A Questionnaire On Music Perception & Music Training for Adult Cochlear Implant Users

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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 users’ music perception & appreciation.

*The University of Canterbury Music Listening Questionnaire.*
UCMLQ

- 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.
Sound Quality - Instruments

Rate the sound quality of:

<table>
<thead>
<tr>
<th>Piano</th>
<th>String Family</th>
<th>Woodwind Family</th>
<th>Brass Family</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Drum Kit</th>
<th>Guitar</th>
<th>Male Singer</th>
<th>Female Singer</th>
</tr>
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</tbody>
</table>

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

similar to Gfeller et al. (2000, 2002)
Sound Quality - Instruments

- Other scales used a mid-point “As Expected”.
- As expected it to sound to someone with NH.

E.g.

- Emptier – As Expected – Fuller
- Duller – As Expected – Sharper
- More Noisy – As Expected – Less Noisy
- Tinnier – As Expected – Richer
- Rougher – As Expected – Smoother
### Sound Quality - Styles

<table>
<thead>
<tr>
<th>Orchestra</th>
<th>Classical – Small Group</th>
<th>Classical – Choir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pop/Rock</td>
<td>Country &amp; Western</td>
<td>Jazz</td>
</tr>
</tbody>
</table>

- 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.
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%).
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).

• 57% hadn’t tried to improve music listening or enjoyment since getting CI.
Devices for music listening

- 37/93 (40%) noticed difference between CI-only & CI+HA. Of these 37, 93% preferred CI+HA.
- 31/81 (38%) noticed difference between CI-only & HA-only. Of these 31, 82% preferred CI-only.
- 51% respondents felt CI+HA gave BEST sound quality for recorded music.
**Instrument Ratings**

- Instruments rated ‘most pleasant & natural’:  
  1) Guitar, 2) Male Singer, 3) Piano
- Least pleasant & natural: Brass
- 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.

<table>
<thead>
<tr>
<th>Emptier</th>
<th>Sharper</th>
<th>Noisier</th>
<th>Tinnier</th>
<th>Rougher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piano</td>
<td>Drum Kit</td>
<td>Piano</td>
<td>Piano</td>
<td>Strings</td>
</tr>
<tr>
<td>Strings</td>
<td></td>
<td>Drum Kit</td>
<td>String</td>
<td>Brass</td>
</tr>
<tr>
<td>Guitar</td>
<td></td>
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<td>Woodwind</td>
<td>Drum Kit</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>Female</td>
<td>Brass</td>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td>Guitar</td>
<td>Female</td>
</tr>
</tbody>
</table>

Rougher: Brass, Drum Kit, Male, Female.
Instrumental Preferences

N=88

Male Singer

Female Singer

No Preference

Low Pitch Inst.

High Pitch Inst.

No Preference

N=88
Musical Styles

• Highest rated style – Country & Western.
• Lowest rated style – Orchestra.
• CI+HA group gave significantly higher ratings (p=0.028) for musical styles than CI-only (2-way RM ANOVA).
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

![Mode of Delivery Pie Chart]

- DVD (47%)
- CD (29%)
- CD-ROM (12%)
- PDA (3%)
- MP3 (6%)
- Other (2%)
- No answer (1%)
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.

• Majority CI users interested in MTP focusing on: Recognise tunes & instruments, better pitch perception, and separating melody-line. 30 min session, 2-3x per week.
References


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