

A CONTRASTIVE STUDY OF THE INTONATION PATTERNS OF CHINESE, MALAY AND INDIAN SINGAPORE ENGLISH

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ABSTRACT

This study attempts to compare the intonation patterns of Chinese, Malay and Indian Singapore English. Analysis is conducted using the pitch extraction feature of the Kay CSL. Preliminary findings indicate a tendency for the intonation patterns of the three ethnic groups to be distinguished in terms of the alignment of the accent peaks with syllables.

INTRODUCTION

Singapore is a multi-ethnic society whose official languages are English, Mandarin, Malay and Tamil, with English serving as the primary working language. In such a situation, there has emerged a uniquely Singaporean English (SE), which is distinctive and varied, showing influences from the major speech varieties. Numerous studies have considered the diagnostic features of SE. While the segmental characteristics are widely described, however, the suprasegmental aspects are less well documented. Older studies have made observations on the basis of auditory impressions of recorded data -- not any less deserving of merit, of course -- usually making comparisons with British English [eg., 1]. Only in the last few years has research taken a more experimental and instrumental slant [2]. Work has also been done on phonetic features that distinguish the three main ethnic groups, focussing, again, largely on segmental features [3]. Some attitudinal and identification studies hold that it is not possible to distinguish between a Chinese, a Malay and an Indian Singaporean just by listening to them speaking English, particularly with the younger and more educated [4].

It is still felt, however, that Chinese, Malay and Indian varieties of SE may be distinguished [5]. My research attempts to

identify distinctive patterns in the intonation of Chinese, Malay and Indian speakers of SE, an area felt not to have been addressed instrumentally or comprehensively enough.

METHOD

Subjects

The subjects consisted of undergraduates from the National University of Singapore, obtained using the "friend of a friend" network technique. Altogether, five each of Chinese, Malay and Indian males, three each of Chinese and Indian females, and four Malay females were recorded.

Material

The data collected included unprompted sentences comprising declaratives, WH- questions, Yes/No questions, and exclamations, sentences prompted by scenarios, a reading passage, a conversation between subject and researcher, and games of 'twenty questions'.

Analysis

Utterances were analysed using the pitch extraction feature of the Kay CSL (Computerised Speech Lab). Pitch synchronous pitch tracking was used by first employing the automatic peak picking capabilities of CSL which marks the division between each voicing impulse in the waveform. This process separates the voiced signal into its periodic components, the inverse of each period being the fundamental frequency (F_0) of the signal. Peak picking was done at a sampling rate of 10 kHz, with analysis range and display of 50 to 250 Hz, and frame size and advance of 20 ms.

The analysis concentrated on the unprompted utterances and free conversation and questioning.

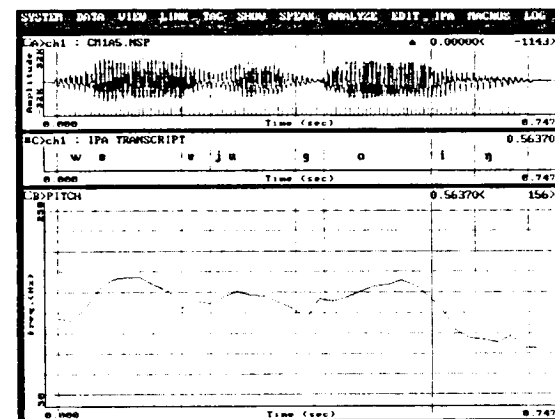


Figure 1. CSL printout of *Where are you going* uttered by Chinese subject (CM1).

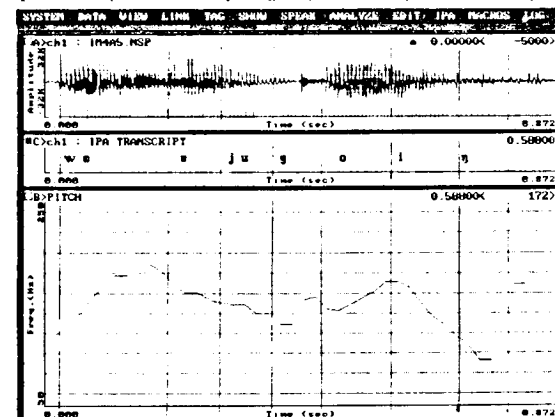


Figure 2. CSL printout of *Where are you going* uttered by Indian subject (IM4).

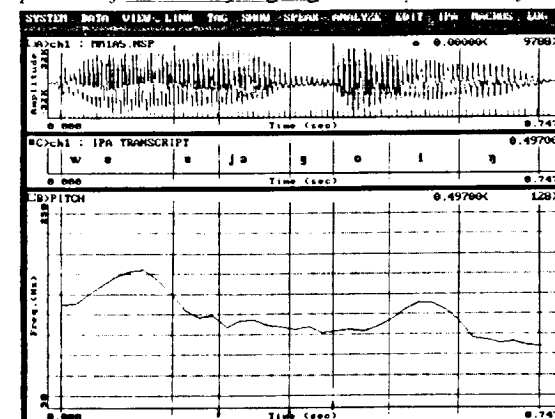


Figure 3. CSL printout of *Where are you going* uttered by Malay subject (MM1).

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RESULTS

Due to the constraints of this paper, the results obtained from one of the utterances which shows interesting patterns, *Where are you going*, will be highlighted. We shall examine in greater detail the pitch movements of one male subject in each of the three ethnic groups, all of which have as utterance contour:

Where are you going

HL !HL L%

Figures 1,2 and 3 are printouts of pitch extraction conducted on the CSL for a Chinese (CM1), Indian (IM4) and Malay (MM1), respectively.

Attention is paid particularly to the final key word in the utterance, as this is where a fair amount of movement occurs. In all three subjects, we note that a similar rise-fall contour spans the final word in the utterance, *going*. The difference between the subjects seems to lie in the alignment of the pitch peak with the syllables [6].

In CM1, the pitch peak is located late within the penultimate syllable; this results in a rise in /go/ and the beginning of a fall, with the fall continuing in /in/. Similarly, in the utterance *Where were you earlier*, while the pitch movement on the final word is reversed, i.e., a fall-rise occurs across *earlier*, the alignment of the pitch peak (trough, in this case) is the same: there is a fall on the penultimate syllable and a rise on the final, with the trough occurring late in the penultimate.

In IM4, the pitch peak is aligned almost exactly at the boundary between the two syllables, resulting in a clear rise in /go/ and a clear fall in /in/. This pattern is also observed in the utterance *Where were you earlier*, where a clear rise-fall is located across the final word, with the pitch peak aligned with the end of the penultimate syllable.

In MM1, the pitch peak is found early in the final syllable of *going*, within the segment /i/. The directional change, as it were, thus occurs in the final syllable /in/. This characteristic pitch peak alignment exhibited by MM1 here is also evident in other utterances. In *Do you like durians*, for example, the rise-fall pattern is found on *durians*, with the pitch peak located early in the final syllable. Similarly in the utterance *Where were you earlier*, the rise in the penultimate syllable continues into

the final syllable, with an early-mid peak going into a fall.

Table 1. Ratio of duration of time from start of /o/ to pitch peak, to duration of time from start of /o/ to end of /i/, in the word *going*.

Subject	Ratio
CM1	0.5136
IM4	0.4807
MM1	0.6897

As can be seen in Table 1, when the duration of time from the start of the vocalic nucleus in /go/ to the pitch peak is calculated as a ratio to the duration of time from the start of the vocalic nucleus in /go/ to the end of that in /in/, the Malay subject has the largest ratio, followed by the Chinese, and then by the Indian. This corresponds to the visual observation made in the previous paragraphs about the alignment of the pitch peak with the syllables.

Tables 2a to c indicate the size, duration and slope of the pitch movements over the word *going*. As we wish to make comparisons between different speakers with different ranges of voice, the magnitudes of distances are better represented independently of the actual frequency in Hz. A conversion into logarithmic units is the usual solution, and the range of fundamental frequency values in Hz (f_1 and f_2) is converted to a range in semitones (ST), using the formula [7]:

$$\text{SIZE (ST)} = 12 \cdot \log_2 \frac{f_1}{f_2} = \frac{12}{\log_{10} 2} \cdot \log_{10} \frac{f_1}{f_2}$$

The rise and fall exhibited over the word *going* are separated into two different phases, at the points where there appears to be a marked change in the value of the slope. As can be seen from the tables, as well as from a visual inspection of the CSL printouts, ignoring the slight perturbations occurring during the plosive, IM4 has clear rise and fall, while the fall in CM1 tapers off to a more gradual slope at the end. In MM1, a somewhat level movement rises to a steeper rise; conversely, his fairly steep fall tapers off, like CM1's, to a very gentle slope.

DISCUSSION

Pitch movement alignment refers to the location of a pitch movement with respect

Tables. Pitch movements over the word *going*, not in alignment with specific syllables.

2a. Of Chinese subject (CM1).

	Rise	Rise	Fall	Fall
size (ST)	-	4.1934	5.8050	2.5751
duration (sec)	-	0.140	0.080	0.100
slope (ST/sec)	-	29.9528	72.5625	25.7513

2b. Of Indian subject (IM4).

	Rise	Rise	Fall	Fall
size (ST)	-	3.1967	10.6453	-
duration (sec)	0.120	0.080	0.140	-
slope (ST/sec)	-	39.9590	76.0377	-

2c. Of Malay subject (MM1).

	Rise	Rise	Fall	Fall
size (ST)	Level	3.5248	4.5308	1.3857
duration (sec)	0.108	0.080	0.060	0.100
slope (ST/sec)	Level	44.0600	75.5126	13.8573

to the syllable boundaries of utterances. The importance of such distinctions to the characterisation of intonational phenomena has long been recognised, particularly with regard to so-called pitch accent languages like Swedish and Serbo-Croatian, as well as languages without an accentual system, like English, German and Dutch [8].

The preliminary results of the present research appear to indicate that pitch accent alignment may also serve to distinguish between ethnic sub-varieties of Singapore English, characterising, particularly, the Malays. This, along with modifications in steepness of contour, would appear to translate to a perceptual sensation of there being more instances of pitch movement within the final word, as uttered by the Malay subject, as compared to, for example, the Indian, which would contribute to the layman's impression that Malays sound more "musical". The contribution of other factors, both segmental and suprasegmental, to this phenomenon must certainly also be borne in mind.

The next logical step in such a study would be the synthesis of utterances, involving variations in the alignment of the accent peak in the pitch contours, as well as variations in steepness of slope, according to the results obtained for the three ethnic groups, and the subsequent obtaining of identification judgements from listeners.

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