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Voice Onset Time (VOT) Consonants Realization of Indian-Muslim English Speakers in Malaysia

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Abstract

Voice Onset Time (VOT) is commonly found in most spoken languages. It is a speech feature to indicate differences in voicing and meaning. In particular, the duration of Voice Onset Time values is directly determined by place of articulation, with labial VOT values being shorter than velar and alveolar and, some-times, alveolar being shorter than velar. In the present study, the researchers examined the VOT values of English speakers in Malaysia, particularly Indian-Muslim English speakers in the northwest region of Malaysia. From the analysis conducted by employing PRAAT software in examining differences in VOT values of voiced and voiceless plosives, the results revealed that there were significant differences in VOT values of bilabial plosives of /p/ and /b/ as well as alveolar plosives of /t/ and /d/ in Indian-Muslim English speakers' community. However, there is no significant difference in the VOT values of both voiced and voiceless velar plosives of /k/ and /g/, indicating the influence of the speakers' mother tongue in their English language use. In the case of prominence of aspiration in the present study, the results show that the Indian-Muslim English speakers in Malaysia have high VOT values in voiceless alveolar plosive /t/ (M = 0.0705, SD = 0.0509) and voiced alveolar plosive /d/ (M = 0.015, SD = 0.00). The findings highlight that there are differences in term of VOT values in bilabial plosives and alveolar plosives of English speakers between Indian-Muslim community and Malay community. In conclusion, this study can provide insights to other researchers, academia, linguists both in Malaysia and overseas to further about the VOT consonants realizations of Indian-Muslim English speakers in Malaysia as this group of speakers in the north-west region of Malaysia is exclusive in the Malaysian context.

Keywords: *English Language, Indian Muslim, Meaning, Voice Onset Time (VOT), Consonants*

1 Introduction

Catford (2001) explained that the characteristic of aspirated stops is that after the moment of release of the oral closure, the vocal folds take some time to come together and start vibrating for the following vowel. This time-lapse is called the voice onset time (VOT). Quoting Lisker and Abramson (1964) in their study, as stated by Yang (1993) mentioned that VOT is the most effective way to separate the stops categories in different languages in term of voicing. This study integrates the measurement of VOT to also investigate the aspiration produced in the initial stop consonants /p/, /t/, /k/, /b/, /d/, and /g/ (Deterding & Kirkpatrick, 2006). Catford (2001) further mentioned that moderately to strongly aspirated voiceless stops always occur in the initial position that is before stressed vowels, and not in somewhere else. However, this feature might

differ across other English varieties (other than RP), as English is spoken by people with different first language that might influence the second language pronunciation.

Malaysia is a multicultural country coloured with a multi-language background of linguistic settings. Malaysia is not only built out of three different majority races namely Malay, Chinese and Indian, but Malaysia itself is a palate of ethnographic mixtures and inter-cultural activities. As an instance, Indian Muslim community is one of the significant ethnics in Malaysia. As what the term means, an Indian Muslim is an individual with Indian origin, and at the same time, being a Muslim with Islam as his religion. In Malaysia, the majority of Indian Muslims are of Tamil-speaking roots. Their ancestors were brought into Malaya during the occupational period to work as labours. According to Sandhu (1961), as quoted by MITRA (2021) in its official webpage, migration of Indians to Malaysia started initially in 1786 when British colony offices opened in Penang. The influx of Indians happened in the mid-19th century due to the intervention of the British in India and Malaya. Some of these Indians married local women and reverted to Islam and settled down in peninsular Malaysia (MITRA, 2021, p. 1) . As addressed by Sheikh Moinudeen Chisti (2008), nowadays Indian Muslim are often considered as Malay, despite the differences in ancestral roots, because of the intermarriage and assimilation of the Indian Muslim community with the Malay community.

Looking at the roots and the assimilation process experienced by Indian Muslim community, it can be said that they are exposed to different types of cultures and languages mainly Tamil and also Malay. At this juncture, the researchers intended to investigate whether VOT is prominent among the Indian-Muslim English language speakers. In the present study, Indian Muslims respondents were chosen based on their ability to communicate in three languages; Tamil, English and Malay. These exceptional characteristics of Indian Muslim community, in terms of their historical background, language use and culture anticipate the need for this research to explore further to this ethnic group. In addition, the lack of literature available, discussing about the language features of Indian Muslim community shows that there is a lot more to be discovered about this unique ethnic community. The present study was conducted to investigate the VOT values of plosive consonants namely /p/, /t/, /k/, /b/, /d/, and /g/ of Indian Muslim English speakers from the Northwest region of Malaysia.

1.1 Research objectives

The present study examined the differences in the duration of voice onset time (VOT) values of Indian Muslim English language speakers in Malaysia. The objectives of the research are as below:

a) To investigate the voice onset time (VOT) values of Indian Muslim English language speakers' plosive consonants namely /p/, /t/, /k/, /b/, /d/, and /g/.

b) To explore the differences of voice onset time (VOT) values between voiceless plosive consonants /p/, /t/, /k and voiced plosive consonants /b/, /d/, /g/ of Indian Muslim English language speakers.

1.2 Research questions

The study addressed two research questions, which are:

4.1.1 What are the voice onset time (VOT) values of Indian Muslim English language speakers' plosive consonants namely /p/, /t/, /k/, /b/, /d/, and /g/?

4.1.1 What are the differences of voice onset time (VOT) values between voiceless plosive consonants /p/, /t/, /k and voiced plosive consonants /b/, /d/, /g/? of Indian Muslim English language speakers?

2 Review of literature

2.1 Voice Onset Time (VOT)

The distinctive use of voicing for stops in initial position is one of the most commonly used contrasts across languages (Whalen, Levitt, & Goldstein, 2007). VOT is the most fruitful way of describing the difference acoustically. When the stop is released prior to voice onset, such as aspirated stops, the VOT is called as positive VOT. On the other hand, negative VOT is when voicing onset precedes the release.

VOT is known to vary according to place of articulation. Cho and Ladefoged (1999) conducted a study to investigate variation and universals in VOT by looking at 18 different languages. The mentioned study indicated six factors that cause variation of VOT due to place of articulation.

1. The volume of the cavity behind the point of constriction.
2. The volume of the cavity in front of the point of constriction.
3. Movement of articulators.
4. Extent of articulatory contact area.
5. Change of glottal opening area for voiceless aspirated stops.
6. Temporal adjustment between closer duration and VOT.

Based on their study, it was found that there are three modal values of VOT which are voiced, voiceless unaspirated and aspirated. Previous studies on VOT do not have more than three contrasts.

2.2 Stop Consonants of Malay and Indian English Speakers

In a study by Shahidi, Aman, and Kechot (2012) on the realisation of the initial plosive voicing contrast in the speech of English learners where Bahasa Malaysia is the first language (L1). Although Malay voiceless plosives are always unaspirated, they can sometimes be aspirated in the case of Malays from the northern Malaysia. Production data showed that English and Malay language have similar phonemic contrasts for plosives but different property pattern. The realization for the word-initial voicing contrast in Malay plosives is short lag for voiceless plosives vs voicing-lead for voiced plosives. This contrasts with English that has a long lag vs short lag distinction. The study found that similar phonemes in L1 and L2 are realised according to L1 sounds. In other words, where there is a phonemic similarity across Malay and English, L1 phonetic properties are found to be strong for Malay learners of English in the L1 environment.

India is a huge country with variations of ethnics that possess different dialects or even different languages. As the present study focuses on Indian Muslim community in Malaysia, which is made up from a large number of Tamil descendent, literature on Indian English speakers will also be focusing on the literature on Tamil English speakers. Wiltshire and Harnsberger (2006) found in their study that the effect of the General Indian English was evident in the presence of initial voiced stops in Tamil English. Another study conducted by Brozbă (2011) on features of consonants in Indian English revealed that the consonantal phonemes in Indian English does not differ significantly from that of *Received Pronunciation*, henceforth will be termed as RP. However, a territorial variation might involve different degrees of aspect in aspiration in stops, depending on the L1 of the speakers, for example Gujarati English and Tamil English. According to Bansal (1990) and Gargesh (2008), as cited in Brozbă (2011), voiceless stops tend not to be aspirated in syllable-initial position.

3 Methodology

3.1 Sample

The present study investigates the VOT values of the Indian Muslim English language speakers where three male Indian Muslims were selected as respondents for the present study. All three respondents were 24 years of age, were born and raised in Penang and Kedah, the Northwest state of Malaysia, have minimum educa-

tion background of bachelor's degree and communicate in English as their second language. These three respondents were chosen based on their availability in order to complete this study. Same sex respondents were chosen through selective sampling method to eliminate unnecessary variables that would interfere with the results. All of the respondents converse in same regional accent which is the Malaysian northern accent. They have lived in Malaysia, to be specific, northern region of Malaysia all their lives. The respondents too, had no impairments in the aspects of hearing, speech organs or even language problems. The samples were also chosen as representative of similar geographical, educational and language proficiency background. All respondents agreed to take part in the study and were required to fill in a consent form before proceeding with the recordings.

3.2 Speech stimuli

The respondents were required to read The Boy who Cried Wolf passage, henceforth will be termed as The Wolf passage, twice. The Wolf passage used in this study was obtained from Deterding (2006) and this text has been widely used by researchers in the field of phonetics in describing and measuring English language pronunciation. The Wolf passage contains tokens nearly for all the plosives / p /, /b/, /t/, /d/, /k/, /g/ in a syllable initial position. The tokens that were selected from the Wolf passage were analysed are as below.

1. Plosive /*p*/: ***poor, perfectly, perched***
2. Plosive /*b*/: ***boy, began, before***
3. Plosive /*t*/: ***to, two, told***
4. Plosive /*d*/: ***dark, did, down***
5. Plosive /*k*/: ***concern, cousins, convinced***
6. Plosive /*g*/: ***good, get, gave***

Three tokens were selected for each plosive, accumulating to 18 tokens altogether for all plosives. Two new sentences were added into the original Wolf passage in order to add tokens for the plosive /p/, for analysis purposes accumulating the words of the passage into 244 words. The additional sentences are listed below. The words in bold are the tokens that were added for the analysis.

a) The forest was **perfectly** creepy and was said to be infested with beasts.
b) Up on a tree, there was a hearing gull **perched** on a wilt branch salivating.

3.3 Recordings

All recordings were conducted in quiet, closed environments using a voice recording device, Zoom Q3HD. The WAV files were uploaded into the computer to be analysed using PRAAT. Using PRAAT, digital information showing waveforms of speech samples and spectrograms were displayed and generated, individually according to each respondent. All respondents were recorded twice but only one recording was chosen to be analysed. The selections of the recordings were done based on the researchers' perception on which recording has better quality of sound of the overall tokens.

3.4 Data analysis

The present study investigated the VOT of all speech sounds of English stop consonants. They are:

a) Bilabial /b/ and /p/
b) Alveolar /d/ and /t/
c) Velar /g/ and /k/

The tokens that were analysed for the above reasons were ***boy, began before, poor, perfectly, perched, dark, did, down, to, two, told, good, get, gave, concern, cousins*** and ***convinced***. Function words were excluded from analysis as these lexical words are more likely to be affected by phonological rules such as geminate reduction (Bell et al., 2020). All of the tokens were analysed with the use of PRAAT (Boersma & Weenink, 2009). VOT measurement of the tokens of English stop consonants were taken from the initial release of the stop consonant to the onset of low frequency periodic signal corresponding to the voicing of the following vowel. Judgements were conducted by visual inspection of the waveform in the spectrogram. The t-test: two sample assuming equal variances value were also calculated in the same workbook.

A test of inter-rater reliability was carried out by using Pearson Product-Moment Correlation. T-test: two sample assuming equal variances analysis was used to determine the degree of intelligibility between voiced and voiceless tokens. The two–sample t-test was applied assuming equal variances for token differences between the two groups.

4 Results

4.1 T-Test: Two-sample assuming equal variances for intelligibility

T-test: two-sample assuming equal variances analysis was conducted to look for differences in VOT values between voiceless plosives /p/, /t/, /k/ and voiced plosives /b/, /d/ and /g/ in the aspect voicing to look at the

effect of VOT values on speech intelligibility. According to Joto, Funatsu, and Nagase (2007), Japanese English voiceless stops were perceived to have lower intelligibility had VOT values less than 20 Ms, that shows less aspiration and they further explained that English speakers perceived plosives with VOT values below 20ms as voiced plosives. They elaborated further that for native English speakers, aspiration is a speech feature that differentiates sounds and meanings as well as aspiration acts as a vital indicator for English plosives to be perceived as being voiceless or voiced.

4.1.1 Measure of intelligibility between English plosives /p/ - /b/ of Indian-Muslim community group.

	/p/	/b/
Mean	0.039716556	0.02075
Variance	8.19817E-05	4.96429E-05
Observations	9	8
Pooled Variance	6.68902E-05	
Hypothesised Mean Difference	0	
df	15	
t Stat	4.772532916	
P(T<=t) one-tail	0.000123421	
t Critical one-tail	1.753050356	
P(T<=t) two-tail	0.000246842	
t Critical two-tail	2.131449546	

Table 4.1.1 t-Test: Two-Sample Assuming Equal Variances English plosives /p/ - /b/ of Indian-Muslim community group

The results from Table 4.1.1 indicate that there is a significant difference in Indian- Muslim community VOT values between voiceless bilabial plosive /p/ and voiced bilabial plosive /b/ in English speech production t (16) = 4.772, p – value = 0.00012. That is, the average VOT values of English voiceless bilabial plosive /p/ (M = 0.397, SD = 0.009) is significantly different, higher from that of English voiced bilabial plosive /b/ (M = 0.0207, SD = 0.007). Thus, the null hypothesis is rejected and both mean values from both groups were not equal.

4.1.2 Measure of intelligibility between English plosives /t/ - /d/ of Indian-Muslim community group.

	/t/	/d/
Mean	0.033733	0.0236918
Variance	0.000182	3.607E-05
Observations	9	9
Pooled Variance	0.000109	
Hypothesized Mean Difference	0	
df	16	
t Stat	2.038397	
P(T<=t) one-tail	0.029196	
t Critical one-tail	1.745884	
P(T<=t) two-tail	0.058391	
t Critical two-tail	2.119905	

Table 4.1.2 t-Test: Two-Sample Assuming Equal Variances English plosives /t/ - /d/ of Indian-Muslim community group

The results from Table 4.1.2 indicate that there is a significant difference in Indian- Muslim community VOT values between voiceless alveolar plosive /t/ and voiced alveolar plosive /d/ in English speech production t (16) = 2.028, p – value = 0.029. That is, the average VOT values of English voiceless alveolar plosive /t/ (M =0.033, SD = 0.013) is significantly different, higher from that of English voiced alveolar plosive /d/ (M = 0.023, SD = 0.006). Thus, the null hypothesis is rejected and both mean values from both groups are not equal.

4.1.3 Measure of intelligibility between English plosives /k/ - /g/ of Indian-Muslim community group.

	/k/	/g/
Mean	0.04164989	0.029745778
Variance	0.0004169	2.59328E-05
Observations	9	9
Pooled Variance	0.00022142	
Hypothesized Mean Difference	0	
df	16	
t Stat	1.69706461	
P(T<=t) one-tail	0.05452389	
t Critical one-tail	1.74588368	
P(T<=t) two-tail	0.10904778	
t Critical two-tail	2.1199053	

Table 4.1.3 t-Test: Two-Sample Assuming Equal Variances English plosives /k/ - /g/ of Indian-Muslim community group

The results from Table 4.1.3 indicate that there is no significant difference in Indian- Muslim community VOT values between voiceless velar plosive /k/ and voiced velar plosive /g/ in English speech production t (16) = 1.697, p – value = 0.054. That is, the average VOT values of English voiceless velar plosive /k/ (M = 0.0416, SD = 0.0204) is not significantly different, from that of English voiced velar plosive /g/ (M = 0.0297, SD = 0.0050). Thus, the null hypothesis is accepted and both mean values from both groups have equal variances.

In the occurrence of voiceless and voiced alveolar plosive consonants /t/ and /d/, the measurements of the plosive consonants are (M =0.033, SD = 0.013) and / (M = 0.023, SD = 0.006) respectively, indicating that the former measurement value is significantly higher than the latter measurement value. Consequently, the null hypothesis assuming that no significant differences between these two alveolar plosive consonants is re-jected.

As for the case of voiceless and voiced velar plosives /k/ and /g/, the measurement values indicate that there is no significant difference between the sound produced by the Indian-Muslim speakers with voiceless velar

plosive /k/ measurement (M = 0.0416, SD = 0.0204), and voiced velar plosive value /g/ measurement value (M = 0.0297, SD = 0.0050). This concludes that these two measurement values have no significant difference between them and the null hypothesis assuming no significant differences is accepted for these consonants.

4.1.4 Measurement of intelligibility between English plosives of Indian-Muslim community group.

Values Groups	t-(df)	p-value	Mean value	Standard Deviation
Indian-Muslim /p/	4.772	0.000123421	0.039716556	0.009
Indian-Muslim /b/			0.02075	0.007
Indian-Muslim /t/	2.208	0.029196	0.033	0.013
Indian-Muslim /d/			0.23	0.006
Indian-Muslim /k/	1.697	**0.05452389**	0.0416	0.0204
Indian-Muslim /g/			0.0297	0.005

Table 4.1.4 Measure of intelligibility between English plosives of Indian-Muslim community group.

As shown in table 4.1.4, there are significant differences in the degree of aspiration between voiced and voiceless plosives in syllable-initial position in Indian- Muslim English speaker's group except for comparison between plosives in syllable- initial position of velar plosives /k/ and /g/. This might have the possibility of causing the speech to be unintelligible due to the small difference between VOT values of these plosives. But, according to Deterding and Kirkpatrick (2006) the differences in VOT values as it is a feature that sometimes occurs with a range of speakers from ASEAN countries, and it does not appear to disrupt communication.

5 Discussion

Voiceless and voiceless phonemes in the English language of RP are phonemic which brings the meaning that the contrast between both voiced and voiceless states are noticeable and exists (Deanne Athaide, 2017) . According to Brozbă (2011) in his study of consonants in Indian English, it was found that the plosive phonemes measurements of Indian English do not differ significantly from acknowledged that that differences in geographical areas might cause different degrees of aspects in aspiration of plosives, depending on the L1 of the speakers, for example Gujarati English and Tamil English where the voiceless stops tend not to be aspirated in syllable-initial position.

In contrast to Brozbă (2011), Wiltshire and Sarmah (2020) found in their study that English language speakers of Telugu and Hindi backgrounds were found to produce a short-lag versus lead voicing contrasts in their English language pronunciation. The researchers too suggested that the Indian English language speakers in their study have developed a contrast which is distinct compared to both American and British English pronunciation. Similarly, this study also has identified that for the pronunciation of Indian-Muslim English speakers, there are noticeable differences between Voice Onset Time (VOT) values of voiceless bilabial plosive /p/ and voiced bilabial plosive /b/ as well as voiceless alveolar plosive /t/ and voiced alveolar plosive /d/ that were produced by the Indian-Muslim English speakers.

This is highly relevant to this study as it shows that due to the individualistic nature of Indian English pronunciation, it has become a drawback in accurately addressing the inter-speaker variations of English language pronunciation. Apart from the suggestions that have been addressed above, future researchers would benefit more if they can combine linguistic fieldwork and generative linguistics to assist them in discovering a clearer description of English language speakers of Indian –Muslim community pronunciation variations.

6 Conclusion

Although the result that was obtained in general shows that there is no major significant differences between the Voice Onset Time (VOT) values of voiceless plosives and voiced plosives in syllable-initial position among the English speakers of Indian-Muslim from Northwest Malaysia, there are minor cases and occurrences that were managed to be recorded in this study such as in the context of voiceless bilabial plosive /p/ and voiced bilabial plosive /b/ as well as in the context of voiceless alveolar plosive /t/ and voiced alveolar plosive /d/ of Indian-Muslim English speakers.

The implication of this study brings a deeper understanding on the nature of the speech sounds produced by the Indian-Muslim English speakers in Malaysia. Although Malaysia has undergone its independence for almost 64 years and English language has become the second lingua franca in Malaysia, yet this study has shown that the sounds of the language produced by a particular ethnic differs from the language's RP due to the biological nature that belongs to a particular ethnic. This simultaneously implies that although the speech sounds produced differ compared to the RP, yet the meanings and messages remain unchanged. Finally, this study contributes to the variety and the betterment of understanding the English language at large. This can help and inspire future researchers in looking at the differences between these groups in future time, in larger scale studies, with more respondents from the ethnic group to see clearly and examine deeper the charac-

teristics of the Voice Onset Time (VOT) values of English language used by the speakers from Indian-Muslim ethnic in Malaysia.

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