The Effects of Chinese Learners' English Acoustic-prosodic Patterns on Listeners' Attitudinal Judgments

HSUEH CHU CHEN
The Education University of Hong Kong
Hong Kong SAR
hsuehchu@eduhk.hk

QIAN WANG
The Chinese University of Hong Kong
Hong Kong SAR

ABSTRACT

Prosody has been emphasised in second language (L2) pedagogy as a strong contribution to successful intercultural communication. As English and Chinese are typologically different languages (Chinese is a syllable-timed language while English a stress-timed language), many differences in stress and rhythmic patterns trouble Chinese learners of English. This study analyses acoustic speech samples for 13 prosodic features collected from 16 Chinese L2 learners and examines the relative importance of various prosody features on language attitudes that native and non-native English listeners hold towards Chinese-accented speech. The results revealed that Chinese speakers have a relatively slow speech rate and produce more stressed words in their English speech compared with native English speakers. When listeners heard long and inappropriate silent pauses in the speech, the integrity rating of the speakers decreased. The speech rate contributed significantly to both attractiveness rating and competence rating. That is, listeners evaluated speakers as more competent and attractive if the latter spoke faster.

Keywords: *L2 fluency; rhythmic patterns; foreign accent; pronunciation learning; language attitudes*

INTRODUCTION

Understanding the relationship between foreign-accented speech, intelligibility and language attitudes is essential both to theoretical inquiries on the nature of speech perception and to the evaluation of successful communication in everyday contexts. L2 researchers have long been interested in listeners' impressions of foreign-accented speech and the factors that may potentially influence the perception of foreign-accented speech, such as the degree of accent, intelligibility and comprehensibility (Chen 2010, 2011, 2015, Munro & Derwing 1995, Piske, MacKay & Flege 2001). Good pronunciation is indeed indispensable for adequate communication in a foreign language and is to a large extent responsible for one's first impression of a learner's L2 competence.

Hong Kong is a multilingual and multicultural society, so English communication by non-native English speakers (NNSs) is commonly observed in English as a second language (ESL) classrooms (Cantonese teachers and South Asian students; Cantonese teachers and Mandarin students). The aim of most pronunciation courses at Hong Kong universities is for students to achieve a native-like accent; this goal is strongly supported by the findings of various attitudinal studies, indicating that L2 learners with little noticeable foreign accent in the target language are generally rated more favourably by native speakers (NSs) than learners with a strong foreign accent (Gallois & Callan 1981, Teufel 1995). Many Chinese learners of English believe that achieving native-like accents can help them succeed in global competition (Jenkins 2007, Li 2009). Nevertheless, only a very small percentage of studentsachieve this ideal goal. Jenkins (2002) claimed that NNSs outnumber NSs globally, so teaching English as an international language (EIL) is more realistic and relevant than

teaching NNSs to imitate NSs' accents. Many studies have suggested that NNSs' English can be more intelligible to NNSs than that of traditional native English speakers (Deterding 2006). However, since the native pronunciation model remains largely entrenched, the accented speech may evoke some negative impressions from listeners (Lev-Ari & Keysar 2010, Munro, Derwing & Sato 2006). Therefore, much research attention should be devoted to the attitudinal judgements that different English accents arouse. This study attempts to provide empirical data regarding which English prosodic components produced by Chinese speakers may contribute to the impressions of NS and NNS listeners. These findings can help establish realistic and practical learning goals for pronunciation teaching and training.

LITERATURE REVIEW

Preston (1989) formally defined language attitudes as 'the responses made by hearers of language in relation to the personal, ethnic, national, gender, class, role, age and other identities of its speakers' (p. 50). Empirical research in the area of language attitudes usually focuses on three dimensions, proposed by Lambert (1967): social attractiveness (friendliness and sociability); competence (intelligence and self-confidence); and integrity (trustworthiness and sincerity).

A number of studies have found that accents do influence listeners' perceptions of speakers (Butler 2007, Cargile & Giles 1997, Rodriguez, Cargile & Rich 2004). Ample evidence was provided to show that people with standard accents will receive more favourable judgements on competence and status dimensions than their non-standard or foreign-accented counterparts (Butler 2007, Cargile & Giles 1998, Giles, Bradac & Johnson 1987, Lindemann 2005, Lippi-Green 2011, Okumura 2005, Rodriguez, Cargile & Rich 2004, Rubin & Smith 1990). Giles's studies (1973) indicate that speakers with standard accents were rated as more competent, self-confident and educated than speakers with non-standard accents. A study by Edwards and Maryanne (1987) also yielded similar findings, that speakers with standard English accents were rated more favourably in competence dimensions (intelligence, confidence and industriousness) and status dimensions, while speakers with non-standard accents received higher ratings in dimensions of personal integrity (sincerity, reliability and generosity) and social attractiveness (friendliness and warmth).

Lev-Ari and Keysar's recent study (2010) indicates that non-standard English accents have a negative effect on the perception of speakers' credibility. Munro, Derwing and Sato (2006) have declared that "individuals with a foreign accent may be perceived negatively because of the stereotypes or prejudices that accent can evoke in a listener" (p. 71). Tamimi Sa'd and Modirkhameneh's findings (2015) also emphasize that intelligibility of the speech and the learners' positive attitudinal and affective responses are closely related with each other.

Regarding attitudes towards Chinese-accented English, Cargile (1997) found that a speaker of Chinese-accented English was rated no differently than a standard American-accented English counterpart in terms of status-related traits in the context of an employment interview,, while in a college classroom, the same Chinese-accented speaker was rated as less attractive than the standard American-accented speaker.

Although numerous studies have investigated the attitudes of listeners toward various English accents (Butler 2007, Cargile 1997, Rodriguez, Cargile & Rich 2004), most studies about language attitudes tend to view languages and their connected cultures as a whole, rather than focusing on a particular accent or specific linguistic features that may affect listeners' perceptual judgements on social and psychological traits. The real associations

between NNSs' specific linguistic features and listeners' attitudes are yet to be ascertained. Therefore, it is important to clarify acoustic-prosodic influences that may induce negative stereotyping of accented English.

A number of studies in L2 phonology are concerned with segmental accuracy (vowels and consonants). For example, Al-Abdely and Yap (2016) claimed that acquisition of English vowels is possibly the most demanding task for L2 learners. Many learners are inclined to preserve a foreign accented speech even after they have achieved a high level of proficiency in listening, reading or writing. However, fewer studies have explored the suprasegmentals with acoustic analyses. Trofovimich and Baker (2006) examined five suprasegmentals (stress timing, peak alignment, speech rate, pause frequency and pause duration) and how each feature contributed to fluency and foreign accents. The results revealed that suprasegmentals contributed to foreign accents at all experience levels and that pause duration and speech rates were more likely to influence the foreign accent rating than other suprasegmentals. Although acoustic analyses take a tremendous amount of time, increasing the number of features and participants would improve the reliability and generalisability of the results. The above-mentioned study, however, discussed only very limited prosodic components and did not examine specific factors determining listeners' attitudes towards accented speech.

This study aims to investigate aspects of English prosodic features spoken by Chinese learners of English at a teacher-training institution. Thirteen components of prosodic features were measured and analysed. On the basis of the attitudinal judgements provided by native and non-native English listeners, this study examined the extent to which the specific prosodic parameters of second-language speech affect the perceived degree of preference. Two major research questions were developed to achieve the aims of this study:

1. In terms of production, what prosodic patterns can be identified based on acoustic measurement of Chinese learners of English and on how far the prosodic patterns of Chinese learners of English deviate from those of NSs?
2. In terms of perception, which prosodic features contribute more to attitudinal judgements of Chinese learners of English?

This study can not only help Chinese L2 English learners clarify the linguistic influences that feed into negative stereotyping based on accents, but it can also benefit Chinese or non-Chinese ESL teachers by increasing their sensitivity to prosodic difficulties experienced by Chinese English learners.

METHODS

Two phases of data collection and analyses were included: the acoustic study and the perceptual study.

PHASE ONE: THE ACOUSTIC STUDY

SPEECH SAMPLE

All 16 Chinese speakers were randomly selected from 80 speakers in the established spoken corpus, 'A Spoken Corpus of the English of Hong Kong and Mainland Chinese Learners' (http://corpus.ied.edu.hk/phonetics/), developed by the authors. The speakers, aged between 18 and 22 years, were selected from the undergraduate program of The Hong Kong Institute of Education in which English is mainly the language of instruction. All of them have gone

through a rigorous selection process before they were admitted to university and they all self-reported that they have been learning English for over 10 years; hence, it was assumed that they have reasonable competence in English. For comparison, ten native English speakers from the UK were recruited and performed the same language tasks as the Chinese speakers did. The speakers from the UK were recruited from North East England (i.e. Durham county), with an average age of 39.

In the captioned corpus, two speakers were paired up to conduct a one-on-one interview. They were required to take turns asking questions prepared by the authors (e.g. everyday topics like hobby, family and travelling experiences). They were also encouraged to ask further questions linked to the topic and to develop their own questions based on their partners' responses. Each interview lasts five minutes on average, but only two-minute sound extracts were used for feature analysis and rating purposes.

PROSODIC VARIABLES

The 13 acoustic variables from the authentic interview dataset described above were acoustically analysed. These variables were divided into four categories: stress timing (i.e. pace and space), tone peak alignment (i.e. pitch span and pitch level), speech rate (speech rate, articulation rate and mean length of run) and pausing (number of silent pause, mean length of silent pause, number of filled pauses, mean length of filled pauses, number of disfluencies/repair and phonation-time ratio).

STRESS MEASURES

Following Vanderplank's definition (1993), stress pattern can be measured through the number of stressed words per minute (Pace) and the proportion of prominent words (Space). Prominent syllables are identified as those stressed syllable with longer duration, higher pitch and greater amplitude than unstressed (non-prominent) syllables. Both human listeners' auditory analysis and instrumental analysis in PRAAT were taken into consideration in determining prominent syllables. The following two variables were measured to indicate the stress patterns of the current speakers.

1. Pace: number of prominent (stressed) words per minute (Pace) (Vanderplank 1993).
2. Space: proportion of prominent (stressed) words (Vanderplank 1993).

INTONATION MEASURES

As indicated in Kang (2010), "one of the most salient features in NNSs intonation patterns is an overall narrow pitch range" (p. 304). According to Kang and Pickering (2013), NNS speech tends to be somewhat monotonous because of compressed pitch range and a lack of variety in pitch level choices. Overall narrow pitch range has been identified as the most common feature of NNSs (Pickering 2004, Wennerstrom 1998), especially in East Asian speakers' speech. Studies of Chinese learners pitch range patterns (Hincks & Edlund 2009, Wennerstrom 1998) have shown that Chinese L2 speakers have much more compressed pitch ranges than NS speakers. Zhang, Nissen, and Francis' findings (2008) suggest that Mandarin speakers tend to produce higher pitches for stressed syllables than English speakers would. To this end, the current study investigated the following two pitch-related variables: pitch span and pitch level.

1. Pitch span: speaker's range of frequencies in a speech sample. It is calculated by F0 maximum minus F0 minimum for prominent syllables divided by total number of prominent syllables.
2. Pitch level: overall pitch height (register) of a speaker's voice, calculated by measuring the mean F0 of the utterance.

There is no general consensus on how to measure the pitch range, as it is particularly hard to quantify the pitch variations. In the current study, we calculated the pitch range value by subtracting the minimum F0 from the maximum F0 of the prominent syllables; specifically, only F0 values (in Hz) of vowels in prominent syllables were taken into consideration. The fundamental frequency (F0) peaks in pitch contours distinguish prominent segments from the surrounding content. Apart from observing the peaks of pitch contours, the intensity contour and human auditory judgements have also been taken into consideration when determining the prominent segments. An example is shown in Excerpt 1 and Figure 1, with prominent syllables represented in CAPS. The pitch of all prominent syllables is given in Hz.

Excerpt 1 from ML6

Er, er, [1.49 s] YOU know (0.72 s) the (0.70 s) the HalloWEEN is Coming (0.69 s) //

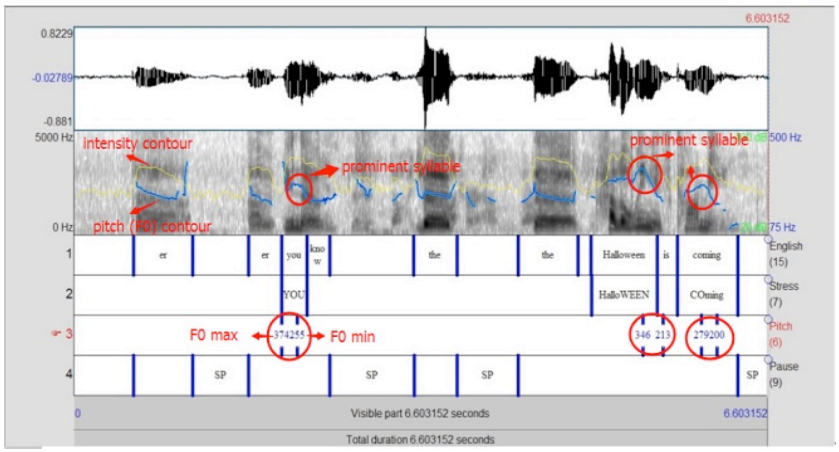

FIGURE 1. A spectrogram with annotations showing the waveform (top) and the fundamental frequency (pitch), in speech analysis software Praat

SPEECH RATE MEASURES

1. Speech rate measures include the following four variables. Phonation-time ratio (PTR): the percentage of time spent speaking, including filled pauses; the PTR is calculated by dividing phonation time by total time.
2. Speech rate (SR): a measure of the total number of syllables/words produced in a given speech sample divided by the amount of total time required to produce the speech sample (including pause time).
3. Articulation rate (AR): a measure of the mean number of syllables/words produced per minute over the total amount of time talking (excluding silent pause time). Filled pauses and partial words containing an initial consonant and a vowel (Riggenbach, 1991) were included.
4. Mean length of run (MLR): the mean number of syllables in utterances between pauses of 100 ms and above.

PAUSE MEASURES

Pause measures include the number of silent pauses, mean length of silent pauses, number of filled pauses and mean length of filled pauses. The number of disfluencies was also included. Five variables pertinent to pausing were measured in current study. An example of pausing analysis is shown in Excerpt 2.

1. Number of silent pauses per minute (NSP): number of silent pauses / total amount of time. The cut-off point of silent pauses in this study is 100 ms (Anderson-Hsiehand & Venkatagiri 1994, Griffiths 1991).
2. Mean length of silent pauses (Lng. SP): total length of silent pauses / number of silent pauses.
3. Number of filled pauses per minute (NFP): number of filled pauses / total amount of time.
4. Mean length of filled pauses (Lng. FP): total length of filled pauses / number of filled pauses.
5. Number of disfluencies per minute (ND): number of disfluencies (such as repetitions, restarts and repairs) / total amount of time.

Excerpt 2 from ML6

And (0.60 s) er [0.29 s] also very different (0.39 s) people you can meet, (0.43 s) // ah [0.18 s] they are very nice and friendly and always (0.19 s) say hello to you every day.(0.28 s)//

Notes: [ ] is used to indicate the duration of filled pause; () is used to indicate the duration of silent pause.

PHASE TWO: THE PERCEPTUAL STUDY

RATERS

Four groups of raters, from Hong Kong, mainland China, native-English-speaking countries and South Asian countries (n = 48, including 13 from Hong Kong, 13 from mainland China, 11 from native-English speaking countries and 11 from South Asian countries) were invited to listen and rate the 16 Chinese speakers. Each rater was asked to listen to eight speakers' two-minute recordings twice. One minute was given at the beginning of the rating session for raters to go through the items on the rating sheet. We inserted one-minute intervals between recordings. The raters were told that they could do their ratings while listening and/or during the intervals.

RATING SHEET

The attitude measures comprise five 5-point bipolar items for each attitudinal category proposed by Lambert (1967) (i.e. social attractiveness, competence and integrity). Apart from the attitudinal rating items, there are another two 5-point bipolar items concerning the foreign accentedness (e.g. speak with foreign accent – speak with native English accent) and intelligibility (e.g. difficult to understand – easy to understand)., so that the relationship between foreign accent, intelligibility and language attitudes could be linked and identified. A sample questionnaire is shown in Appendix.

DATA ANAYSIS

A stepwise multiple regression was performed in SPSS to examine which prosodic variables predicted the most variance in the ratings of speakers' personality traits. The dependent variables were three dimensions of attitudinal judgements (social attractiveness, competence and integrity), and the predictors were the 13 suprasegmental variables.

In stage one of the stepwise multiple regression, the independent variable that best correlated with the dependent variable was included in the equation. In the second stage, the remaining independent variable that showed the highest partial correlation with the dependent (controlling for the first independent variable) was entered. This process was repeated until the addition of a remaining independent did not increase R-squared significantly.

RESULTS

STRESS (PACE AND SPACE)

As can be seen in Table 1, the average pace of the Chinese speakers was 71.95 stressed words per minute, while the British English (BrE) speakers' data in current study was 43.37 stressed words per minute. According to Vanderplank (1993, p. 118), "the normal NS pace would be around 50 beats (or stresses) per minute".

Regarding the space value (i.e. proportion of prominent words), Chinese speakers put stress on 66% of words, more than twice as many as BrE speakers did (32%). These findings suggest that Chinese learners tend to produce significantly more stressed words in their utterances compared with BrE speakers. This finding can be well-supported by Chinese syllable-timed rhythm pattern in which the intervals between syllables are equal, and each syllable receives equal amount of time and stress.

TABLE 1. The 13 prosodic measures of Chinese speakers and British speakers

	British speakers				Chinese speakers			
Variables	Min	Max	Mean	SD	Min	Max	Mean	SD
1.Pitch span(Hz)	17.60	51.36	37.98	11.33	27.3	88.33	46.6	15.13
2. Pitch level(Hz)	115.05	204.54	160.69	41.18	119.11	275.79	199.19	39.98
3. Pace(min)	34.94	52.43	43.37	5.28	46.49	99.38	71.95	15.31
4. Space	0.27	0.38	0.32	.03	0.53	0.85	0.66	0.08
5. NSPmin	17.94	38.46	26.47	7.37	5.56	25.81	13.56	5.64
6. LngSP (s)	0.35	0.72	0.57	.11	0.44	0.92	0.59	0.14
7. NFP/min	0.55	10.95	6.22	3.41	2.55	19.69	9.68	4.3
8. LngFP (s)	0.25	0.74	0.48	.14	0.25	1.14	0.42	0.21
9. ND/min	0.62	5.18	2.30	1.20	1.06	7.88	4.63	2.08
10. PTR	0.63	0.86	0.75	.08	0.70c	0.95	0.87	0.06
11. SR1	162.61	237.08	187.20	23.18	115.8	206.64	166.45	25.21
SR2	118.10	181.65	138.24	17.89	79.64	139	108.88	18.43
12. AR1	216.39	275.31	250.22	19.41	153.23	217.95	191.14	22.97
AR2	166.78	210.94	184.65	14.22	94.71	157.03	125.05	17.64
13.MLR (s)	4.68	11.45	7.48	2.52	5.72	34.31	14.01	7.14

Notes:
SR1= No. of syllables/min, SR2= No. of words/min
AR1=No. of syllables/min, AR2=No. of words/min

An independent samples t-test of 13 prosodic variables for Chinese speakers and BrE speakers has been done and are shown in Table 2. Two groups of speakers showed significantly difference for the majority of prosodic features except for "Pitch span (Hz)", "Mean length of silent pauses", and "Mean length of filled pauses."

TABLE 2. An independent samples t-test of 13 prosodic variables for Chinese speakers and BrE speakers

	Independent Samples Test				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
1. Pitch span(Hz)	1.55	24	.135	8.62013	5.57474
2. Pitch level(Hz)	2.36	24	.03	38.49	16.30
3. Pace(min)	5.66	24	.00	28.58	5.05
4. Space	12.28	24	.00	.34	.03
5. NSPmin	-5.04	24	.00	-12.90	2.56
6. LngSP (s)	.22	24	.83	.01	.05
7. NFP/min	2.15	24	.04	3.46	1.61
8. LngFP (s)	-.76	24	.46	-.06	.08
9. ND/min	3.21	24	.00	2.33	.72
10. PTR	4.41	24	.00	.12	.03
11. SR1	-2.10	24	.05	-20.75	9.86
SR2	-4.00	24	.00	-29.36	7.35
12. AR1	-6.75	24	.00	-59.09	8.75
AR2	-8.99	24	.00	-59.61	6.63
13.MLR (s)	2.76	24	.01	6.52	2.36

INTONATION (PITCH LEVEL AND PITCH SPAN)

As shown in Table 1, the overall pitch height (register) of the Chinese speakers was 199.19 Hz, whereas that of the BrE speakers was 160.69. Table 3 further groups the participants by gender: the mean pitch height for Chinese female speakers was 213.67 Hz, while the value for male Chinese speakers was 136.43 Hz. Both male and female Chinese speakers had higher values than BrE speakers. The mean pitch height of female BrE speakers was 199.19 Hz and that of male speakers was 122.19 Hz. The current finding is consistent Zhang et al.'s (2008) suggestion that Mandarin speakers tend to produce significantly higher pitch values for stressed syllables than English speakers do.

Some previous studies regarding pitch range patterns of Chinese speakers of English (Hincks & Edlund 2009; Wennerstrom 1998) have suggested that Chinese L2 speakers have much more compressed pitch ranges than NS speakers. In the current study, the mean pitch range variation of prominent syllables in Chinese speakers' utterances was 46.6 Hz, among which, the female speakers' mean pitch range was 50.13 Hz, whereas the male speakers had a lower value of 31.28 Hz. In contrast, female BrE speakers had a slightly lower pitch range (i.e. 45.79 Hz) than Chinese female speakers (i.e.50.13 Hz), whereas the male BrE speakers exhibited a roughly same pitch range value (i.e. 31.28 Hz) as Chinese male speaker did (i.e. 30.16 Hz). The results of t-test show that there is no significant difference between BrE speakers and Chinese speakers in terms of the pitch range. Chinese is a tonal language in which the upward and downward movements of pitch are used to denote different meanings and each word carries a different tone, whereas English use sentence level pitch variation (i.e. intonation) to indicate different meanings. Some previous studies suggest that lexical-level pitch variation in Chinese is usually transferred into English produced by Chinese speakers. The result suggests that the range of lexical-level pitch variation in English produced by Chinese speakers is not significantly different from the pitch variation in sentential level of British English.

TABLE 3. Mean pitch value of British speakers and Chinese speakers

		Pitch range (Hz)	Pitch level (Hz)
Chinese speakers	Female (N=17)	50.13	213.67
	Male (N=3)	31.28	136.43
BrE speakers	Female (N=5)	45.79	199.19
	Male (N=5)	30.16	122.19

SPEECH RATE

Compared with BrE speakers, Chinese speakers in this study have significantly lower speech rates and articulation rates. The average speech rate of the Chinese speakers was around 108.88 words per minute, as shown in Table 1, much slower than the speech rate of the BrE speakers, who produced 138.24 words per minute.

In Tauroza and Allison's analysis (1990) of speech rates in BrE through four types of speech tasks (i.e. radio, lecture, interview and conversation), the average speech rate in four categories is between 125 and 230 words per minute. This range is relatively consistent with the findings in this study.

PAUSE

Pausing is another prosodic feature that is closely related to the perceived degree of foreign accent. Previous research findings have shown that both pause duration and pause frequency may contribute to listeners' perceptual judgements of foreign accents and comprehensibility of L2 speech, and that both are viewed as important determinants of L2 fluency and intelligibility. Therefore, both filled pauses and silent pauses were analysed in the current study.

As shown in Table 1, the mean length of silent pauses of Chinese speakers (0.59 s) was almost the same as those of BrE speakers (0.57 s). However, a closer look at the number of silent pauses per minute shows that BrE speakers produced 26.67 silent pauses per minute, twice that of Chinese speakers (13.56/min). Regarding the production of filled pauses, BrE speakers produced significantly fewer filled pauses (6.22/min) than Chinese speakers (9.68/min). However, the average duration of filled pauses of BrE speakers (0.48 s) is not significantly different from that of Chinese speakers (0.42 s).

CORRELATION BETWEEN THIRTEEN PROSODIC VARIABLES

The correlations between the prosodic variables shown in Table 4 reveal that the following pairs are correlated: pitch level and pitch span (r = 0.64), pace and space (r = 0.63) and speech rate and articulation rate (r = 0.90). The other clusters of temporal variables that are significantly correlated include the pace and speech rate (r = 0.68), pace and length of silent pause (r = 0.63), number of silent pause and phonation-time ratio (r = –0.80), number of silent pause and mean length of run (r = –0.82), length of silent pause and speech rate (r = –0.64), speech rate and phonation-time ratio (r = 0.63), mean length of run and phonation-time ratio (r = 0.76) and speech rate and mean length of run (r = 0.62).

It is understandable that pace and speech rate have a strong positive correlation (r = 0.68) because high speech rates usually indicate high language proficiency, and speakers with higher language proficiency tend to produce more prominent (stressed) syllables or words in their utterances (Kormos & Denes 2004) and have stronger ability to use the prominence feature in utterances to express their intentions. This finding is also consistent with the previous literatures (Kormos & Denes 2004).

TABLE 4. Correlations between 13 prosodic variables

	Pitch level	pace	space	NSP	Lng SP	NFP
Pitch span	.64**	.42	.38	.06	-.48	-.01
Pitch level		.31	.50*	-.01	-.16	-.26
pace			.63**	-.27	-.63**	.01
space				-.14	-.33	-.27
NSP					-.11	-.32
Lng SP						-.45

	Lng FP	ND	PTR	SR	AR	MLR
Pitch span	-.12	-.25	.229	.16	.095	.02
Pitch level	.45	-.16	.176	-.12	-.225	-.17
pace	-.39	-.52*	.57*	.68**	.531*	.38
space	-.11	-.46	.30	-.07	-.243	-.08
NSP	-.05	-.27	-.80**	-.29	.105	-.82**
Lng SP	.39	.31	-.49	-.64**	-.56*	-.12
NFP	-.05	.34	.55*	.519*	.333	.45
Lng FP		.46	-.06	-.354	-.412	-.09
ND			.14	-.106	-.214	.08
PTR				.626**	.221	.76**
SR					.897**	.62**
AR						.33

***. Correlation is significant at the 0.01 level (2-tailed)* **. Correlation is significant at the 0.05 level (2-tailed)*

RATING OF FOREIGN ACCENTEDNESS AND INTELIGIBILITY

To ensure that the foreign-accented speech selected was intelligible, apart from the attitudinal rating, we also included two rating items to investigate the intelligibility and foreign accentedness of current speakers from the perspective of different groups of raters (see Table 5 for the rating scores). The four groups of raters rated the Chinese speakers' intelligibility at least 3.0 (raters from mainland China gave the highest rating score, 3.84, while the raters from South Asia gave the lowest score, 3.18), indicating that all raters could understand the current speakers well. However, the foreign accentedness rating suggests that all four groups of raters could tell that the Chinese speakers were non-native and exhibited strong foreign accents: raters from mainland China gave the highest rating score (2.74) and raters from South Asia gave the lowest score (1.99). The findings suggest that listeners from mainland China are more lenient to Chinese speakers of English in terms of rating of foreign accentedness, while the raters from the South Asia are most sensitive to the Chinese-accented English as compared to the NS raters and two Chinese rater groups.

TABLE 5. Rating score of foreign accentedness and intelligibility

		Foreign accent rating score		Intelligibility rating score	
Rater group	*N*	Mean	SD	Mean	SD
Hong Kong	13	2.22	1.21	3.66	1.11
Mainland China	13	2.74	1.15	3.84	0.89
Native English speaker	11	2.13	0.92	3.23	1.10
South Asia	11	1.99	1.10	3.18	1.03

RATING OF LANGUAGE ATTITUDES

Overall, three separate regression results indicate that listeners tended to focus on different suprasegmentals depending on the types of rating outcomes (i.e. attractiveness, competence and integrity).

RELATIVE SALIENCE OF THIRTEEN PROSODIC FEATURES ON RATING OF *ATTRACTIVENESS*

Table 6 reveals the final model summary of stepwise multiple regression of prosodic variables on the judgements of speakers' attractiveness. Eight regression models generated in this analysis were statistically significant (the final model, F (6, 383) = 19.68, $p < 0.001$). Six prosodic variables out of 13 contributed significantly to the prediction of variance in attractiveness.

The number of filled pauses shows a positive effect on listeners' judgements on NNSs' attractiveness ($\beta = 0.51$), which means that the more hesitation fillers produced per minute, the more attractive the raters perceived the speaker to be. This finding seems a bit contradictory with our impression, that is "the fewer the pause, the higher the speech

fluency". In fact, the hesitation fillers measured in our study include those discourse markers which can serve certain conversational functions, like "ah" for expressing the agreement and "yeah" for indicating the end of the utterance, and thus leave a good impression on the listeners. Articulation rate was significantly associated with attractiveness ratings and showed a positive relationship (β = 0.30), which indicates that the faster the speakers spoke, the more attractive their speech sounded to the listeners. Next, pitch level was significantly associated with attractiveness ratings and showed a positive relationship (β = 0.49); in other words, the higher the pitch level was, the more attractive the raters perceived the speaker to be.

The mean length of run and mean length of filled pauses were found to have a significant negative relationship with listeners' judgements of speakers' attractiveness (β = –0.21, β = –0.29). To be more specific, when listeners heard long filled pauses and long speech runs without proper pauses, they found the speakers less attractive. Finally, mean length of silent pauses showed a positive impact on judgements of speakers' attractiveness (β = 0.30). This result suggests that the appropriate silences occur between the meaningful chunks can possibly raise the perceived attractiveness.

TABLE 6. Relative salience of 13 suprasegmental features on judgments of attractiveness

Prosodic variables	Unstandardized Beta		Beta	t	Sig.
	Beta	Std. Error			
1. No of filled pauses per second	5.78	.78	.51	7.42	.00
2. Articulation rate	.621	.129	.30	4.83	.00
3. Pitch level	.10	.00	.49	7.33	.00
4. Mean length of run	-.24	.00	-.21	-3.77	.00
5. Mean length of filled pauses	-.746	.175	-.29	-4.27	.00
6. Mean length of silent pauses	1.69	.47	.30	3.61	.00

Final model R Square =.24, F (6, 383) = 19.68, p<.001, Adjusted R Square=.23
p < .05 was used as the criterion for significance for all tests.

RELATIVE SALIENCE OF THIRTEEN PROSODIC FEATURES ON RATING OF *COMPETENCE*

Table 7 shows the final model summary of stepwise multiple regression of suprasegmental variables on competence ratings. Four regression models generated in this analysis were statistically significant (e.g. the final model, F (4, 382) = 28.06, p < 0.001), but only three variables exerted significant effects on this dimension of judgements of competence.

Speech rate contributed significantly to the prediction of variance in the competence rating and showed strong positive effects (β = 0.39): that is, listeners evaluated speakers as more competent if they spoke faster. Pitch span and number of filled pauses per minute were marginally significant variables (p < 0.05), but the effects were very small (β = 0.17).

The remaining ten predictor variables exerted no significant effects on this dimension of judgements of competence and were therefore removed from the models. The phonation-time ratio exerted statistically significant effects on this dimension of judgements of competence, but the effect was very small (β = –0.12).

TABLE 7. Relative salience of suprasegmental features on judgments of competence

Prosodic variables	Unstandardized Beta		Beta	t	Sig.
	Beta	Std.Error			
1. Speech rate	.72	.11	.39	6.49	.00
2. Pitch span	.01	.00	.17	3.56	.00
3. No. of filled pauses per second	1.89	.63	.17	3.01	.00

Final model R Square =.23, F (4,382)= 28.06., p<.001, Adjusted R Square=.22
p < .05 was used as the criterion for significance for all tests.

Table 8 shows the final model summary of stepwise multiple regression of suprasegmental variables on judgements of integrity. The results suggest weak predictive effects of the current 13 variables on listeners' impressions of speakers' integrity. Only one model generated in this analysis was statistically significant (the final model, F (1, 383) = 16.75, $p <$ 0.001), and only one variable exerted a significant effect on this dimension of judgements of integrity. The mean length of silent pauses was best correlated with the dependent variable (judgements of integrity) and contributed significantly to the prediction of variance in the integrity rating, showing a moderately negative impact on judgements of speakers' integrity ($\beta = -0.20$). When listeners heard long and inappropriate silent pauses in the speech, the integrity rating of the speakers decreased.

TABLE 8. Relative salience of suprasegmental features on judgments of integrity

Prosodic variables	Unstandardized Beta		Beta	t	Sig.
	Beta	Std. Error			
1. Mean length of silent pauses	-1.07	.26	-.20	-4.09	.00

Final model R Square =.23, F (4,382)= 28.06., p<.001, Adjusted R Square=.22
p < .05 was used as the criterion for significance for all tests.

DISCUSSION AND CONCLUSION

The present study investigated acoustic measures of 13 different prosodic parameters, analysing approximately two-minute spoken excerpts from interviews with 16 Chinese college students. Consistent with previous studies, the results revealed that Chinese speakers have relatively slow speech rates as compared to British English speakers. Another significant difference is the proportion of stressed words, i.e. Chinese learners tend to produce significantly more stressed words in their utterances as compared to BrE speakers. This finding can be well-supported by Chinese syllable-timed rhythm pattern in which the intervals between syllables are equal, and each syllable receives equal amount of time and stress. Regarding their pausing patterns, Chinese speakers have significantly more filled pauses and less salient pauses compared with British NSs. The study also examined the relative salience of 13 prosodic features on listeners' language attitudes toward speakers. The results have shown that speaking rate (i.e. speech rate and articulation rate) contributed significantly to both attractiveness ratings and competence ratings. That is, listeners evaluated speakers as more competent and attractive if they spoke faster. The mean length of silent pauses contributed significantly to the prediction of variance in the integrity rating and showed a moderately negative impact on judgements of speakers' integrity, meaning that when listeners heard long and inappropriate silent pauses in the speech, the integrity rating of the speakers decreased.

Previous research on L2 phonological patterns, foreign accents and attitudes has assumed that listeners perceive speech holistically. Fewer studies have explained what discrete prosodic components contribute to the perception of foreign accents and which factors affect listeners' reactions the most. By identifying the phonologies of Chinese-accented English in terms of a spontaneous speech task and the perceptions of NSs and NNSs toward their speech, a model can be established. The proposed model is as follows:

1. Six prosodic variables of the 13 contributed significantly to the prediction of variance in attractiveness: the number of filled pauses, articulation rate, pitch level, the mean length of the run, the mean length of filled pauses and the mean length of silent pauses.

2. In the final model summary of stepwise multiple regression of prosodic variables on competence ratings, three variables exerted significant effects on judgements of competence: speech rate, pitch span and number of filled pauses per second.
3. Only one variable, the mean length of silent pauses, exerted a significant effect on judgements of integrity.

Jenkins (2002) found that in EIL context, weak forms, stress-timed rhythm, word stress, the direction of pitch movement and other features of connected speech are all categorised as non-core features, suggesting that these prosodic features do not significantly affect intelligibility. Similar findings were identified in this study for the stress-timed rhythm: neither stress-related variables' pacing nor spacing was found to have any significant influence on the rating of speakers' competence, attractiveness or integrity.

However, the current study found two variables to affect listeners' impressions most significantly: pitch span and pausing. Pitch span significantly contributed to the competence rating across different groups of raters; the most noticeable feature in connected speech, pausing (both silent pause and filled pauses), also had a strong impact on people's judgement of a speaker's attractiveness.

PITCH SPAN

The most distinctive difference between Chinese and English is that Chinese is a tonal language, while English is an intonation language. In English, there is no individual tone for each word; instead, the tones vary over a stretch of utterance to emphasise or express emotions and purposes for the entire sentences. Intonation, as an important suprasegmental variable, is regarded as a fundamental component in the communicative process (Chun 1988), because it conveys not only linguistic information but also non-linguistic information, like the emotions and mood of the speaker (Mennen 2006). Because not all languages use this intonation system to indicate meaning, some distinctive intonation patterns produced by NNSs may cause communication breakdowns and make a conversation frustrating and unpleasant.

Narrow overall pitch range has been identified as the most common intonation feature of NNSs (Pickering 2004, Wennerstrom 1998), especially in East Asian speakers' speech. According to Kang and Pickering (2013), pitch range variation is an important intonation feature that affects NSs' comprehension of NNSs' speech. This intonation pattern appears to have very negative impact on the proficiency and comprehensibility ratings of NS speakers (Pickering 2001).

In current study, the results suggest that there is no significant difference between BrE speakers and Chinese speakers in terms of the pitch range. Chinese is a tonal language with lexical-level pitch variation, whereas English use sentence level pitch variation (i.e. intonation) to indicate different meanings and express different emotions. Chinese and English use pitch variations in different ways, i.e. lexical-level pitch variation and sentence-level pitch variation. Due to the L1 transfer, lexical-level pitch variations in Chinese are usually transferred into English produced by Chinese speakers. This can probably explain why the pitch range of Chinese speakers of English is not significantly different from that of British English speakers. In addition, in current study, we measured the pitch variations mainly for the stressed syllables, but as Chinese speakers have much more stressed syllables than British English speakers do, the pitch variation may be influenced by the number of stressed syllables. The future study regarding the comparison of the pitch range of Chinese speakers and British English speakers can be done by using the same speech materials (i.e.

sentence reading or passage reading) and measuring the same number of words/syllables for pitch variations. By doing so, the comparison could be more accurate.

PAUSING

Pausing is the other prosodic feature that most affects attitudinal judgements. The following variables have been identified as possibly reflecting pausing patterns accurately: the number, the length and the location of silent and filled (e.g. 'eh' or 'um') pauses (DeJong et al. 2012a, 2012b, Kang 2008, 2010, Kang & Pickering 2013, Kang et al. 2013, Negishi 2012). Most previous research (Anderson-Hsieh & Venkatagiri 1994, Kormos & Dénes 2004) has similarly found that 'low-proficiency L2 speakers tend to pause more frequently and inappropriately, and their pause durations are longer, whereas higher-proficiency learners tend to speak faster, with less pausing and fewer unfilled pauses' (Kang & Pickering 2013, p. 1051).

Research by Trofimovich and Baker (2006) showed that pause duration makes a stronger contribution to foreign accent ratings than other suprasegmental features (e.g. stressing, peak alignment), whereas no significant correlation has been found between NNSs' pauses and comprehensibility judgements. Kang et al.'s recent study (2013) found that the increase of silent pauses could have a positive effect on listeners in terms of comprehensibility rating. The current study identifies the impact silent and filled pausing patterns have on listeners' attitudinal judgement.

PEDAGOGICAL IMPLICATIONS

The importance of pronunciation teaching is particularly evident in the context of language teaching at teacher training institutes, which involve the training of future language teachers and subject teachers in English as a Medium of Instruction (EMI). Forde (1995) examined the attitudes of Chinese learners of English towards Hong Kong English and various native English accents. He found that the American and British accents were preferred for all variables, including the person's ability to be a good English teacher. Most popular commercial listening materials in English language teaching are based on British or American English accents and, more importantly, native English benchmarks in high-stakes examinations often penalise candidates' first-language-influenced phonological features (Hamp-Lyons & Davies 2008). For example, Bunton and Tsui (2002) report that the Language Proficiency Assessment for Teachers (LPAT), a prerequisite qualification for Hong Kong's English teachers, penalises teachers for their first-language-influenced pronunciation 'errors', such as stressing of weak forms and problems in articulating initial and final consonant clusters. In order to make a good impression in a teaching model or job interview, teachers should have a good knowledge of what linguistic features may contribute more to listeners' judgements of speakers' social and psychological traits (such as their perceived level of intelligence, competence and integrity).

Based on the results of this study, English teachers and learners in EIL contexts should be aware of the importance of pitch-related and pausing-related skills. Chinese learners of English should first learn to pronounce the core phonological features and then gradually learn the peripheral ones in order to improve interlocuters' impressions of the speakers. Remedial pronunciation strategies for Chinese learners can be derived from this study's findings: for example, increasing their speech rate with appropriate silent pauses and producing fewer stressed words in their English speech.

In order to avoid miscommunication in EIL interactions, not only should Chinese learners of English be provided with remedial pronunciation strategies, but they should develop listeners' accommodation strategies when communicating with people with different

first-language backgrounds. The best way to do so may be to include course materials providing exposure to a range of NNS accents. For example, Walker (2010) includes recordings of speakers from many different countries, in addition to classroom activities that aim to develop students' accommodation skills.

Notwithstanding the practicality and attainability of adopting a localised phonological target in the local TESOL classroom, as proposed by Jenkins (2002), the issue of social acceptability tends to be most fundamental to an EIL pedagogical model (Ferguson 2009). Although Hong Kong local textbook publishers for secondary or even tertiary schools often claim to have incorporated authentic tasks simulating real-life communication into the textbooks, few have included authentic examples of different language accents. Many textbook activities are still based on standard native English and fail to raise learners' language awareness of the global use of English (Chan 2014). Therefore, it is suggested that native English pronunciations be used in high-stakes situations, such as English proficiency assessments for teachers and job interviews; the use of second or foreign language accents in more casual and interactive settings (such as chatting with friends and giving directions to foreign tourists) can be integrated into classroom tasks as well. Teachers could also increase the availability of mixed-L1 classes in school and set up video-conferencing tasks with institutions in other L1 areas (Hong Kong and Malaysia). All these are realistic and cost-effective approaches.

LIMITATIONS AND FUTURE STUDIES

Although this study has generated results regarding the prosodic features of Chinese learners, it still suffers from several limitations that remain for future studies to address. First, more studies need to be done to include speakers at different proficiency levels or with different learning experiences, to see if proficiency levels and/or learning experience affect performance of prosodic patterns. Second, the speech samples comprised only of interview data; it is recommended that future research include a variety of speech sample types, such as lecture speech or casual conversations. Finally, successful L2 phonology learning cannot be attributed exclusively to the existence of positive attitudes towards the target accent. Researchers should measure how other factors (e.g. socio-psychological factors, social identity and motivation) influence pronunciation achievement.

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APPENDIX

ATTITUDINAL RATING SHEET

Part I. Attitudinal Rating								
Social attractiveness rating								
1	Unfriendly	1	2	3	4	5	CD	Friendly
2	Unattractive	1	2	3	4	5	CD	Attractive
3	No sense of humor at all	1	2	3	4	5	CD	Good sense of humor
4	Unsociable	1	2	3	4	5	CD	Sociable
5	Shy	1	2	3	4	5	CD	Outgoing
Competence rating								
6	Not competent	1	2	3	4	5	CD	Competent
7	Not intelligent	1	2	3	4	5	CD	Intelligent
8	Not educated	1	2	3	4	5	CD	Well-educated
9	Not self-confident	1	2	3	4	5	CD	Self-confident
10	Lazy	1	2	3	4	5	CD	Industrious
Integrity rating								
11	Not sincere	1	2	3	4	5	CD	Sincere
12	Not honest	1	2	3	4	5	CD	Honest
13	Not trustworthy	1	2	3	4	5	CD	Trustworthy
14	Not kind-hearted	1	2	3	4	5	CD	Kind-hearted
15	Not polite	1	2	3	4	5	CD	Polite
Part 2. General rating								
1	speak with foreign accent	1	2	3	4	5	CD	speak with native English accent
2	Very difficult to understand	1	2	3	4	5	CD	Very easy to understand

Note: A score of 1 is the most negative and 5 is the most positive. CD means Cannot Decide