Adult Cochlear Implant Recipients: Relations Between Music and Speech Perception

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Focus of This Presentation
- Similarities and differences between speech and music
- The impact of signal processing on speech perception and music perception
- Relations between speech and music as demonstrated in research
- Practical considerations in aural rehab counseling

Similarities and differences between speech and music
- Speech and music are similar in having sequential patterns that unfold over time.
- Speech and music differ in rules of interaction.
- Spoken communication generally has more environmental cues that music to assist with recognition.
- Speech is high in semantic content while music is self-referential.
- The CI signal is well suited for transmitting key features of speech; it is not well suited for transmitting
  pitch, melody, and harmony.
  - The frequency range of relevant musical sounds is much wider than that transmitted through
  the CI.
  - Music requires more channels of information for pitch resolution and sound quality.
- Recognition of both speech in background noise and musical sounds is aided by more fine structure
  and access to low-frequency residual hearing.

Research on Music and Speech Perception of Adult CI Recipients
- Multiple studies of specific music measures demonstrate considerable variability among CI recipients
  on: Pitch perception, simple melody recognition, complex melody recognition, timbre (musical
  instrument) recognition, and appraisal of sound quality
  - Perceptual acuity and appraisal (liking) are 2 distinct aspects of music listening.
  - The presence or absence of sung lyrics is influential in both perceptual acuity and appraisal.
  - Device and strategy are not significant predictors, but the use of hearing aids is.
    - Value of residual hearing
    - Bi-modal stimulation
- Music functions as a masker of speech sounds in many real-life situations (e.g., music at a party,
  MUZAK, musical scores in movies).
  - Residual hearing in the low frequency range assists with speech recognition against
    background music.
  - Speech recognition varies depending upon the structural features of the background music.
Conclusions

- There are interesting similarities and differences between speech and music in relation to CI technology and its effectiveness.
- There is considerable variability among CI recipient regarding music perception and appreciation.
- The presence of lyrics in music can sometimes help CI recipients.
- The extent to which background music is detrimental to speech perception varies depending upon:
  - the specific characteristics of the music itself;
  - availability of low-frequency information transmitted through acoustic stimulation.

Practical recommendations

- Counsel CI recipients on the inter and intra-subject variability of CI recipients to various aspects of music.
  - Hearing aids can assist in perception of music and speech in background music.
- Lyrics can assist CI recipients in recognizing previously familiar songs.
  - Provide closed captioning of lyrics or printed lyrics.
- Consider foregoing background music as “ambience” in social gatherings with CI recipients.

Bibliography


