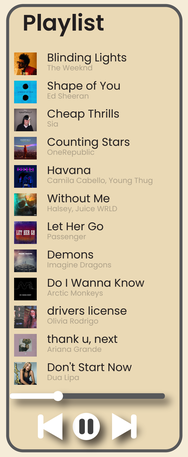
Aims and Hypotheses

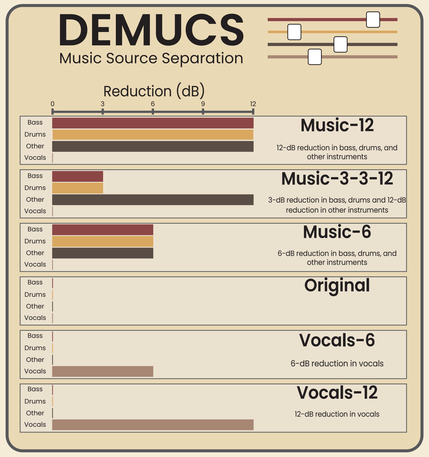
This study examined the impact of music remixing techniques on music appreciation in two groups: prelingually deaf, early implanted and postlingually deaf, late implanted CI users.

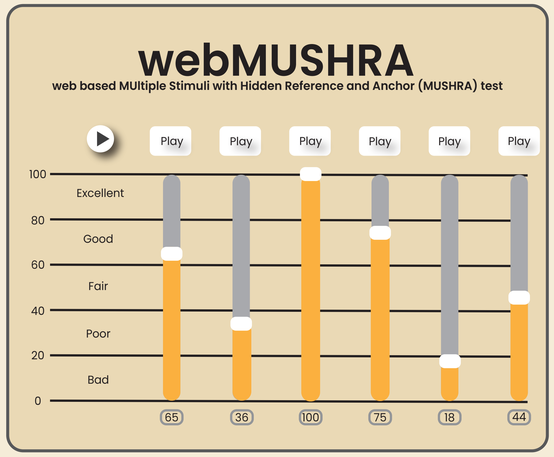
- **Postlingual group** might prefer attenuating background music to simplify songs, whereas **prelingual group** may favor less modification to the songs.
- Higher familiarity with the songs may lead to greater appreciation of the original version.
- Lower vocal pleasantness may result in lower appreciation of the music attenuated versions.

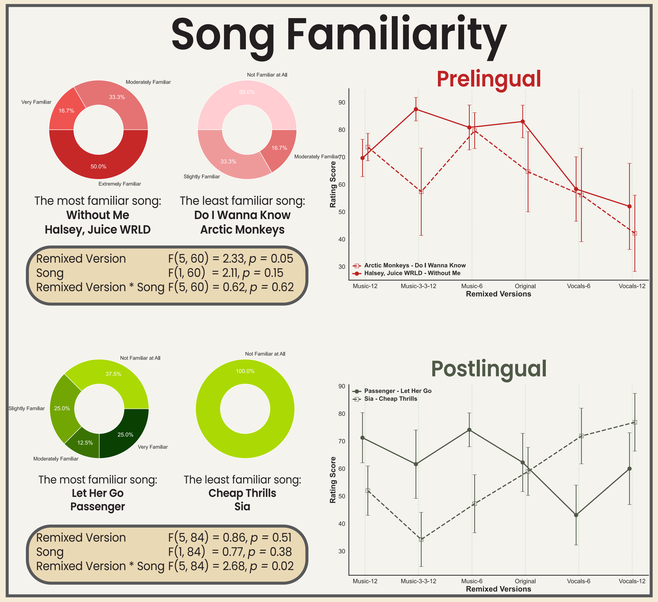
Key Findings

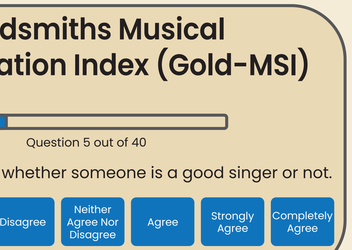
- **Prelingual CI users** preferred the “Original” and “Music-6” versions, while **postlingual CI users** preferred the “Vocals-12” version.
- **Postlingual CI users** had lower music appreciation, song familiarity, vocal pleasantness, and musical sophistication indices than **prelingual CI users**.
- Although both groups showed a trend where higher song familiarity led to higher appreciation for the original version, unbalanced sample sizes prevented statistical significance.
- Songs rated highly unpleasant in vocals received lower appreciation of music attenuated versions.

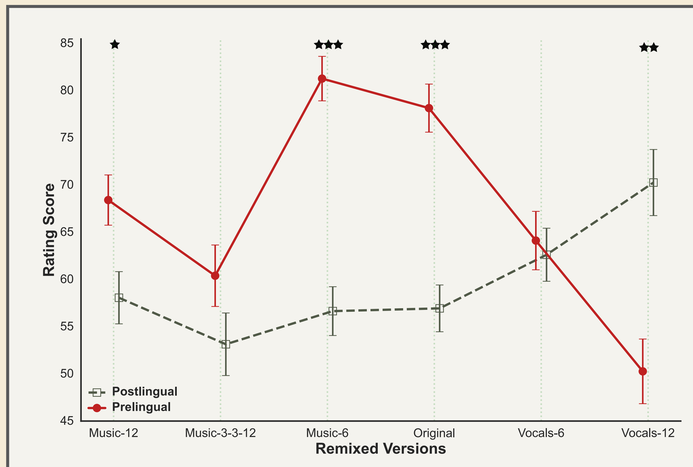












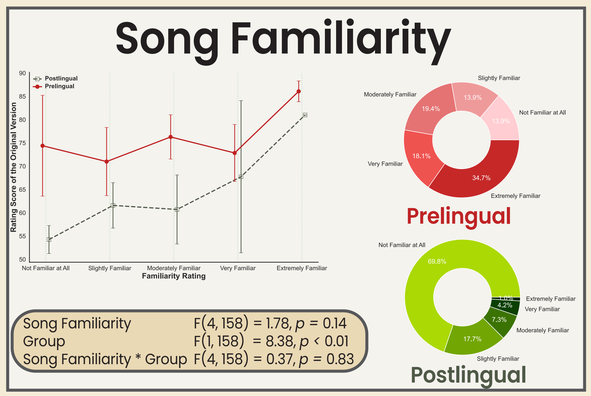
- Six participants
- Ages at testing ranging from 13 to 24
- Ages at implantation ranging from 1 to 3

- Eight participants
- Ages at testing ranging from 60 to 77
- Ages at implantation ranging from 39 to 59

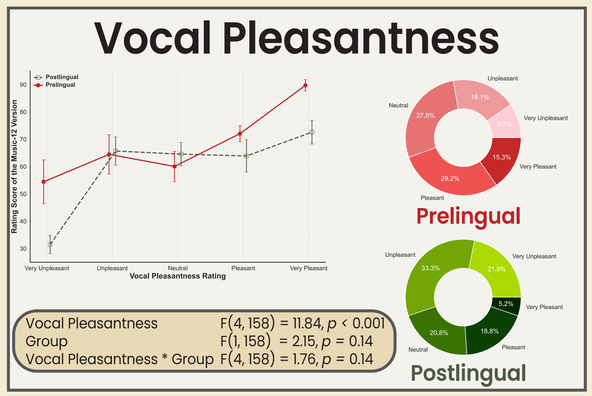
Remixed Version	$F(5, 996) = 3.36$, $p < 0.01$
Group	$F(1, 996) = 18.63$, $p < 0.001$
Remixed Version * Group	$F(5, 996) = 14.19$, $p < 0.001$

In the prelingual group, the "Music-6" and "Original" versions were significantly preferred over the other versions ($p < 0.05$), except against the "Music-12."

In the postlingual group, the "Vocals-12" version was significantly preferred over the other versions ($p < 0.05$), except against the "Vocals-6."



Song Familiarity	$F(4, 158) = 1.78$, $p = 0.14$
Group	$F(1, 158) = 8.38$, $p < 0.01$
Song Familiarity * Group	$F(4, 158) = 0.37$, $p = 0.83$



Vocal Pleasantness	$F(4, 158) = 11.84$, $p < 0.001$
Group	$F(1, 158) = 2.15$, $p = 0.14$
Vocal Pleasantness * Group	$F(4, 158) = 1.76$, $p = 0.14$