

# *The perception of sentence stress in Malay and English*

Book or Report Section

Published Version

Setter, J. ORCID: <https://orcid.org/0000-0001-7334-5702>, Yap, N. T. and Stojanovik, V. ORCID: <https://orcid.org/0000-0001-6791-9968> (2019) The perception of sentence stress in Malay and English. In: Calhoun, S., Escudero, P., Tabain, M. and Warren, P. (eds.) Proceedings of the 19th International Congress of Phonetic Sciences, Melbourne, Australia 2019. Australasian Speech Science and Technology Association Inc., Canberra, Australia, pp. 2268-2271. ISBN 9780646800691 Available at <https://centaur.reading.ac.uk/85971/>

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# THE PERCEPTION OF SENTENCE STRESS IN MALAY AND ENGLISH

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## ABSTRACT

There is little research on stress and prominence in Bahasa Melayu (BM). Work which has been done on varieties of Malay concluded that pitch or durational differences do not contribute to the production or perception of stress. This study aimed to investigate the role of intensity in the perception of stress in BM among two groups of listeners, 16 native speakers of BM and 30 of BrE, in comparison with spoken British English (BrE) and Malay Speaker English (MSE).

Listeners rated 30 low-pass filtered sentences, ten from each language, indicating all syllables they perceived as stressed. Comparisons of listener identification of stress with syllable intensity yielded no statistically significant difference in the BrE and MSE conditions. In the BM condition, BrE listeners rated significantly more syllables as stressed with low to mid intensity than the BM listeners.

The results are discussed in terms of the contribution of intensity to perceived prominence in languages.

**Keywords:** Stress, prominence, Bahasa Melayu, intensity.

## 1. INTRODUCTION

This paper reports the findings from a pilot study which aimed to see whether speakers of Bahasa Melayu (BM) as a first language (L1) – i.e., the variety of Malay considered to be standard in peninsular Malaysia – and L1 British English (BrE) speakers make similar judgements about the placement of sentence stress in spoken Malay, BrE, and Malay speaker English (MSE).

The study was motivated by a discussion on the nature of stress in BM, BrE and MSE during the Intonation Workshop Series at Universiti Putra Malaysia in July 2017. Mat Nayan [3] observed that lexical stress in bi- and multi-syllabic words in MSE was not fixed in the same way as it is in BrE. However, as there is little available literature on the nature of suprasegmentals in Malay [3; 4], it was not possible to make any suggestions as to why this might be caused by influence from MSE speakers' L1, BM. At the workshop, the idea emerged that BM speakers and listeners could be favouring intensity as a cue to

stress rather than the English tendency to focus more strongly on pitch. As this is a largely under-investigated area, the research presented here sets out to test that hypothesis.

## 2. SPEECH PROMINENCE IN LANGUAGES

Stress, or prominence, in speech is achieved by manipulation of the following parameters: fundamental frequency (F0) (the perceptual realisation of this being pitch), duration (length) and intensity (loudness) [1]. In languages like BrE, vowel quality also plays a role [6]. The manipulation of these features will vary in degree depending on the language spoken. For example, Japanese uses differences in pitch to highlight patterns of linguistically salient prominence in speech, but not intensity [9], Setswana makes use of penultimate syllable duration as a cue [7], whereas BrE and many other varieties of English use a combination of the four parameters.

Where BM is concerned, there is little literature to draw upon concerning stress and/or prominence, and few accessible studies which use empirical data. Mohd Don et al [5] analysed duration and F0 in 111 word tokens produced by two female L1 speakers of BM. They found that peak F0 tended to occur around the penultimate syllable, and that word final syllables were significantly longer in duration than preceding syllables. They drew initial conclusions that BM had penultimate stress. However, further investigation led them to conclude that BM does not have word stress after all. They also conclude that BM is not syllable-timed, as there is too much duration variation between all syllables in words, and that the syllable may not be a “genuine” prosodic unit in BM. They do not, however, look at intensity.

Where other varieties of Malay are concerned, a few more studies present themselves. For example, Maskikit-Essed and Gussenhoven [2] look at the role of pitch peaks and syllable duration in Ambonese Malay, spoken in Indonesia, and conclude, as the title of their paper indicates, that the variety does not have stress, pitch accent, or prosodic focus – at least, none associated with pitch or durational differences. In their review of research on other varieties of Malay, they indicate that there are three views: 1) word stress is located on the penultimate syllable – i.e., the

traditional view; 2) there is no link between word stress and the syllable; and 3) stress is a property not of words in Malay but of phrases [5].

One question that arises is whether there are any languages that use intensity as the primary cue in the identification of word or sentence stress. As Vaissière points out [8], intensity and pitch are interrelated physiologically, and she does not identify any languages in which intensity is the single most important cue.

The fact that the authors have not been able to identify any languages for which intensity is the most important cue in linguistic stress/prominence may well indicate that it is unlikely to have a significant role in BM. However, we considered it an interesting hypothesis to test, and wondered if it might throw light on MSE's variable word stress patterns and generally attested lack of prosodic focus.

Our research question is, therefore, as follows:

- In a listening task comprising BM, BrE and MSE utterances, are L1 speakers of BM more likely to identify syllables with increased intensity as prominent than L1 speakers of BrE?

Hypothesis:

- L1 BM listeners are more likely to identify syllables with increased intensity as prominent in comparison with L1 BrE listeners.

Null hypothesis:

- L1 BM listeners are not more likely to identify syllables with increased intensity as prominent in comparison with L1 BrE listeners.

### 3. METHODOLOGY

#### 3.1. Participants

16 L1 speakers of BM, who were all ethnically Malay, and 30 L1 speakers of BrE were recruited at Universiti Putra Malaysia (UPM) and the University of Reading (UoR), UK, respectively. All were students at those universities at the time the research was undertaken and had received basic instruction in phonetics and phonology as part of their degree programmes. The BM students were all volunteers, and the BrE students participated for partial course credit. The mean age of the BM speakers was 24.07 (st. dev. 1.49) and the mean age of the BrE speakers was 20.87 (st. dev. 0.68).

More participants than reported here took part in the Malaysian context, but were excluded for not having Malay as their L1.

#### 3.2. Materials

The materials were recordings of 10 sentences spoken in English, BM and MSE by two female speakers. The BM and MSE recordings of the same female speaker were kindly provided by colleagues at the University of Malaya under a reciprocal arrangement; the BrE recordings were originally made by the first author for a different project at the University of Malaya. 44.1kHz, 16 bit recordings were made using either a Zoom H6 Handy Recorder or a Roland Edirol R-09 audio recorder. Sentences varied in length from six to 25 syllables.

The three recordings were first copied to make two separate files each, and a low-pass filter applied to one set of each language variety using Adobe Audition; we used pre-set effect "The Club Downstairs", which has sudden attenuation just below 1kHz and a cut off frequency of 500Hz. The reason for doing this was to attempt to focus the participants' attention on the prosodic features and not on individual words, about which they might have preconceived ideas. The resulting six files – three filtered, three unfiltered – were then each split into 10 files of 10 sentences. The six sets are shown in Table 1.

**Table 1:** The six sets of recordings.

Set	Language	Presentation
A	BrE	filtered
B	MSE	filtered
C	BM	filtered
D	BrE	unfiltered
E	MSE	unfiltered
F	BM	unfiltered

Response sheets were prepared for each of the six sets of files. For the filtered condition, rows of the letter "X" equivalent in number to the syllables in each utterance, and with two character spaces in between each one, were presented for each sentence. For the unfiltered condition, orthographic representations of the sentences were presented. In the unfiltered condition, the sentences were presented in a different order from the filtered condition.

This paper reports on the results from the filtered data sets only.

#### 3.3. Procedure

BrE participants were divided into three groups of 10. Each group listened to one set of filtered files comprising 10 sentences each, and were required to underline the syllables they perceived to be stressed, each represented by the letter "X". They were allowed

to listen to the sentences as many times as they wished to complete the task.

As there were only 16 BM participants, they each listened to all three sets of filtered files. We selected 10 lots of participant responses for each set at random.

In the second phase (results not reported here), the procedure was repeated using the unfiltered file sets. The BrE participants were allocated a set of unfiltered files from a different language/variety, and required to underline the syllables they perceived to be stressed on the orthographic representation of those sentences. For example, if they had listened to the BrE speaker in the filtered condition, they were allocated to the MSE speaker in the second condition using unfiltered speech. Again, they were permitted to listen to the sentences as many times as they wished. The BM participants again listened to all three sets, and we selected 10 lots of participant responses for each language variety.

### 3.4. Analysis

Participants' responses were entered on an MSExcel spreadsheet to ascertain the syllables most likely to be identified as stressed in each of the six sets of recordings by the two groups of listeners. These were then correlated with the relative intensity in each of the speech files and compared across L1 groups.

We calculated average peak intensity for each syllable for BrE, MSE and BM. For BrE the mean was 73dB (range 67-78). We considered 67-70 as low, 71-75 as mid and 76-78 as high intensity. The intensity peak values for MSE and BM had an identical mean of 60dB (range 54-69). We considered 54-57 as low, 58-63 as mid and 64-69 as high intensity.

We then calculated the number of syllables which were identified by each group (BrE and BM speakers) as stressed in relation to their intensity level. The results were analysed separately for the BrE, MSE and BM stimuli and we present the percentage of syllables identified as stressed by each group.

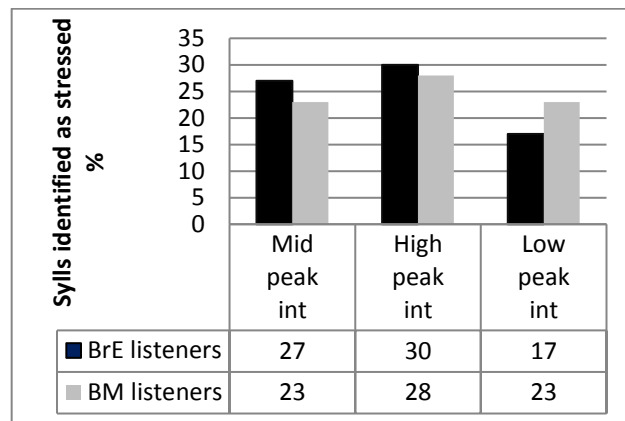
## 4. RESULTS

### 4.1. BrE stimuli

The BrE listeners identified 159 (out of 600) syllables of mid intensity as stressed compared to the BM listeners, who identified 137 syllables of mid intensity as stressed. This difference was not statistically significant. The BrE listeners identified 51 (out of 170) high peak intensity syllables as stressed compared to the BM listeners, who identified 48 high peak intensity syllables as stressed and this difference between the groups was also not

significant. Finally, the BrE listeners identified 31 (out of 180) low intensity peak syllables as stressed compared to the Malay listeners, who identified 42 low peak intensity syllables as stressed. This difference between the two groups was also not significant (Figure 1).

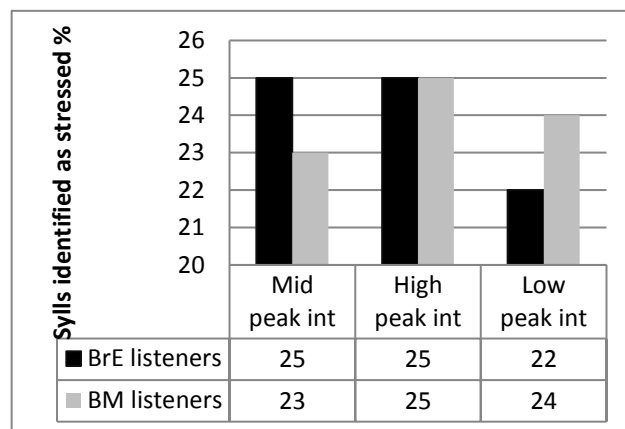
Figure 1: Results for the BrE stimuli (%)



### 4.2. MSE stimuli

The BrE listeners identified 149 (out of 620) syllables of mid intensity as stressed compared to the BM listeners, who identified 142 syllables of mid intensity as stressed. The BrE listeners identified 27 syllables (out of 110) of high peak intensity as stressed compared to 26 syllables of high peak intensity identified by the BM listeners. Regarding syllables of low peak intensity, the BrE listeners identified 51 (out of 230) compared to the BM listeners who identified 55. None of the differences between the groups were statistically significant (Figure 2).

Figure 2: Results for the MSE stimuli (%)

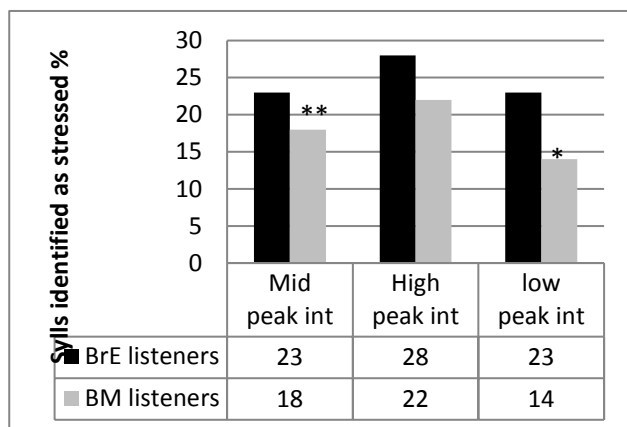


### 4.3. BM stimuli

The BrE listeners identified 194 (out of 830) syllables of mid peak intensity as stressed which

was significantly higher than the BM listeners, who identified 147 (p=.03). Also, the BrE listeners identified significantly more low peak intensity syllables as stressed (n=103 out of 440) compared to the BM listeners (n=60) (p=.005). There was no difference between the groups in the number of syllables of high intensity they identified as stressed: 37 syllables out of 130 were identified by the BrE listeners and 29 by the BM listeners) (Figure 3).

**Figure 3:** Results for the BM stimuli (%) (\*p≤0.05; \*\*p≤0.005).



## 5. DISCUSSION

The results indicate that L1 BM listeners are not more likely to identify syllables with increased intensity as prominent in comparison with L1 BrE listeners, thus there was no evidence to reject the null hypothesis. This result is not really a surprise, given no research on other languages has highlighted intensity as being salient in the identification of stress on its own.

It is more surprising that BrE listeners perceived a greater number of mid- and low-peak BM syllables to be stressed than the BM listeners. It is possible that these syllables have higher F0 than those which were not perceived as stressed by the BrE listeners. Should this be the case, it could indicate that F0 and intensity are not as interrelated physiologically in the production of stress in BM as they are in some languages. However, as the jury is out on the linguistic effect of stress in BM, this may not prove to add anything of use to the argument.

The BrE listeners, who participated in this research for partial course credit, were asked to write a reflective passage on aspects of taking part in the research. Among other things, they were asked whether they had any difficulties completing the tasks. One matter arising was the low overall intensity of the filtered files, which resulted from the application of the low-pass filter – i.e., they found the filtered files to be rather quiet. This may have had an

effect on the results, but does not explain why mid- and low-peak BM syllables were more likely to be perceived as stressed by BrE listeners.

It will be interesting to analyse the non-filtered data to see whether the statistically significant effect persists. It is also our intention to look at the role of F0 in these data, and whether it correlates closely with intensity in all three language varieties.

## 6. ACKNOWLEDGEMENTS

This paper arises from work funded by British Academy Newton Mobility Grant project number H5235600 awarded to Ngee Thai Yap and Jane Setter. We would like to thank Ernie bt Adnan, Faculty of Language & Linguistics, University of Malaya for providing the BM and MSE recordings used as stimuli in this project.

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