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).
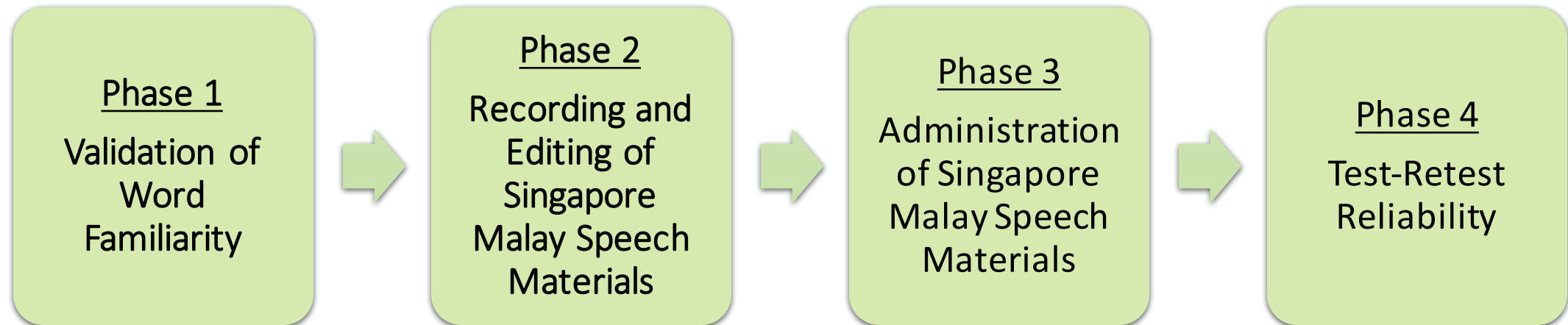
Malay Speech Audiometry

◦ 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  ◦ Unpublished pilot study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

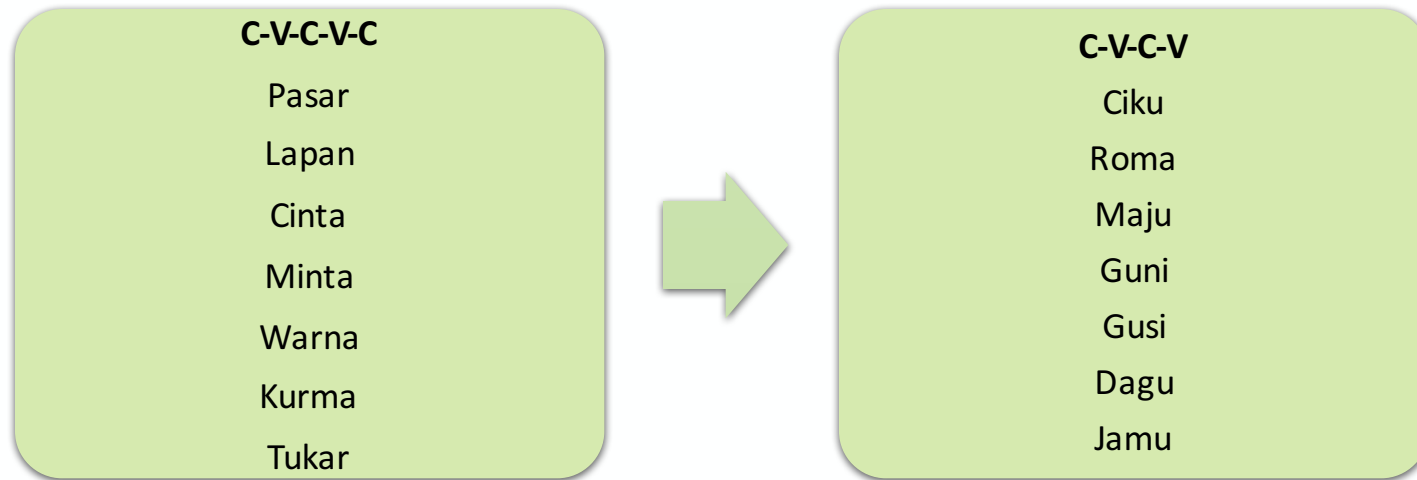○ To establish Malay speech audiometry materials for clinical use in Singapore.

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

Procedure

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

C-V-C-V-C	C-V-C-V
Pasar	Ciku
Lapan	Roma
Cinta	Maju
Minta	Guni
Warna	Gusi
Kurma	Dagu
Tukar	Jamu

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

List 1 (Track 1)	List 2 (Track 2)	List 3 (Track 3)	List 4 (Track 4)	List 5 (Track 5)
Cuti	Saya	Kota	Pulau	Tali
Tahu	Jemu	Tepi	Dagu	Dari
Nama	Baru	Lupa	Bagi	Topi
Besi	Lagi	Lari	Kaki	Goda
Rayu	Beca	Biru	Jadi	Roti
Bapa	Sama	Guna	Suci	Lagu
Suka	Buka	Cuma	Mana	Jari
Layu	Kamu	Kopi	Kira	Bawah
Curi	Juga	Dosa	Jika	Mudah
Baju	Cuci	Cuba	Guni	Rabu
List 6 (Track 6)	**List 7 (Track 7)**	**List 8 (Track 8)**	**List 9 (Track 9)**	**List 10 (Track 10)**
Bola	Hawa	Sana	Kita	Tiga
Sini	Mata	Kaya	Lama	Pagi
Jaga	Hina	Cina	Nasi	Ciku
Mahu	Mari	Jamu	Bumi	Kedai
Nota	Haji	Kayu	Cari	Dahi
Pisau	Limau	Maju	Meja	Lima
Laju	Desa	Satu	Hari	Beli
Gaya	Kaca	Baca	Buku	Keju
Gusi	Beri	Roma	Hati	Lalu
Rupa	Raya	Sayu	Bila	Ilmu

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)

    Word Scoring   Phonemic Scoring

  - 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.

Word	Frequency of Error N, (%)	List	Erroneous Response
Rayu	1, (2.4)	1	"Layu"
Suka	1, (2.4)	1	"Suke"
Tali	4, (9.8)	5	"Kali" (4)
Goda	3, (7.3)	5	"Kuda", "Koda" (2)
Gaya	1, (2.4)	6	"Daya"
Desa	1, (2.4)	7	"Desal"

Word	Frequency of Error N, (%)	List	Erroneous Response
Jamu	1, (2.4)	8	"Jangu"
Roma	2, (4.9)	8	"Rumah"
Bila	2, (4.9)	9	"Bile"
Ciku	8, (19.5)	10	"Tiku" (3), "Tigu", "Kiku" (3), "Piku"
Dahi	1, (2.4)	10	"Dalhi"
Ilmu	1, (2.4)	10	"Demu"

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.

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Terima Kasih!