A Questionnaire On The Music Perception Of Adult Cochlear Implant Users, And Its Implications For A Music Training Program.

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Background

- Postlingually deafened adult CI users are less accurate at perceiving musical sounds, and rate music to be less enjoyable post-CI than pre-CI. (Gfellar et al. 1998, 2000, 2002, 2003, Mirza et al., 2003)
- Spend less time listening to music post-surgery. Some report that they avoid listening to music.
- A training program may help enhance music perception & appreciation (Gfeller et al., 2000, 2002).
- May also encourage ↑ persistence with music listening.

Existing studies

- Insufficient detail on factors CI users feel contribute to their poor ratings for music.
- Ask CI users to compare back to how they remember music to sound with normal or better hearing, or 'pre-implant'.
  - However, recollection of musical sounds would be affected by the length, nature & progression of hearing loss, and their exposure to musical experiences.
- Don't ask - What approach should a training program take???

Aim

- To develop & administer a questionnaire that collects unique information which would assist in the development of a training program for improving CI user's music perception & appreciation.
- Questionnaire differed in its approach and focus to existing questionnaires.

UCMLQ

- Initial interviews: 3 postlingually deafened adult CI users were interviewed about their views & personal experiences on music-listening with a CI.

  ➔ Pilot questionnaire:
- Pilot-tested on 9 adult CI users.
- These 9 respondents were then interviewed to establish the length, clarity & appropriateness of the questionnaire.

  ➔ Final version of ***The University of Canterbury Music Listening Questionnaire***.

UCMLQ

- Final version: 48 questions divided into 7 sections:
  - Music Listening & Musical Background
  - The Sound Quality of Musical Instruments, Instrumental Families & Voice
  - Musical Styles
  - Music Preferences
  - Music Recognition
  - Factors Affecting Music Listening Enjoyment
  - Music Training Program
- ~ 1 hr ± ½ hr to complete.
- Combination of visual analog rating scales, closed-set choices & open-ended questions.

1) Music Listening & B'ground

- Subject Factors.
- Difference CI made.
- Time spent listening to music, and enjoyment of music: Pre-hearing loss, Time just prior to getting CI, Now with CI.
- Formal music training, and music participation: Pre-CI, & Post-CI.
- Device(s) used for listening to music (e.g. CI+HA, CI-only, HA-only).
- Music listening preferences (e.g. style).

2) Sound Quality - Instruments

- Rate the sound quality of:

Piano	String Family	Woodwind Family	Brass Family
Drum Kit	Guitar	Male Singer	Female Singer

- 2 types of visual analog scales:
  - Unpleasant – Pleasant
  - Unnatural – Natural

  } similar to Gfeller et al. (2000, 2002)

2) Sound Quality - Instruments

- Other scales used a mid-point "**As Expected**".
- As expect it to sound to someone with NH.

  - Emptier – As Expected – Fuller
  - Duller – As Expected – Sharper
  - More Noisy – As Expected – Less Noisy
  - Tinnier – As Expected – Richer
  - Rougher – As Expected – Smoother

3) Sound Quality - Styles

Orchestra	Classical – Small Group	Classical – Choir
Pop/Rock	Country & Western	Jazz

- Unpleasant – Pleasant;
- Simple – Complex;
- Can never follow melody line – Can always follow melody line;
- Can never identify this style by listening-alone – Can always identify this style by listening-alone;
- Sounds nothing like I would expect it to sound to a person with NH – Sounds exactly as I would expect it to sound to a person with NH .

UCMLQ – Part 4-6

Part 4: Music Preferences
  - Preferences for different instruments, voices, instrumentations & group sizes.

Part 5: Music Recognition
  - Instruments & tunes can *always* recognise.
  - Instruments & tunes *would like to be able to* recognise.

Part 6: Factors Affecting Listening Enjoyment
  - If certain variables make music listening more enjoyable, less enjoyable, or no difference.

7) Music Training Program

- Questions on the Music Training Program (MTP) included:
  - Whether they would be interested in undertaking one;
  - Skills they feel are important for music listening enjoyment.
  - Logistics of a possible training program.

Response Rate

- The questionnaire was sent to 221 adults – all Nucleus CI24 with the ACE strategy.
- 133 (60%) questionnaires were returned. Of these:
  - 100 were completed (45%).
  - 28 returned incomplete questionnaires or replied that they were unable to complete them.
  - 5 questionnaires were returned unopened.

Respondents

Subject characteristics (n=100):

- Age: M = 62.1y (SD: 17.1; R: 18-88y)
- Duration severe-profound loss: M = 13.4y (SD: 12.8; R: 0-60y)
- Length CI use: M = 4.11y (SD: 3.1; R: 10mths-19y)

Speech Perception (1yr post-CI) (n=63):

- Words in quiet: M = 50.8% (SD: 22.5)
- Sentences In quiet: M = 88.2% (SD: 20.6)

Results – Music Listening

- ↓ time spent listening to music AND ↓ enjoyment levels now with CI than *pre-hearing loss* ($p<0.001$; paired t-test).
- ↑ time spent listening to music AND enjoyment levels now with CI than *just prior to getting CI* ($p=0.003$; paired t-test).
- Post-surgery - Only 1/100 had formal music training, and 9/100 participated in musical activities.
- 57% hadn't tried to improve music listening or enjoyment since getting CI.

Devices for music listening

- Live music:
  - CI+HA: 47%; CI-only: 45%; HA-only: 1%.
- Recorded music:
  - CI+HA: 42%; CI-only: 46%; HA-only: 3%.
- 37/93 (40%) noticed difference between *CI-only & CI+HA*. Of these 37 subjects, 93% preferred CI+HA.
- 31/81 (38%) noticed difference between *CI-only & HA-only*. Of these 31 subjects, 82% preferred CI-only.
- 51% respondents felt CI+HA gave BEST sound quality for recorded music. (CI-only = 28%).

Instrument Ratings

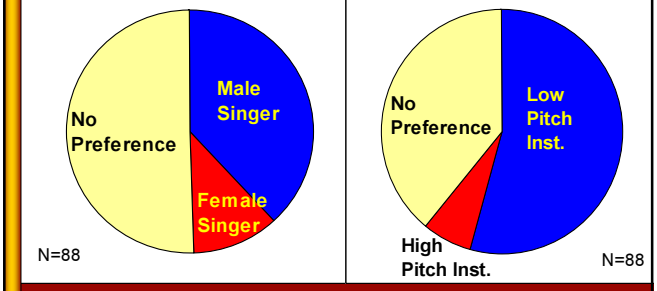
- Instruments rated 'most pleasant & natural':
  1) Guitar
  2) Male Singer
  3) Piano
- Least pleasant & natural: Brass
- Observed that CI+HA gave higher 'pleasant & natural' ratings than CI-only for all instruments except drum kit.
- However 2-way RM ANOVA showed no significant difference between CI & CI+HA groups, but a significant difference between the instruments.

Instrument Ratings

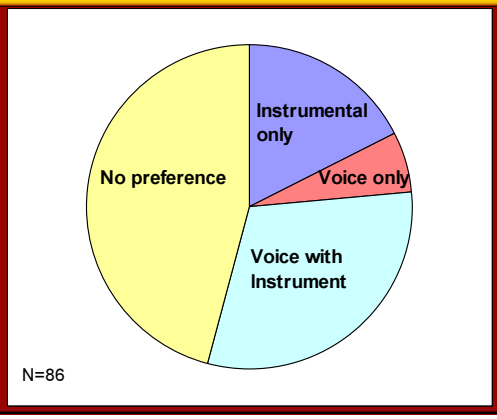
- For scales with 'as expected' as a mid-point, 1-sample t-test used to see if ratings were significantly different to how subjects expect the instrument(s) to sound to a NH person.

Emptier	Sharper	Noisier	Tinnier	Rougher
• Piano • Strings • Guitar • Male • Female	• Drum Kit	• Piano • Drum Kit • Guitar • Female	• Piano • Strings • Woodwind • Brass • Guitar • Female	• Strings • Brass • Drum Kit • Male • Female

Instrumental Preferences



Instrumental Preferences



Preferred Group Size

- Asked to rank preferred group size (1, 2, 3 performers, Small group, Large group).
- 63/89 ranked 1 performer as most preferred. 59 ranked 'Large group' as least preferred.
- 1-way RM ANOVA on Ranks: Significant difference between these rankings ($p<0.001$).
- Post-hoc Tukey Test: Respondents significantly preferred:
  - 1, 2, & 3 performers over 'Large group';
  - 1 & 2 performers over 'Small group';
  - 1 performer over 2 & 3 performers;
  - 2 performers over 3 performers.

Musical Styles

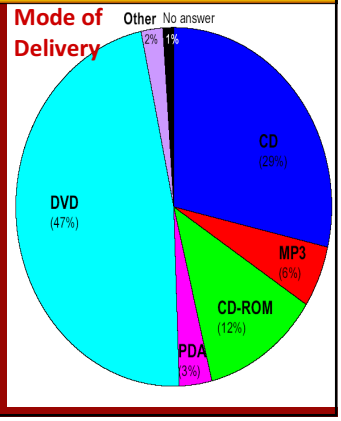
- Combined the scales: 'pleasantness', 'ability to follow melody line', 'ability to identify style' & 'sounds as expect it to sound to a NH person'.
- Highest rated style – Country & Western.
- Lowest rated style – Orchestra.

Musical Styles

- Significant difference between CI & CI+HA groups ($p=0.028$), as well as between styles ($p=0.04$) *(combined scales).* No interaction. *(2-way RM ANOVA).*
- CI+HA group gave significantly higher ratings for musical styles than CI-only.
- Country & Western rated significantly higher than:
  - Orchestra ($p=0.007$), *(Post-hoc Tukey test)*
  - Pop ($p=0.008$),
  - Jazz ($p=0.016$),
  - Classical Small Group ($p=0.047$).

Music Training Program (MTP)

- 54% interested in a MTP.
- 64% prefer MTP to introduce a wide range of styles.
- 80% would find a written manual helpful.
- Length of each session:
  - M: 35.6 mins
  - Median: 30 mins
  - Range: 10-60 mins
- No. times per week:
  - M: 2.7
  - Median: 2
  - Range: 1-7



Skills important for MTP

- Skills most often rated as the most important to help music listening enjoyment:
  1. Recognising tunes known prior to implantation.
  2. Recognising commonly-known tunes.
  3. Recognising commonly-known instruments.
  4. Being able to hear pitch changes.
  5. Being able to pick out the tune when presented with accompaniment.

Overall findings

- CI+HA better than CI-only for music listening.
- Generally, instruments tend to sound emptier, noisier, tinnier & rougher than CI users expect that they'd sound to a person with NH.
- Low pitch range preferred to high pitch range.
- Fewer performers preferred to larger groups.
- Country & Western highest-rated style; Orchestra poorest rated.

Implications for a MTP

- Majority CI users interested in MTP.
- Prefer MTP to introduce variety of styles & have written manual.
- DVD (with subtitles).
- 30 min session, 2-3x per week.
- Could have range of session lengths.
- Skills to focus on: Recognise tunes & instruments, better pitch perception, and separating melody-line.

"The implant has given me so much, but I still really grieve for real music. Music can elicit so many emotions and bring such pleasure, it is like having a large part of life missing!...It does not bring the same pleasure or emotion that it did when I was fully hearing..." (Sbjt #183)

" Listening to music was an extremely important part of my life. The loss of music has been a dynamic in learning to cover my emotions. It is an element in the process of 'grief and loss'." (Sbjt #184)

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