Adapting the Established American English speech audiometry materials for clinical use in Singapore

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Introduction

**Aim:**
To adapt the established American English speech audiometry materials for clinical use in Singapore.

The American English speech audiometry materials used in this study:

<table>
<thead>
<tr>
<th>Type of speech audiometry material used</th>
<th>Name of word list used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Spondees</td>
<td>Central Institute of the Deaf (CID) W-1</td>
</tr>
<tr>
<td>2 Monosyllabic words</td>
<td>CID W-22</td>
</tr>
<tr>
<td>3 Sentences</td>
<td>Bamford-Kowal-Bench (BKB) sentences</td>
</tr>
</tbody>
</table>

Singapore Version

American version
Background

Research has shown that language background impacts on the performance of the listener (Axmear et al., 2005; Major et al., 2002; Matsuura et al., 2014).

Speech audiometry related research - Development of the Mandarin Monosyllable Recognition test (Tsai et al., 2009) to be used with Mandarin speakers in Taiwan.
Methodology

Recording Phase

- Speakers selection
- Instrumentation for recording
- Speech audiometry materials:
  - Monosyllabic words
  - Spondees
  - Sentences
- Processing of recordings (editing and exportation)
Participant flow chart

Recruitment of participants

Validation Phase

Sample Size

Modification Phase

Excluded

Did not pass hearing assessment

$n = 9$

$(\geq 60$ years old$)$

$n = 32$

$(21$ to $75$ years old$)$

$n = 23$

$(21$ to $55$ years old$)$

Chinese, $n = 19$

Malay, $n = 4$

1st session: 4.5 hours
American and Sg V.1

2nd session: 2.5 hours
Sg V.2

Consent taking, hearing and cognitive assessments
Results

Significant results:
1. Higher scores yielded for Spondees Track 3 List A Sg V.1 than American version
2. Higher scores yielded for Sg V.1 monosyllabic word lists than American version exception of three lists
3. Higher scores yielded for only List 4 of BKB sentences Sg V.1 than American version
### Results cont.

<table>
<thead>
<tr>
<th>Speech audiometry materials</th>
<th>Individual words (intra-list) which yielded more than 20% errors</th>
<th>Material version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spondee</td>
<td>duckpond</td>
<td></td>
</tr>
<tr>
<td>Monosyllabic words</td>
<td>wool dull clothes knee on send ham odd owl</td>
<td>American version</td>
</tr>
<tr>
<td>Sentences</td>
<td>hole bull</td>
<td></td>
</tr>
<tr>
<td>Spondee</td>
<td>duckpond</td>
<td></td>
</tr>
<tr>
<td>Monosyllabic words</td>
<td>bin stove knee there chest low him toe bathe show up ham aim our</td>
<td>Sg V.1</td>
</tr>
<tr>
<td>Sentences</td>
<td>faucets</td>
<td></td>
</tr>
<tr>
<td>Monosyllabic words</td>
<td>bill us chew</td>
<td>Sg V.2</td>
</tr>
</tbody>
</table>
Discussion

Postulations:
1. Inconsistency of speaker during recording
2. Longer inter-stimuli intervals of 1 second for Track 3 List B

Postulation: Effect of American’s speaker accent on local Singaporean listeners (Major et al. 2002; Matsuura et al. 2014)

Errors < 20% (American)
Discussion cont.

Postulations:
1. Effect of listener’s phonological processing abilities (Deterding & Poedjosoedarmo 1998)
2. Poor recording and/or editing

Errors < 20% (Sg V.1 only)

Postulations:
1. Speaker’s pronunciations unclear for these words
2. General Singapore accent and pronunciation unclear for these words

Errors < 20% (Sg V.2 only)
Presence of contextual cues allowing listener to conceptualise and extrapolate possible key words used in conjunction with acoustic cues (Hirsh et al. 1952; Wilson, McArdle and Smith 2007)

No significant differences between American and Sg V.1 versions of BKB sentences (except of 1 list)
Further directions:

1. Tabulating list of acceptable range of allowed pronunciations
2. Increase accuracy of capturing speech scores by implementing inter-rater and intra-rater reliability measures
3. Establishing large-scale normative data collection on Singapore population
Conclusion

In this study, majority of the speech scores for Singapore version of speech audiometry materials yielded were higher than the American version indicating high usability on Singapore population.

Next in mind: The Singapore speech audiometry materials produced in this study administered on the local population with large-scale normative data collection.
Reference list


Thank you 😊