Music enjoyment in SSD patients: the synergistic effect of electric and acoustic stimulation

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Music perception by CI users

• Music perception is typically much worse than speech perception for CI users.

• But how good (or how bad) is music with a CI?

• Music sound quality with a CI is hard to evaluate without a reference.
  • For example, scaling quality of music relative to normal hearing depends on memory of what music sounded like with normal hearing.
Single-sided deafness (SSD) CI users

• SSD CI users, who have normal contralateral hearing present a unique opportunity to assess music enjoyment quantitatively in CI users

• SSD subjects allow comparing sound quality of electrical or electroacoustic stimuli relative to a normal ear.

• Allows comparing across subjects (as all of them have the same normal hearing fixed reference point)
Defined a scale with a normal ear against which electrical stimulation can be compared. Where is Song played only to a CI on this scale? Where is Song played to Normal Ear and CI on this scale? Song Unprocessed to 1 Normal Hearing Ear? Song Vocodered (6 channel with 6.5 mm shift) to Normal Hearing Ear.
We quantified music with a CI relative to music with a Normal Ear.

On a scale of unprocessed (100) to 6 channel vocoded (0) to the Normal Ear:
- Ring Of Fire: Electric stimulation is 22
- Rhapsody in Blue: Electric stimulation is 11

Music Enjoyment with Electric Only was similar to Acoustic Only with Low Pass Filter at 250 Hz
Adding the poor quality electrical stimulus contralaterally to a normal ear IMPROVES music enjoyment

On a scale of unprocessed (100) to 6 channel vocoded (0) to the Normal Ear

- Acoustic + Electric is 131 (Ring of Fire)
- Acoustic + Electric is 115 (Rhapsody in Blue)
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- Quantified music with a CI relative to music with a Normal Ear.
- Adding the poor quality electrical stimulus contralaterally to a normal ear IMPROVES music enjoyment.
- Created a test that allows comparing sound quality across subjects!