A Pilot Study: Developing Malay Speech Audiometry Materials for Clinical Use in Singapore

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Introduction

- **Speech Audiometry**: Clinical tool that uses speech stimuli to assess an individual’s hearing abilities (Boothroyd, 1968).
- Should be developed in languages other than English (Carhart, 1952).
- Using speech materials in a language unfamiliar to the individual will result in negative clinical implications (Marinova-Todd, Siu and Jenstad, 2011).
Malay Speech Audiometry

- Two developments of speech audiometry materials in Malaysian Malay
  - Yiap Kim Hong, 1984
  - Mukari & Said, 1991
    - Uncertain if words are as appropriate or familiar for the Singapore Malay community
    - Uncertain if the pronunciation of the words are similar to that of Singapore Malay

- Malay Speech Audiometry Materials by Temasek Polytechnic & CGH
  - TAC Word List
  - Unpublished pilot study
  - Familiar but poor quality of word recordings
Aim of Current Study

◦ To establish Malay speech audiometry materials for clinical use in Singapore.

Hypothesis: Malay speech audiometry materials can be used in determining normative data for the Malay population in Singapore.
Procedure

Phase 1: Validation of Word Familiarity
Phase 2: Recording and Editing of Singapore Malay Speech Materials
Phase 3: Administration of Singapore Malay Speech Materials
Phase 4: Test-Retest Reliability
Phase 1: Validation of Word Familiarity

- Compare the familiarity of the Mukari & Said (1991) and TAC word lists
- Both word lists contained bisyllabic words
- 20 random Malay-speaking Singaporean adults aged 23-75 years old
- TAC word list more familiar
  - 7/100 words had different phonemic structure
Phase 2: Recording and Editing

- New Singapore Malay word list
- Recorded 100 Malay words at YST
- Singaporean Male
- Native fluency in Malay
- Raw recordings edited
  - 10 CD tracks/lists of 10 words
  - 2 secs interval between each word
  - 1kHz calibration tone
**Phase 3: Administering Malay Speech Audiometry**

- 41 Participants
- Basic hearing assessment
- Determine:
  - Pure Tone Average (PTA: 500, 1k, 2kHz)
  - Speech Reception Threshold (SRT)
  - Word Recognition Score (WRS)
  - WRS at one suprathreshold level: **PTA + 50dBHL** for all 10 lists

**Phase 4: Determining Test-Retest Reliability**

- Repeat WRS testing
- Identify high-error rate words
Results

◦ **PTA-SRT Difference**

  ◦ Average difference between PTA and SRT = 5.96dB
  ◦ 6dB difference indicates a good agreement between PTA and SRT (Brandy, 2002)
Results

- **High Error-Rate Words**
  - High error rate: Inaccurately identified by 20% of the participants in both test and retest
  - None of the 100 words yielded a high error-rate.

<table>
<thead>
<tr>
<th>Word</th>
<th>Frequency of Error N, (%)</th>
<th>List</th>
<th>Erroneous Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rayu</td>
<td>1, (2.4)</td>
<td>1</td>
<td>“Layu”</td>
</tr>
<tr>
<td>Suka</td>
<td>1, (2.4)</td>
<td>1</td>
<td>“Suke”</td>
</tr>
<tr>
<td>Tali</td>
<td>4, (9.8)</td>
<td>5</td>
<td>“Kali” (4)</td>
</tr>
<tr>
<td>Goda</td>
<td>3, (7.3)</td>
<td>5</td>
<td>“Kuda”, “Koda” (2)</td>
</tr>
<tr>
<td>Gaya</td>
<td>1, (2.4)</td>
<td>6</td>
<td>“Daya”</td>
</tr>
<tr>
<td>Desa</td>
<td>1, (2.4)</td>
<td>7</td>
<td>“Desal”</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Word</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Jamu</td>
<td>1, (2.4)</td>
<td>8</td>
<td>“Jangu”</td>
</tr>
<tr>
<td>Roma</td>
<td>2, (4.9)</td>
<td>8</td>
<td>“Rumah”</td>
</tr>
<tr>
<td>Bila</td>
<td>2, (4.9)</td>
<td>9</td>
<td>“Bile”</td>
</tr>
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<td>Dahi</td>
<td>1, (2.4)</td>
<td>10</td>
<td>“Dalhi”</td>
</tr>
<tr>
<td>Ilmu</td>
<td>1, (2.4)</td>
<td>10</td>
<td>“Demu”</td>
</tr>
</tbody>
</table>
Results

- **Test-Retest Reliability**
  - Medium-Large correlation strength between test and retest WRS using both method of word scoring and phonemic scoring
  - Correlation coefficients unattainable for lists 2, 3 and 4
    - All 41 subjects scored 100% on either or both test and retest
Results

◦ **Word Scoring vs. Phonemic Scoring**
  ◦ Phonemic scoring provides a more sensitive measure of the speech recognition curve (Markides, 1978)
  ◦ Bisyllabic words: Greater number of phonemes → Greater likelihood of identification error
  ◦ Significant difference when phonemic scoring was used on lists 5, 8 and 10
    ◦ Lists contain unfamiliar words and words with higher error rate
    ◦ Phonemic scoring should be used for these lists
  ◦ No significant difference in method of scoring on other lists
Discussion

- **Outcome:** The developed Singapore Malay word lists deemed appropriate for use on normal-hearing sample.
- Use of Malaysian or TAC materials inappropriate
- No high error-rate words
- Inaccurate repetitions
  - Pronunciation of stimuli in a colloquial/informal manner
  - Lack of familiarity
    - 12 subjects reported unfamiliar with at least 1 word
  - Quality of recording
  - Misunderstanding of instructions
  - Fatigue

Formal
“Suka”
“Bila”

Informal
“Suke”
“Bile”
Limitations

1. Malay language proficiency screening
   ◦ Primary language of Malay

2. SRT determination
   ◦ Gold Standard
   ◦ Phonemic scoring

3. Duration of interval between test and retest
   ◦ One month suggested duration
Future Studies

◦ Word lists should be tested on subjects with varying degrees of hearing loss.
◦ Performance-intensity curves should be developed using both normal hearing and hearing-impaired subjects.
◦ Establish large-scale normative data for the Malay population in Singapore.
References


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Terima Kasih!