A description of the Yunnan English accent

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INTRODUCTION

A province in Southwest China with a population of approximately 46 million people as of 2010, Yunnan is home to 25 minority ethnic groups[1] (For details about ethnicity and language situation in this province, see Ao and Low 2012). When we consider linguistic situation in Yunnan, three facts are worthy of attention. The first fact is that the most commonly spoken language in Yunnan is Yunnanese (or Yunnan dialect of Mandarin[2]) except on a few formal occasions such as in the classroom where Mandarin (largely Yunnanese-accented Mandarin, to be exact) is spoken. Secondly, Yunnanese is classified into four types (Wu et al. 1985; for further details, see Gui 2001), namely Central Yunnanese (Region 1), Southern Yunnanese (Region 2), Western Yunnanese (Region 3) and Northeastern Yunnanese (Region 4). This classification, however, should not be seen as absolute due to the fact that each county in these regions is inhabited by more than one ethnic group, which inter-influences languages spoken in the county. Thirdly, one should not neglect the languages spoken by the 25 minority ethnic groups. Given this complicated sociolinguistic situation in Yunnan, it is reasonable to speculate here that inter-influences exist among the accents spoken by different ethnic groups in this province, and that the sociolinguistic background of speakers may in turn influence the Yunnan English accent in complex ways. This study sets out to investigate selected phonetic features of Yunnan English, and thus to contribute to a growing body of research on English in China, or 'Chinese English(es) (CE[3]).

This paper adheres to Kachru's (1992) Concentric Circles Model which places China in the Expanding Circle where English is learnt and used as a foreign language and is a country whose standards and norms of English are dependent on the Inner Circle varieties, namely British English or American English (Kachru 1985). Although the number of people learning English in China is staggering (for details, see Wei and Su 2012), the use of English in the country is but for

a limited number of domains, education currently being the main one (Bolton and Graddol 2012) and there is hitherto little detailed research showing the existence of English-speaking Chinese community. Similarly, there is a scarcity of detailed basic research on English language learning in different locations of education, as observed by Bolton and Graddol (2012).

In this paper, we seek to fill the gap by describing salient pronunciation features of Yunnan English (hereafter referred to as YE[4]). Our main focus is on the acoustic description of the vowel durations and qualities of three groups of Yunnan English speakers, i.e. Han English majors, Han non-English majors and Yi minority ethnic English majors. We also compare the findings among these three groups both in terms of vowel durations and qualities. Ultimately, what we are interested in are how vowel durations and qualities are different among these groups and whether they are different from or similar to those of other varieties described in previous studies.

RESEARCH ON CE VOWELS

There is generally a paucity of research on phonetic features of varieties of CE. With regard to Yunnan English, there is, to the best of our knowledge, only one phonetic study that has been done on its segmental features, i.e. vowels and consonants (see Ao and Low 2012). Since we may broadly regard Yunnan English as a variety of CE, it would be relevant to examine briefly previous phonetic studies of CE. In what follows, therefore, we first highlight some salient features of vowels found in other varieties of CE before examining closely the phonetic features of Yunnan English described in an earlier study. We here restrict our review to the previous studies done on varieties of English spoken by participants from Mainland China.

Vowels of CE

With respect to phonetic features of CE, perhaps the most detailed and systematic empirical study is by Deterding (2006a) though some salient features are also found in two empirical studies by Ho (2003) and Hung (2002), as well as in some impressionistic studies by Chang (1987), Pride and Liu (1988), Jiang (2002), and He and Li (2009) and in some unpublished dissertations such as these by Chen (2008) and Teo (2010). We briefly highlight and discuss here

four common features identified in previous studies (mainly empirical studies, due to constraints of space) and leave interested readers to find details of other features in each of the studies we have cited herein.

(i) Extra vowels

Deterding's (2006a) study reports a feature of vowel pronunciation, namely "extra final vowel" (p. 179) in the speakers of CE. For example, the word *and* /ænd/ is pronounced /ændə/, and *next week* /nekst wiːk/ is pronounced /ˈnekstə wiːk/ respectively. According to Deterding (2006a), all informants except the one from Jiangxi added extra final vowels in their recordings. This feature is also observed in Chen (2008) though it is unclear whether Chen's subject from Jiangxi was among the ones who added the extra vowel. Chen (2008) also observes that her participants tended to add a schwa to the end of the word *and* when they paused to think. Chen (2008) brought in the proficiency levels of CE speakers by stating that "the more proficient a speaker is, the more likely he/she is able to avoid being influenced by their mother tongue Chinese to add an extra final vowel" (p. 35). However, this observation needs to be further validated, given that it is based on only one speaker.

Ho (2003) observes that students from Hubei, Henan, Sichuan and Shandong add final vowels to consonants such as /d/, /b/, /t/, /dʒ/ and /k/. For example, the words *and, should, job, almost,* and *college* are realized as /ændə/, /ʃʊdə/, /dʒɒbə/, /ɔːlməʊstə/ and /kɒlɪdʒɪ/ respectively. Ho's study for Henan and Shandong corresponds to Deterding's (2006a) findings. However, one informant from Zhejiang in Deterding's (2006a) study added extra final vowels while informants from the same province (Hangzhou) in Ho's (2003) study are not found to possess this feature. One tenable explanation could be that the informants in their studies are from the same province (i.e. Zhejiang Province) but not from the same city. In other words, Ho's (2003) informants are from Hangzhou but it is unclear which city in Zhejiang Province Deterding's (2006a) informant is from. The discrepancy in the findings described above indicates that the phonetic features of CE can be different as a result of dialectal differences within the same province and can also be expected across different provinces in the vast geographical area of China. This feature may be attributable to the syllable structure in Mandarin Chinese in which syllable-final consonants are uncommon, thus resulting in addition of extra vowels at the end (Chang 1987).

(ii) Vowel reduction

It is common in English that vowels in unstressed syllables and monosyllabic function words are reduced. Of all the reduced vowel forms, the most common form of reduction is to a schwa (Collins and Mees 2008). Deterding (2006a) notes that there is an "absence of reduced vowels" (p. 182) in the speech of CE speakers in his study. These speakers tend to use a full vowel even "in monosyllabic function words" (p. 183). He observes that only three tokens out of the 65 function words in his study are pronounced with a schwa: *than* (by two participants respectively) and *to*. The other 62 tokens were all produced without vowel reduction.

Chen (2008), however, notes that all six participants use a full vowel in the function words *to* and *that*, but use a schwa in the word *of*. The discrepancy is almost certain to have resulted from the differences that exist in the origins of their participants. Given the fact that Deterding (2006a) and Chen (2008) both have participants from Liaoning and Jiangsu, it is plausible to suggest that either speakers from Heilongjiang, or the speaker from Guangxi or Shanxi sometimes use reduced vowels. Even if this is true, Chen's (2008) generalisation that "*of* seems to be the only function word that is taught to be pronounced with a schwa for **Chinese speakers** (author's bold)" is refutable, considering the fact that all Deterding's (2006a) participants from nine Chinese provinces do use full vowels in their realisation of *of*.

(iii) Length of vowels

It is commonly acknowledged that differences in the length of vowels exist between English and Chinese Putonghua or Mandarin Chinese, specifically, the length of long vowels and the realisation of diphthongs (Pride and Liu 1988). Some Chinese vowels, for example, sound similar to but are generally shorter than the English equivalent phonemes such as /ɑː/, /ɔː/, /ɜː/, /iː/ and /uː/, and diphthongs like /eɪ/, /ɑɪ/, /əʊ/ and /ɑʊ/. Therefore, when CE speakers produce these phonemes, it is to be expected that their pronunciation tends to be characterized by shorter vowel length. This feature, however, is largely based on impressionistic observation and lacks empirical evidence. To validate this observation, a comparative acoustic study of Chinese and English vowels produced by the same group of CE speakers needs to be conducted.

(iv) Nasalization of vowels

Another phonetic feature described in Deterding (2006a: 185) is the nasalization of vowels which occurs before a final nasal consonant and is "often accompanied by absence of any closure for the nasal" that follows. This, for example, often occurs in words like ***m*****an** and **on***ly* which are realized as /mã/ and /õlɪ/ respectively. Nasalised vowels were also observed, to a lesser extent, in Chen's (2008) study. Chen (2008) concludes, however, that the instances of vowel nasalization for her participants (33%) are fewer than for the RP speaker (50%), and that "the frequency of heavy nasalization (4%) was less significant as opposed to the 38% observed in Deterding's research" (p. 31).

The studies of phonetic features of CE we have discussed above, especially the systematic empirical studies done by Deterding (2006a), Ho (2003) and Hung (2003), have undoubtedly offered some insights into English in China and laid a good foundation for subsequent phonetic description of varieties of CE. One important implication arising from these studies is that in order to investigate more fruitfully the dialectal influences upon a particular variety of CE it may be plausible to focus on just one particular variety of English, considering the significant differences in the regionalects[5], dialects and minority languages in China. Following this line of thought, the present study focuses on one particular province, i.e. Yunnan. The following section presents some vocalic features of Yunnan English described by Ao and Low (2012).

Vowels of Yunnan English

A recent study has been done by Ao and Low (2012) who, based on the auditory analysis of 10 undergraduate Yunnan English speakers from 5 different ethnic groups, identified five salient pronunciation features of vowels of Yunnan English, as summarized below.

(i) /ʌ/ pronounced as /ɑ/

This is found in Ao and Low (2012) to be the most commonly occurring vocalic feature in Yunnan English. Nine out of ten participants in their data pronounced the vowel /ʌ/ as /ɑ/ in the words such as *up, us, come* and *cousins*. This feature, however, was not reported in the above-mentioned studies of CE, which led Ao and Low (2012) to believe that this is the widespread

feature of Yunnan English. This is traceable to the fact that the vowel /ʌ/ is absent in Yunnanese so YE speakers tend to replace it with /ɑ/.

(ii) Absence of reduced vowels

Regarded in previous studies of CE (especially Deterding 2006a) as the second most salient vocalic feature, this is also found to be quite common in Yunnan English, for example, the words *concern*, *convinced* and *of* tend to be pronounced by Yunnan English speakers as /ˈkɒnsən/, /kɒnˈvɪnst/ and /ɒf/ respectively.

(iii) Variable realization of /iː/, /ɪ/ and /e/

Unlike other CE speakers in previous studies, some Yunnan English speakers were found to pronounce these sounds in a similar way to other vowels, for example, the vowel /iː/ is realized as /e/ (as in *fields*) and /eɪ/ (as in *feast*) by three out of ten speakers; the vowel /ɪ/ is realized as /iː/ as in *it* and *fist*, /e/ as in *village*, /ɜː/ as in *fist* and /eɪ/ as in *village* and *fist*; the vowel /e/ is realized as /ɜː/ as in *however*, /iː/ as in *threaten* and /eɪ/ as in *pleasure* and *successful*. This is in a sense not easy to account for but it may be safe to say that the absence of the vowels /ɪ/ and /e/ in the varieties of Yunnanese spoken by some of the participants is a contributing factor.

(iv) Schwa insertion

Three types of schwa (i.e. /ə/) insertion were found in Ao and Low (2012): (1) word-final plosive + /ə/ + plosive (or other C/V), e.g. *next to* /ˈnekstə̲ tʊ/, *used to* /ˈjʊzdə̲ tʊ/ and *just escaped* /ˈdʒɑstə ɪˈskeɪpt/; (2) inside consonant cluster, e.g. *cried* /kə̲ˈrɑɪd, kə̲ˈred/; (3) before nasal /n/, e.g. *afternoon* /ɑːftəˈnuːən/ and *soon* /ˈsuːən/. Since Yunnanese has a similar syllable structure to that of Mandarin Chinese which in general has few final consonants and consonant clusters (Chang 1987), Yunnan English speakers therefore tend to add an extra vowel at the end of a word. And it can be anticipated that Yi speakers would also have this feature due to the similar syllable structure of the Yi language (Yang and He 2007: 69).

(v) Variable pronunciation of diphthongs

Interestingly, it was found in Ao and Low (2012) that participants do not seem to be comfortable with the pronunciation of English diphthongs. Some diphthongs are either pronounced as other ones or pronounced as monophthongs. These problematic diphthongs include /eɪ/, /ɑɪ/, /ɪə/ and /ɛə/, for example /eɪ/ is pronounced as /ɑɪ/ as in *raising* /ˈrɑɪzɪŋ/ (five out of ten speakers) and /iː/ or /e/ as in *safety* /ˈsiːftɪ/ or /ˈseftɪ/; /ɑɪ/ is pronounced as /e/ as in *while, tried, cried* and *diet*; /ɪə/ is pronounced as /ɛə/ as in the word *fear* /fɛə/ whereas /ɛə/ is realized as /ɜː/ as in *air* /ɜː/. This feature may have been transferred from Yunnanese in which, as in Mandarin Chinese, diphthongs are generally realized "with quicker and smaller tongue and lip movements" than English, resulting in little distinction between the two vowels (Chang 1987: 225).

Some of these features were also present in previous studies such as Deterding (2006a), e.g. 'lack of reduced vowels' and 'extra final vowel'. What is noticeable, however, is that some features found in Yunnan English were not present in the studies of CE. These features may potentially become the features of Yunnan English. These results, however, must be taken with caution due to the fact that participants in Ao and Low (2012) only comprise English majors who may not represent the whole population of Yunnan English speakers. Another factor is that Ao and Low (2012) is based on a small data set (only two participants from each ethnic group) and did not take into account influences from participants' substrate languages. Furthermore, in terms of both duration and quality, vowels are in many cases indistinguishable in auditory terms. Acoustic analyses may produce more robust results in this respect.

The present study aims to address these issues by attempting an acoustic investigation of the vowel durations and quality of Yunnan English speakers. Based on this aim, the main research questions are:

1. What are the vowel duration distinctions between long and short vowels for Yunnan English speakers, namely English majors, non-English majors and the Yi minority ethnic group speakers respectively?
2. What are the vowel quality distinctions for Yunnan English speakers, namely English majors, non-English majors and the Yi minority ethnic group speakers respectively?

METHOD

Participants

The present study involves a total of 15 participants, including 5 Han Chinese English majors (YEMH), 5 Yi minority ethnic English majors (YEMYI), and 5 Han Chinese non-English majors (YENMH). The Yi minority ethnic speakers were chosen instead of other minority ethic speakers because Yi is the largest minority ethnic group in Yunnan. The participants were all females as there was a shortage of male volunteers from both English and non-English majors.

Since the speech sample of these 15 participants is used for comparative analysis, participants with similar social characteristics were chosen. Therefore, all participants met at least three criteria, namely age, residence and education background. Specifically, participants were between 19 and 23 years old with an average age of 20.8. At the time of the recording, they had not lived outside of Yunnan for more than three months, which means the pronunciation of their first language had not been affected by other Chinese regionalects or dialects. In terms of education background, which is an important factor to be taken into, all participants were undergraduate students who had learnt English for at least six years before entering university. Of the English majors, two were first-year students, four were second-year and the other four were third-year students. All the five non-English majors were first-year students. At the time of recording, all speakers were at the end of the second semester, which means all participants had received at least one academic year of university education.

In terms of English proficiency level, all the 15 participants had passed the National University Entrance Qualifying Exam (or *gaokao*) which includes English as one of the core subjects. Besides, the English majors all took part in the oral English test (an additional qualifying test for English majors) before *gaokao*. And the two groups of English majors (i.e. YEMH and YEMYI) had all completed a one-semester course in English phonetics besides other subjects in English. For these English majors, most subjects were taught in English. The non-English majors had not received any phonetic training.

For purposes of pronunciation screening, we excluded the recording of one participant who spoke with a lisp and the recordings of two participants whose speech had too many mispronunciations and idiosyncrasies. Nevertheless, we predicted that English majors may have

lower intra- and interspeaker variability than non-English majors given the fact that the former are more exposed to English than the latter, not forgetting the fact that the former had gone through a course on English phonetics.

Test materials and recording conditions

In order to ensure accurate measurements in acoustic analysis, it is important that clearly recorded speech samples are obtained and that a sufficient number of tokens for each category is analysed. While spontaneous speech samples are preferable to some researchers, read speech is in fact also very commonly used in acoustic phonetic studies. It is true that spontaneous speech samples can provide natural occurring data, but they often cannot provide sufficient or any tokens for certain vowels or consonants that need to be analysed, thus rendering comparison difficult. For this reason, we decided to use a read passage so that we could get the same tokens for each speaker for purpose of comparison. The passage *The Boy Who Cried Wolf* (hereafter 'The Wolf Passage'; see Appendix I) proposed in Deterding (2006b) was used instead of *The North Wind and the Sun* (hereafter 'NWS'). Although the latter is the standard text used by the International Phonetic Association (1999: 39), it is not without its shortcomings according to Deterding (2006b). Among other shortcomings, NWS "is not ideal for the acoustic description of English vowels" (Deterding 2006: 192) whereas The Wolf Passage has more to offer for the same purpose. For example, at least three clear and easily measurable instances of monophthongs of English can be found in the Wolf Passage. These instances are free from preceding approximants which tend to seriously affect the vowels due to coarticulation (Deterding 1997). Another advantage of the Wolf Passage over the NWS passage in the interest of the present study is that it contains four minimal pairs that can be used to test vowel distinctions in the variety of English under study (Deterding 2006b). These minimal pairs include /ɪ/~/ iː/, /ʊ/~/uː/, /ʌ/~/ɑː/ and /ɒ/~/ɔː/.

From the Wolf Passage a minimum number of three tokens of each monophthong produced by each speaker were selected for analyses of both vowel duration and quality. To ensure that participants could read the passage as fluently and accurately as possible, we gave the test material to participants at least three hours for preparation before recording took place. During recording, participants were asked to read aloud and as clearly and naturally as possible. Some

participants were given the opportunity to read the materials a second time because of the errors that occurred in their first recordings.

All the recordings were made in a quiet though not soundproof room. A high quality ZOOM H4n PCM digital recorder was placed a few inches away from each subject reading the test materials. Their speech was digitally captured directly in the .wav format and was transferred to a computer through USB connection after recording was done. A sampling rate of 22,500 Hz was selected as this is frequently used as the baseline level required for close acoustic analysis of speech (Hayward 2000).

Data analysis

The speech data was analysed using Praat (Version 5.2.33), a freely available software programme developed by Paul Boersma and David Weenink (2011) of the Institute of Phonetic Sciences, University of Amsterdam. Instances of clear vowels that receive primary stress were selected and analysed by estimating formants (F1 and F2) using Linear Predictive Coding (LPC) analysis overlaid on digital spectrograms. In measuring vowels, special care was taken as to where segment boundaries were placed. In some obvious cases, auditory method was used as it is a very useful technique for the determination of rough segment boundaries (Baart 2010). In the Praat programme, for example, the cursor can be easily positioned in any point of the segment which can be played. In some cases, one particular segment was selected and repeatedly listened to in order to determine where one segment ends and where the next starts. For the present study, we measured the frequencies of F1 and F2 to examine the quality, i.e. frontness and height of Yunnan English vowels. However, since vowels also differ in terms of duration (Lehiste and Peterson 1961), we also measured vowel durations using the Wolf Passage.

In order to obtain the Yunnan English speakers' vowel quadrilaterals, we calculated each speaker's average values of F1 and F2. Then we scaled the dimensions of the average values through the Bark scale[6], as is a method widely used by phoneticians (Hayward 2000: 142). The Bark scale was used to transform the measured values of F1 and F2 into a perceptual space, which enables a visual presentation of how the vowels are perceived (see Hayward 2000: 140-142). In this way, the distance between the plotted vowel formant values are similar to the distances between the auditorily perceived vowel qualities. In the present study, we use the Bark scale conversion formula similar to the one used by Deterding (2003). The formula, as shown

below, was proposed by Zwicker and Terhardt (1980):

$Z = 13 \arctan (0.00076F) + 3.5 \arctan (F/7500)^2$

where F is the frequency in Hz and Z is the frequency in Bark

And following Deterding (2003), the vowel formants were plotted in this study using a direct plotting of F2 against F1. In addition to measurement of vowel formants, we also calculated the distance of the individual vowels from the centroid[7], also known as 'the Euclidean Distance'. We strictly adhered to the guidelines expounded in Deterding (2006a) when selecting vowel samples from the Wolf Passage for the measurement of both vowel duration and quality. Clearly-spoken stressed instances of each of the monophthongs were used, specifically, each instance of monophthong used for measurement is clear and occurs in a stressed position; monophthongs preceded or followed by /r/, /w/ and /j/ were avoided; and monophthongs followed by /l/ and /ŋ/ were avoided. The reason is that these sounds "would have severe co-articulatory effects on the formants of the following vowel" (Deterding 2003: 4). As a general rule, we avoided function words as they tend to be reduced in connected speech though here we did include, as shown in Table 1, two function words *did* and *this*. However, their chance of being reduced is in fact quite slim as they are used for emphasis in the Wolf Passage.

This study adopts British English Received Pronunciation (RP) as the reference variety. While we are fully aware of the fact the American English (AmE) is becoming increasingly dominant through printed media, movies, music and the Internet to which our participants have been exposed, we should not neglect the fact that British English has been adopted as the model for English language teaching in China since the 1950s (Cheng 1992). To the best of our knowledge, there is no research showing the shift from British English to American English as the target model in Yunnan. In fact, our communication with some teachers in the university in Yunnan where our data were collected indicated that their preferable target model was British English though a few of them expressed open preferences between British English and American English.

Care was therefore taken to ensure that the selected sample words were not pronounced with American English features which would otherwise render the results inaccurate. For this reason, we excluded the values of a few words in which /ɒ/ was realized /ɑ/ in AmE, namely 'flocks' (one instance), 'hot' (three instances), 'not' (two instances), 'bother' (four instances).

The frequently selected sample word ‘thought’ was excluded from the list as it was found to be realized as /ɵɒt/ by eight out of fifteen speakers. Another word that was excluded from the list was ‘course’ which was realized as /kɒs/ or /kɜːs/ by eight speakers. We also excluded the values of a few other words which were either idosyncrasies or mispronunciation. These include ‘flocks’(realized as ‘folks’), ‘short’(realized as /ʃɑːt/ or /ɕjuːt/), ‘shot’ (realized as /ʃuːt/), ‘began’ (realized as /bɪˈgɑɪŋ/), ‘heard’ (realized as /hɪəd/ or /hɛəd/), ‘company’ (realized as /ˈkæmpənɪ/ or /ˈkæmnɪ/) and ‘cousins’ (realized as /ˈkæŋsəs/). After exclusion of the above words and instances, there were still three tokens for each monophthong vowels for the majority of the speakers though there were two tokens for /ɒ/ for YEMH2 and YENMH4, and two tokens for /ɜː/ for YEMYI, YENMH2, YENMH3 and YENMH5 repectively. No instances of /ɑː/ (e.g. in ‘afternoon’ and ‘after’) were found to be realized as /æ/ and only one instance of rhoticity was found in one of the selected sample words, namely the word ‘third’ (realized as /ɵɜ˞d/) which was excluded from measurement.

Table 1. Monophthongs measured for each participant

Vowel	Vowels from the ‘Wolf’ passage
iː	sheep, even, feast
ɪ	little, fist, this, chicken, did, convinced
e	shepherd, next, get, pleasure, successful
æ	plan, exactly, actually, began
ʌ	up, company, fun, cousins, much, duck, come
ɑː	dark, afternoon, after
ɒ	flocks, hot, not, shot, bother
ɔː	short, more, before, unfortunately
ʊ	foot, good, looking
uː	afternoon, soon, two, zoo
ɜː	heard, concern, third

Measuring vowels can be problematic. In most cases, precision and consistency in determining the beginning and end of a vowel is required in the present study in which durations of vowels are an important component for scrutiny. Auditory criteria were at times inadequate and some visual criteria were therefore used instead to determine the segment boundaries. Specifically, three guidelines described in Low (1998) and Baart (2010) were strictly followed, namely (1)

sudden change of amplitude, i.e. the marked difference in amplitude between two successive cycles in a speech wave; (2) change of wave and formant structure; and (3) the middle of transitional region. The results for Yunnan English vowel durations and qualities measured for the present study are presented and discussed in the section below.

RESULTS

Vowel durations

The average values for long/short vowel durations for the three groups of Yunnan English speakers are shown in Table 2. We also calculated the standard deviation (SD) and conducted t-tests for each vowel pair, also shown in Table 2. Contrary to our expectations, durational distinctions are only maintained between /ɪ/~/iː/ by the Han Chinese English majors, as is confirmed by t-test results. This is surprising as the Han Chinese English majors are expected to maintain more distinctions between long and short vowels given that they, being English majors, are generally exposed to more resources in English. The Yi minority ethnic English majors, on the other hand, distinguish between /ɒ/~/ɔː/ and /ʊ/~/uː/ but do not differentiate between /ɪ/~/iː/ and /ʌ/~/ɑː/. One would expect this group to be the same as the Han Chinese English majors as both groups comprise English majors. The fact that difference exists between these two groups in terms of vowel durations, though more striking differences may emerge with a larger data set, is perhaps indicative of substrate influence from the first language of the Yi minority ethnic English majors. This, however, needs to be further validated with more participants from both groups and more tokens measured for each vowel pair.

Table 2. Average durational values (in ms) of long-short vowel pairs with standard deviation (SD) and T-test results (the Wolf Passage)

Vowel/vowel (paired t-test)	ɪ	iː	t-value /ɪ, iː/	ʌ	ɑː	t-value /ʌ, ɑː/
YEMH	91.68	105.65	4.55*	102.21	108.59	0.76
SD	*13.99*	*10.76*		*14.10*	*12.18*	
YEMYI	100.22	105.88	1.04	118.18	116.70	0.55
SD	*12.54*	*5.14*		*17.46*	*20.32*	
YENMH	101.65	119.75	3.47*	116.71	123.23	1.47
SD	*3.82*	*13.71*		*15.61*	*18.45*	
Vowel/vowel (paired t-test)	ɒ	ɔː	t-value /ɒ, ɔː/	ʊ	uː	t-value /ʊ, uː/
YEMH	117.00	126.63	0.98	92.22	123.30	2.23
SD	*11.34*	*20.65*		*16.18*	*23.09*	
YEMYI	108.82	133.52	3.08*	108.98	145.14	3.68*
SD	*9.67*	*18.45*		*24.93*	*16.77*	
YENMH	130.64	148.62	3.95*	97.97	143.67	7.62**
SD	*30.01*	*27.60*		*15.32*	*14.89*	

(*: $p < 0.05$; **: $p < 0.01$. df = 4, paired sample, two-tailed)

Key: YEMH = Han Chinese English majors; YEMYI = Yi minority ethnic English majors; YENMH = Han Chinese non-English majors

The third group, i.e. the Han Chinese non-English majors, also quite unexpectedly, do maintain significant durational distinctions between three pairs of vowels, i.e. /ɪ/~/iː/, /ɒ/~/ɔː/ and /ʊ/~/uː/, as confirmed by T-test results in Table 2. Comparing this non-English major group with the other two English major groups, one cannot help but wonder why more durational vowel distinctions are maintained by the Han Chinese non-English majors who are likely to have had less exposure to English language resources. When we compare the Han Chinese English majors with the Han Chinese non-English majors, we find that the differences existing in the vowel durations between these two groups of speakers may hardly be attributable to influences from Yunnanese, a common language they share. Otherwise, the differences would not have been so great. Neither can we convincingly attribute the differences to their English proficiency level because that would mean less proficient speakers distinguish between long and short vowels whereas more proficient speakers do not. Exposure aside, the results clearly show that a difference exists between English majors and non-English majors in terms of vowel durations.

From the durational values of each group of speakers of Yunnan English, it is quite tempting to assume that there may be considerable conflation of vowels produced by the Han Chinese English majors, less conflation in the vowels of the Yi minority ethnic English majors

and least conflation of vowels produced by the Han Chinese non-English majors. However, to confirm these assumptions, vowel qualities need to be examined as vowels are differentiated not only durationally but also qualitatively. To achieve this goal, we now move to the next section in which results of vowel qualities are presented.

Vowel quality

The average F1 and F2 formant values for all the three groups of Yunnan English speakers are listed in Table 3. At first glance, one would have an impression that these values look quite similar across the three groups both in terms of F1 and F2. However, this impression is only partly confirmed by the results of t-test which reveal that the difference between the Han Chinese English majors and the Yi minority ethnic English majors is insignificant both in terms of F1 and F2. Comparison was made between the Han Chinese English majors and the Han Chinese non-English majors, and no significant difference was found in terms of F1, but in terms of F2 the difference between these two groups are highly significant ($t=5.92$, $df=10$, $p<0.001$, paired sample, two-tailed). As for the comparison between the Yi minority ethnic English majors and the Han Chinese non-English majors, the t-test result shows that these two groups are significantly different both in terms of F1 ($t=2.37$, $df=10$, $p<0.05$, paired sample, two-tailed) and F2 ($t=3.17$, $df=10$, $p<0.05$, paired sample, two-tailed) values. This is to be expected, as the Han Chinese English majors and the Yi minority ethnic English majors specialize in English whereas the Han Chinese non-English majors do not, which results in similarity between the Han Chinese English majors and the Yi minority ethnic English majors but difference between these two groups and the Han Chinese non-English majors. The similarity and difference between formant values of these groups can be seen more clearly when presented in the formant plots later in this section.

Table 3. Average formant frequencies for YEMH, YEMYI and YENMH monophthong vowels (The Wolf Passage)

	F1 (Hz)			**F2 (Hz)**		
	YEMH	YEMYI	YENMH	YEMH	YEMYI	YENMH
iː	441	439	433	2063	2201	1784
ɪ	474	479	469	2089	2173	1933
e	686	685	700	1849	1876	1704
æ	720	757	790	1808	1877	1678
ʌ	870	821	871	1477	1434	1361
ɑː	850	884	896	1494	1372	1449
ɒ	699	696	662	1325	1225	1223
ɔː	615	542	581	1164	1054	1132
ʊ	462	466	497	1557	1536	1305
uː	518	457	495	1596	1676	1308
ɜː	662	589	623	1671	1599	1424

Key: YEMH = Han Chinese English majors; YEMYI = Yi minority ethnic English majors; YENMH = Han Chinese non-English majors

Figure 1 shows a plot of the average formant frequencies for the Han Chinese English majors. This plot can be compared with the average formant values for the Yi minority ethnic English majors, as shown in Figure 2, and also with those for the Han Chinese non-English majors, as shown in Figure 3. As Figure 1 shows, the first differences that strike us are the three pairs of vowels that are quite close together for the Han Chinese English majors, namely /ɪ/~/iː/, /e/~/æ/, /ʌ/~/ɑː/. This means that for the Han Chinese English majors these pairs of vowels are partially merged to a varying degree. In contrast, /ʊ/~/uː/ are further apart and /ɒ/~/ɔː/ are much further apart for the Han Chinese English majors. The results of t-test show that for the Han Chinese English majors significant difference only exists between the vowel pair /ɒ/~/ɔː/ (F1: $t=2.92$, $df=4$, $p<0.05$; F2: $t=7.28$, $df=4$, $p<0.01$; paired sample, two-tailed) and F1 of the vowel pair /ʊ/~/uː/ ($t=2.92$, $df=4$, $p<0.05$, paired sample, two-tailed). The overlap of /ʌ/~/ɑː/ is found here, which accords closely with the previous study of Yunnan English in which distinction between these two vowels is also not maintained (see Ao and Low 2012).

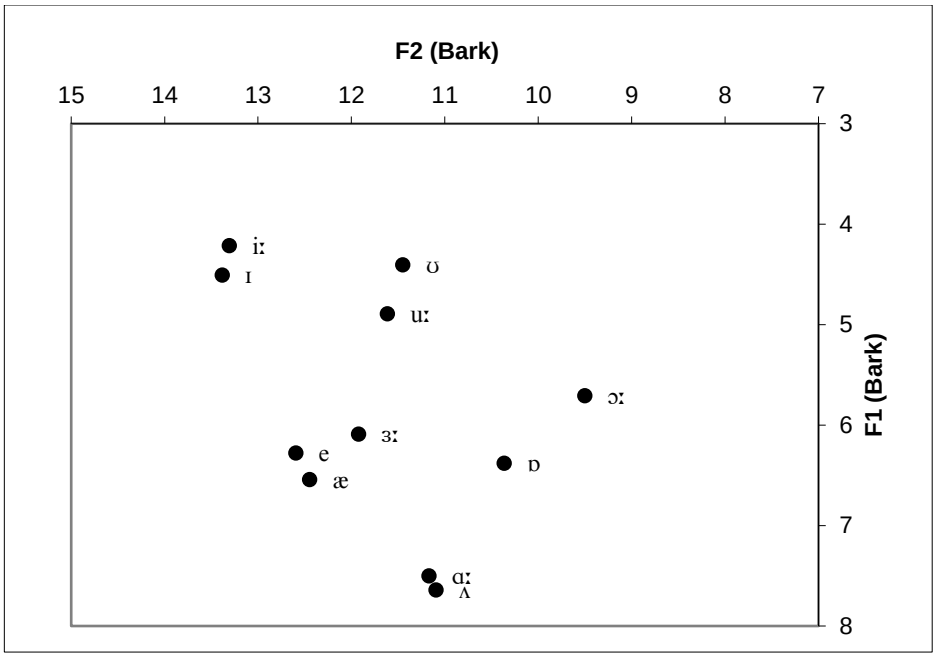

Figure 1. Formant plot for average vowels of the Han Chinese English majors (The Wolf Passage)

As for the Yi minority ethnic English majors as shown in Figure 2, a similar pattern can be observed for vowel pairs /ɪ/~/iː/, /e/~/æ/ and /ʌ/~/ɑː/ which are partially merged though they are slightly further apart than those for the Han Chinese English majors. In comparison with the Han Chinese English majors, it is also found that both /iː/ and /æ/ are a bit more front for the Yi minority ethnic English majors. While the pattern for /ɒ/~/ɔː/ is considerably similar between the Han Chinese English majors and the Yi minority ethnic English majors, /uː/ is higher for the Yi minority ethnic English majors. The t-test results show that except for the vowel pair /ɒ/~/ɔː/ (F1: t=3.38, df=4, $p<0.05$; F2: 4=4.54, df=4, $p<0.05$; paired sample, two-tailed) and F2 for the vowel pair /ʊ/~/uː/ (t=3.64, df=4, $p<0.05$; paired sample, two-tailed) which are significantly different, the distinctions between other vowel pairs are not maintained in the Yi minority ethnic English majors.

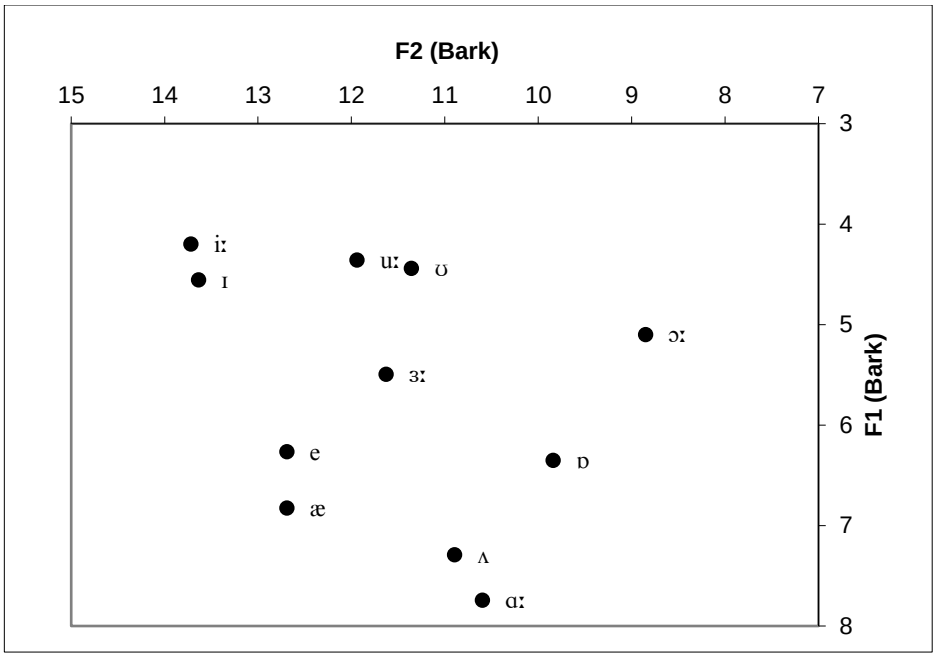

Figure 2. Formant plot for average vowels of the Yi minority ethnic English majors (The Wolf Passage)

Comparatively speaking, the plot of average formant values for the Han Chinese non-English majors (Figure 3) presents a different picture from those of the other two groups of English majors. One of the most noticeable differences is that the /ʊ/~/uː/ pair is completely merged together for this group of speakers. Other differences are that the vowel pairs /ɪ/~/iː/, /e/~/æ/, /ʊ/~/uː/ and the vowel /ʌ/ are generally more back for the Han Chinese non-English majors than those for the two groups of English majors. A common feature shared by all three groups of speakers is that the pattern of vowel pair /ɒ/~/ɔː/ is quite similar though a bit lower for the Han Chinese English majors. The result of t-test, however, shows that for this group of Yunnan English speakers there is significant difference between this vowel pair only in terms of F1 ($t=3.35$, $df=4$, $p<0.05$, paired sample, two-tailed). For the vowel pair /ʌ/~/ɑː/, significant difference only occurs for F2 ($t=3.33$, $df=4$, $p<0.05$, paired sample, two-tailed). This may be traceable to the fact that the /ɒ/~/ɔː/ distinction is maintained in most varieties of Yunnanese (Gui 2001) though it is not maintained in Mandarin Chinese (Chang 1987, 225).

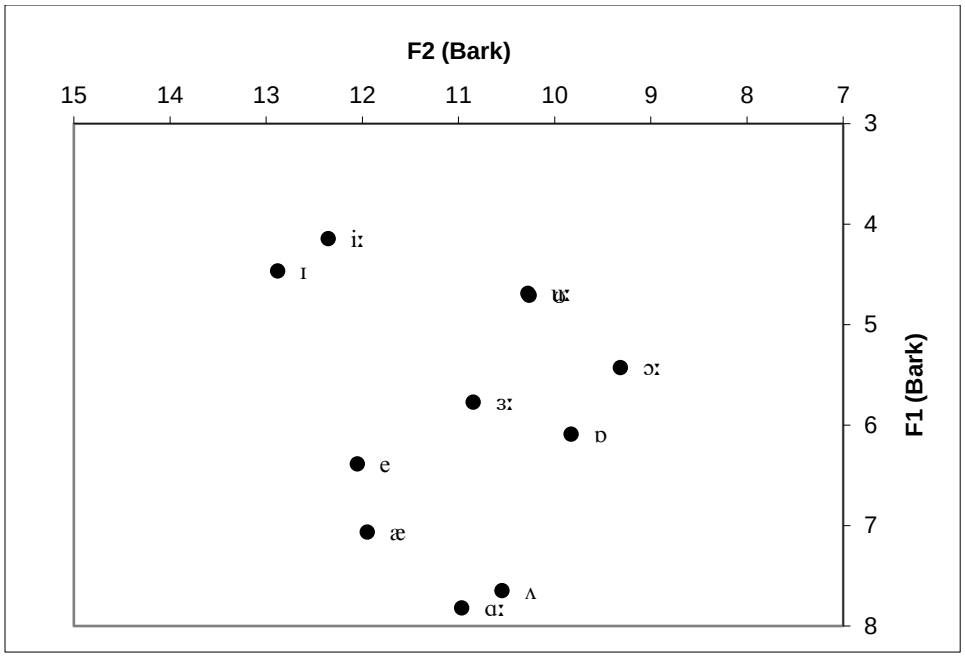

Figure 3. Formant plot for average vowels of the Han Chinese non-English majors (The Wolf Passage)

Figure 4 below, with the average formant values of all three groups plotted together, provides an overall summary of vowel spaces for the three groups of Yunnan English speakers. An additional observation to be made is that the vowel /ɑː/ is slightly higher than those for the other two groups, thus leaving the vowel pair /ʌ/~/ɑː/ inverted for the Han Chinese English majors.

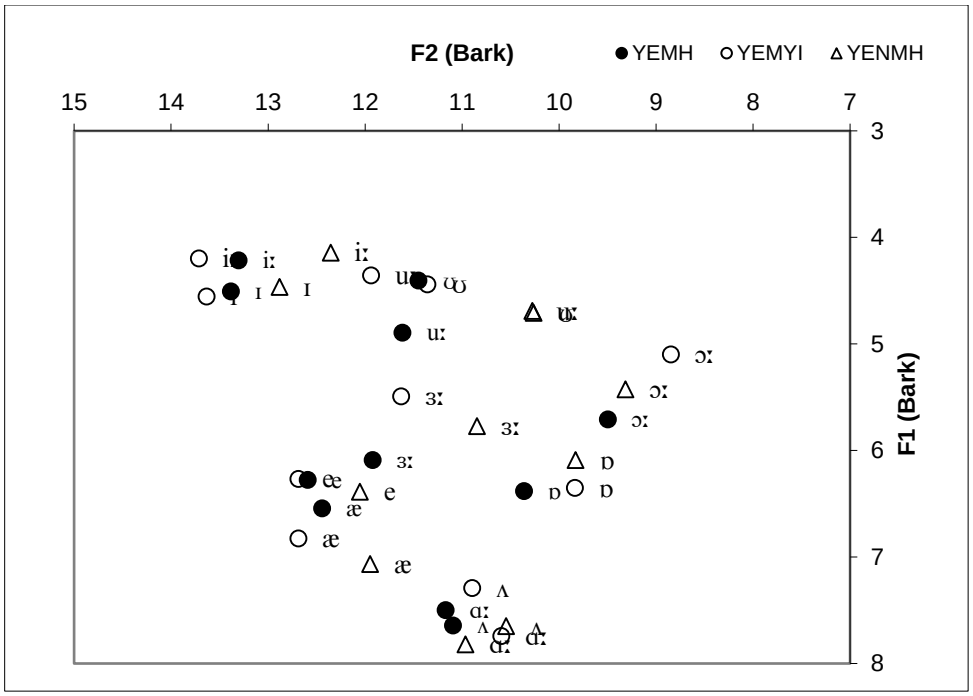

Figure 4. Overlapping formant plot for average vowel values for the Han Chinese English majors (YEMH), the Yi minority ethnic English majors (YEMYI) and the Han Chinese non-English majors (YENMH)

Examination of Figures 1-3 suggests that the vowel quadrilaterals of the Han Chinese English majors and the Han Chinese non-English majors are more compact than that of the Yi minority ethnic English majors. In order to confirm whether this is the case, we measured the Euclidean distance (see Table 4), a method used by Deterding (1997) to ascertain the average distance of all the vowels from the centroid and also to determine how central or peripheral the vowels are in the vowel quadrilaterals of the three groups of Yunnan English speakers. The result of the Euclidean distance is 1.61 for the Han Chinese English majors, 1.91 for the Yi minority ethnic English majors and 1.67 for the Han Chinese non-English majors. The Euclidean distance is significantly different between the Han Chinese English majors and the Yi minority ethnic English majors ($t=3.34$, $df=9$, $p<0.01$, paired sample, two-tailed), but not between the Han Chinese non-English majors and the Yi minority ethnic English majors. Moreover, there is no significant difference in Euclidean distance between the Han Chinese English majors and the Han Chinese non-English majors. This confirms that the vowel space of the Yi minority ethnic English majors is significantly more peripheral than that of the Han Chinese English majors and the Han Chinese non-English majors.

Table 4. Euclidean distance for YEMH, YENMH and YEMYI monophthong vowels (The Wolf Passage)

	ɪ	iː	e	æ	ʌ	ɑː	ɒ	ɔː	ʊ	uː	Average
YEMH	2.13	2.27	0.99	1.02	1.91	1.75	1.46	2.22	1.45	0.94	1.61
YEMYI	2.31	2.57	1.21	1.56	1.76	2.29	1.90	2.84	1.28	1.37	1.91
YENMH	2.31	2.15	1.16	1.54	1.87	1.98	1.22	1.76	1.36	1.37	1.67

Key: YEMH = Han Chinese English majors; YEMYI = Yi minority ethnic English majors;
YENMH = Han Chinese non-English majors

Having examined in detail the vowel durations and qualities of Yunnan English speakers, we now provide an overall summary (Table 5) of durational and qualitative features of Yunnan English vowels with a view to offering in a nutshell the general picture of Yunnan English. As shown in Table 5, there appear to be more similarities than differences across the three groups Yunnan English speakers, particularly in terms of vowel quality.

Table 5. Summary of the results relating to the vowels of Yunnan English

Vowel pairs	**Han Chinese English majors**	**Yi minority ethnic English majors**	**Han Chinese non-English majors**
/ɪ, iː/	• significant difference in vowel length (t=4.55, p<0.05) • no differentiation in vowel quality	• no difference in vowel length • no differentiation in vowel quality	• significant difference in vowel length (t=3.47, p<0.05) • no differentiation in vowel quality
/e, æ/	• no difference in vowel length • no differentiation in vowel quality	• no difference in vowel length • no differentiation in vowel quality	• no difference in vowel length • no differentiation in vowel quality
/ʌ, ɑː/	• no difference in vowel length • no differentiation in vowel quality (overlapped; /ʌ/ is lower than /ɑː/)	• no difference in vowel length • no differentiation in vowel quality	• significant difference in vowel length (t=4.67, p<0.01) • differentiation in F2 (t=3.33, df=4, p<0.05) but not in F1
/ɒ, ɔː/	• no difference in vowel length • differentiation in vowel quality (F1: t=2.92, df=4, p<0.05; F2: t=7.28, df=4, p<0.01)	• significant difference in vowel length (t=3.08, p<0.05) • differentiation in vowel quality (F1: t=3.38, df=4, p<0.05; F2: t=4.54, df=4, p<0.05)	• significant difference in vowel length (t=3.95, p<0.05) • differentiation in F1 (F1: t=3.35, df=4, p<0.05) but no in F2
/ʊ, uː/	• no difference in vowel length • differentiation in F1 (t=2.92, df=4, p<0.05) but no differentiation in F2	• significant difference in vowel length (t=3.68, p<0.05) • differentiation in F2 (t= 3.64, df= 4, p<0.05) but not in F1	• significant difference in vowel length (t=7.62, p<0.01) • no differentiation in vowel quality (overlapped)

Our analyses have so far shown that there are only slight differences in vowel quality among Yunnan English speakers. However, we still have not examined variability among individual participants in all three groups. For without looking at variability, we are unable to determine the degree of difference or similarity among each group of participants. Therefore, standard deviation (SD) measures were obtained for all F1 and F2 values of the vowels from the Wolf Passage that were measured in this study in order to determine the degree of inter-speaker variability within each group and individual. The average SD values of all 11 vowels for all three groups of Yunnan English speakers are shown in Table 6.

Table 6. Standard deviation (SD) values of F1 and F2 frequencies of all tokens measured

	F1 (SD)			**F2 (SD)**		
	YEMH	YEMYI	YENMH	YEMH	YEMYI	YENMH
iː	48.5	55.8	53.8	352.1	178.7	428.2
ɪ	45.6	36.2	49.5	287.3	194.3	188.3
e	105.9	103.2	104.9	155.7	114.8	314.3
æ	37.9	149.0	170.2	272.6	225.7	75.2
ʌ	38.8	51.2	129.1	99.1	149.3	39.7
ɑː	47.7	117.5	74.6	102.2	110.0	73.3
ɒ	72.7	76.3	105.6	95.5	162.4	179.0
ɔː	13.0	39.1	56.5	72.4	113.2	104.3
ʊ	38.0	48.4	43.2	206.4	289.5	145.8
uː	69.7	51.5	69.7	171.3	312.4	214.0
ɜː	97.7	89.2	45.6	97.8	72.9	209.5

Key: YEMH = Han Chinese English majors; YEMYI = Yi minority ethnic English majors;
YENMH = Han Chinese non-English majors

Table 6 shows that in terms of F1 the inter-speaker variability of the two groups of English majors (i.e. YEMH and YEMYI) is quite similar (though YEMH speakers have lower SD values for a few vowels) and on the whole lower than that of the non-English majors (i.e. YENMH). This is quite unsurprising as the English majors have received some training in phonetics and may have more exposure to English than the non-English majors. Quite interestingly, in terms of F1, the fact that the Han Chinese English majors have the highest inter-speaker variability for /e/ and /ɜː/ confirms the auditory observation in Ao and Low (2012) that in some cases the former is in fact realized as the latter by Yunnan English speakers. Another interesting fact is that the inter-speaker variability for the vowel /e/ is virtually the same among all three groups and at the

same time similarly high, suggesting that this vowel is equally problematic (at least in terms of vowel height) for all the three groups of Yunnan English speakers. However, F2 appears to be more problematic for all the three groups of speakers as their SD values are generally much higher than those for F1. A quick glance shows that for all three groups the SD values are high for the four front vowels, i.e. /iː/, /ɪ/, /e/ and /æ/ except for the Han Chinese non-English majors in terms of /æ/. And in order to examine more closely how individual speakers vary in their vowel qualities, we present in Table 7 the SD values for vowel quality pertaining to each speaker in our data.

Table 7. Patterns of inter-speaker variability reflected in standard deviation (SD) based on individual speakers

		ɪ	iː	e	æ	ʌ	ɑː	ɒ	ɔː	ʊ	uː	ɜː
F1	YEMH1	158	69	88	84	77	83	86	49	103	96	122
	YEMH2	102	172	114	114	65	46	88	165	34	110	17
	YEMH3	124	69	75	136	94	108	36	117	105	42	21
	YEMH4	148	70	101	77	55	24	79	67	29	126	187
	YEMH5	16	41	49	272	32	19	104	69	27	22	57
	YEMYI1	78	13	82	262	118	195	97	48	47	75	50
	YEMYI2	34	93	201	112	114	111	273	124	25	60	9.5
	YEMYI3	74	51	127	90	26	50	40	71	59	41	63
	YEMYI4	132	110	118	23	45	79	99	160	48	42	74
	YEMYI5	97	46	67	99	35	19	82	78	26	22	64
	YENMH1	70	19	105	54	136	215	75	40	40	56	27
	YENMH2	95	144	59	118	232	38	42	57	34	179	49
	YENMH3	66	31	158	162	124	13	119	20	80	110	76
	YENMH4	67	68	90	73	158	119	89	76	15	149	5.7
	YENMH5	41	89	91	119	47	86	114	36	33	52	12
F2	YEMH1	893	748	786	487	213	288	145	222	79.2	335	89
	YEMH2	412	304	93	255	154	166	183	440	143	194	124
	YEMH3	461	295	257	729	80	81	88	202	79	203	136
	YEMH4	393	613	97	361	198	92	146	190	75	144	289
	YEMH5	190	202	293	490	125	102	117	234	274	285	367
	YEMYI1	475	385	350	294	112	167	226	337	121	584	58
	YEMYI2	308	457	216	505	108	369	257	198	136	244	600
	YEMYI3	430	516	306	434	85	80	52	219	184	164	12
	YEMYI4	51	197	607	387	135	312	134	154	243	133	402
	YEMYI5	385	115	122	162	141	50	230	334	107	282	292
	YENMH1	689	415	607	436	212	78	155	177	161	206	244
	YENMH2	918	945	476	635	239	79	91	336	25	77	298
	YENMH3	673	305	604	701	120	23	35	308	363	114	225
	YENMH4	282	126	219	76	136	207	33	350	59	99	12
	YENMH5	356	344	160	182	72	108	109	191	111	165	36

Key: YEMH = Han Chinese English majors; YEMYI = Yi minority ethnic English majors;
YENMH = Han Chinese non-English majors

On closer examination of Table 7, more detailed observations can be made on inter-speaker variability. With reference to F1, the inter-speaker variability does not seem very high among the two groups of English majors, which is confirmed by the result of one-factor ANOVA (YEMH: $F(10, 44)=1.11$, $p=0.38$; YEMYI: $F(10, 44)=1.50$, $p=0.17$) to be insignificant. By contrast, while the Han Chinese non-English majors have the high SD value (232) that is not as high as those of the Han Chinese English majors (272) and the Yi ethnic minority English majors (273), the Han Chinese non-English majors have greater number of low SD values than the other two groups. That is why the inter-speaker variability among the Han Chinese non-English majors is confirmed to be statistically significant ($F(10, 44)=2.62$, $p=0.01$).

Compared with F1, the SD values of F2 present a more striking picture. The overwhelming majority of high SD values cluster in the F2 area, especially of the two pairs of front vowels, i.e. /ɪ/~/iː/ and /e/~/æ/ (see the shaded parts in Table 7) whereas those for the other vowels are much lower, which confirms the forgoing observation. The highest and second highest SD values (i.e. 945 and 918) are specific to the Han Chinese non-English majors. And what is noticeable is that these values belong to the same speaker, i.e. YENMH2, suggesting that intra-speaker variability is remarkably high for this speaker. The lowest value for this group of speakers is only 12 and thus the difference between the highest and the lowest is 933 for the Han Chinese non-English speakers. This leads us to believe that the inter-speaker variability in F2 values for this group is statistically significant, which is confirmed by the result of one-factor ANOVA ($F(10, 44)=4.60$, $p=0.0002$). This is closely followed by the Han Chinese English majors whose highest SD value is 893 and lowest 75, resulting in a significant inter-speaker variability ($F(10, 44)=3.45$, $p=0.002$). The Yi ethnic English majors, on the other hand, have the lowest variability of the three groups and are confirmed to have statistically insignificant inter-speaker variability ($F(10, 44)=1.51$, $p=0.17$). We will discuss this further in the next section.

CONCLUSION

It is our aim to conduct an acoustic investigation of vowel durations and vowel qualities of Yunnan English based on speech sample from three groups of speakers, namely the Han Chinese English majors, the Yi minority ethnic English majors and the Han Chinese non-English majors.

In what follows, we will first summarize and discuss the main findings that have emerged from this study, after which we will explore some implications of the findings.

In terms of vowel duration, the Han Chinese English majors only distinguish between one of the four sets of long/short vowels, i.e. /ɪ/~/iː/, but not /ʌ/~/ɑː/, /ɒ/~/ɔː/ and /ʊ/~/uː/ whereas the Yi minority ethnic English majors maintain the long/short distinction for two vowel pairs, namely /ɒ/~/ɔː/ and /ʊ/~/uː/. For the Han Chinese non-English majors, however, there is only one vowel pair, namely /ʌ/~/ɑː/ for which distinction is not maintained, which is quite unexpected. Thus, considering vowel duration alone, it appears the Han Chinese non-English majors veer more toward the Inner Circle variety, i.e. RP than the other two groups of speakers. Conversely, the other two groups of speakers (i.e. the English majors) seem to be more influenced by Yunnan dialects or the Yi language in which distinction is not maintained for these vowel pairs. The results, however, should be treated with caution as the measurements were only based on data from female Yunnan English speakers. The future study needs to include male speakers to yield a more complete picture of vowel durations in Yunnan English.

With respect to vowel quality, significant difference in Euclidean distance occurs only between the Han Chinese English majors and the Yi minority ethnic English majors who have the highest average value. This suggests the vowel spaces of the Han Chinese English majors and the Han Chinese non-English majors are more compact than that of the Yi minority ethnic English majors, which further indicates that the Yi minority ethnic English majors may have less centralized quality of vowels than the other two groups. In addition, for this group of speakers, the results of formant frequency measurements show that the long and short vowel pairs are partially overlapped except the vowel pair /ɒ/~/ɔː/ and F2 of the vowel pair /ʊ/~/uː/. The Han Chinese English majors present a similar picture for the vowel pair /ɒ/~/ɔː/ though distinction is maintained for F1, rather than F2, of the vowel pair /ʊ/~/uː/. For the Han Chinese non-English majors, however, only F1 of the vowel pair /ɒ/~/ɔː/ and F2 of the vowel pair /ʌ/~/ɑː/ are distinguished. This indicates that the distinction between /ɒ/~/ɔː/ in RP has been realized in the English pronunciation of Yunnan English speakers and it may likewise be said that transferences from Yunnan dialect and the Yi language have been reflected.

Given that the present study only focuses on the monophthong vowels based on read speech of three small groups of Yunnan English speakers, the conclusions we draw here may be regarded as tentative. Based on the findings on vowel durations and qualities, which are

supported by statistical validation, shared vowel patternings across all three groups of Yunnan English speakers seem to be small. With respect to vowel length, the common feature seems to be that the vowel pair for which long/short distinction is maintained is /ʌ/~/ɑː/. Moving on to vowel quality, our data show that there is more similarity in distinguishing vowel quality compared to vowel length although differences exist between the English majors and non-English majors in these two respects. The most common vocalic feature is that /ɪ/~/iː/ and /e/~/æ/ are not distinguished by all three groups of speakers. However, for the two groups of English majors, there are more shared features. For instance, both groups do not distinguish /ʌ/~/ɑː/; both distinguish /ɒ/~/ɔː/ and both partially distinguish /ʊ/~/uː/. The Han Chinese non-English majors, on the other hand, do not fully distinguish (i.e. either F1 or F2) these three vowel pairs.

This raises important issues concerning inter-speaker variability and linguistic transference which need further elucidation before we conclude this paper. Inter-speaker variability may be the main factor influencing the results of vowel quality and vowel length. This is especially true for the Han Chinese non-English majors who show the highest level of inter-speaker variability of the three groups in terms of vowel quality, as indicated by their highest SD values. Although in terms of vowel length, the Han Chinese non-English majors do maintain distinction between three of the four long/short vowel pairs, it does not mean that their level of inter-speaker variability is consistently lower than their English major counterparts as the results for vowel length are based on aggregated values of individual speakers. Despite the fact that both groups of English majors have relatively lower inter-speaker variability for vowel quality, there still exist in these two groups individual speakers who have high variability. Interestingly, the Yi minority ethnic English majors do not exhibit significant inter-speaker variability for vowel quality, as shown by the ANOVA result. Having said that, in order to further corroborate this, future studies of Yunnan English need to include male speakers, more phonetic aspects such as consonants and rhythm, as well as more varied speech samples (e.g. both read and spoken speech, if possible). With respect to linguistic transference, we have earlier remarked that all three groups of speakers have shown phonological features that appear to be transferred from their mother tongues, namely Yunnan dialect and the Yi language. However, what is worthy of attention is that the vowel qualities of the Han Chinese English majors and the Yi minority ethnic English majors share quite similar characteristics, which may suggest that the sources of their phonological transferences are similar to a certain extent. This may also be because they share similar

background in English learning, e.g. both groups of speakers have attended a course in English phonetics. Another plausible explanation is that the Yi speakers have been exposed from primary school to Mandarin or Putonghua which has been used as "the main medium of instruction and minority languages are used as transitional medium of instruction" (Zhou 2012: 4). As a result, the phonology of the Yi language has substantially been influenced by that of Mandarin, or more specifically the Yunnan dialect.

Returning then to vocalic features of Yunnan English, one final observation needs to be made. When we compare the results of vowel length and vowel quality, we find that the two do not correlate closely with each other. For example, one group of speakers may maintain durational distinction for a certain vowel pair but not qualitative distinction for the same vowel pair. A case in point is the Han Chinese non-English majors who maintain highly significant distinction between /ʊ/~/uː/ in terms of vowel length but totally merge these two vowels. It can be concluded, in the light of this fact and the foregoing discussion, that Yunnan English is largely phonologically unstable, which confirms Schneider's (2011: 182) assertion that CE "is not a stable variety". Our analyses suggest that besides Yunnan dialect and the Yi language which contribute in a considerable degree to the vocalic features of Yunnan English, certain features may have resulted from following Inner Circle variety norms and mainly RP. However, it is important to note that the issue of proficiency level also needs to be factored in when considering the phonological features of Yunnan English. Some phonological features may be speaker-specific and may change or disappear when a speaker's level of proficiency increases, as pointed out in Deterding (2006b). Considering these factors, and in the absence of evidence showing the existence of English speech communities in this province, Yunnan English may be regarded as a learner variety. This, however, is inconclusive at this stage and needs to be further confirmed by including both male and female Yunnan English speakers and by considering consonants and suprasegmental features such as stress, rhythm and intonation.

This present study is intended to contribute to the study of Chinese English as a field of study within the world Englishes paradigm. Its contribution can be viewed from two perspectives, one related to the broader perspective, i.e. the features-based investigation of one variety of Chinese English and the other to a narrower perspective, i.e. the description of the English spoken by learners/users of the language in Yunnan province. From the first perspective, this study adds to the phonetic "feature pool" (Mufwene 2001: 4) of Chinese English by adopting a

province-based approach, rather than more general descriptions of the phonetic features of Chinese English (see for example Deterding 2006a). In this context, given the large population and complicated sociolinguistic situation in China, one might expect learners of English from different provinces to speak English with a range of different accents, reflecting the range of linguistic backgrounds found across the country. From a narrower perspective, the present study may also have pedagogical implications for English language teaching in Yunnan. For example, we would argue that our results highlight the lack of differentiation between long and short vowels in the speech of our Yunnan participants. Second, the present study similarly alerts teachers of English to the fact that the Yunnan English speakers typically partially or do not maintain contrasts in vowel pairs such as /ɪ/~/iː/, /e/~/æ/, /ʌ/~/ɑː/ and /ʊ/~/uː/, which may assist teachers in formulating practical aims and expectations in their classroom teaching. Finally, and perhaps most importantly, studies such as this may also serve to raise the awareness of educators, language teachers, and others, of the linguistic complexity of English language learning and use in this linguistically diverse area of China.

NOTES

1. The information about population and number of minority ethnic groups is based on the Yunnan government website (www.yn.gov.cn).
2. Following Li Rong (1985a, 1985b), Mandarin (i.e. Putonghua or PTH) consists of eight dialect groups, namely Beijing Mandarin Group (北京官话), Northeastern Mandarin Group (东北官话), Jilu Mandarin Group (冀鲁官话), Jiaoliao Mandarin Group (胶辽官话), Central Plains Mandarin Group (中原官话), Lanyin Mandarin Group (兰银官话), Southwestern Mandarin Group (西南官话) and Jianghuai Mandarin Group (江淮官话).
3. The term ‘CE’ here refers to ‘English in China’ or ‘Chinese English’, without taking up a strong position on the notion of varieties of English in China, which would be a topic for a rather different study.
4. Similarly, ‘YE’ is used here to mean ‘English in Yunnan’ or ‘Yunnan English’. By using this term we do not assume that an established variety of English has come into being in Yunnan Province.
5. Here we borrow the term *regionalect* proposed by DeFrancis (1984) to refer to the mutually unintelligible Chinese varieties. The term *dialect* is reserved by DeFrancis (1984) for the mutually intelligible subvarieties of the regionalects.
6. The Bark scale is defined by Kent and Read (2002: 301) as “a nonlinear transformation of frequency that is thought to correspond to the analysis accomplished by the ear”.
7. The centroid here refers to the central point of the chart that represents a certain speaker’s vowel space.

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APPENDIX I.

The Boy who Cried Wolf

There was once a poor shepherd boy who used to watch his flocks in the fields next to a dark forest near the foot of a mountain. One hot afternoon, he thought up a good plan to get some company for himself and also have a little fun. Raising his fist in the air, he ran down to the village shouting “Wolf, Wolf.” As soon as they heard him, the villagers all rushed from their homes, full of concern for his safety, and two of his cousins even stayed with him for a short while. This gave the boy so much pleasure that a few days later he tried exactly the same trick again, and once more he was successful. However, not long after, a wolf that had just escaped from the zoo was looking for a change from its usual diet of chicken and duck. So, overcoming its fear of being shot, it actually did come out from the forest and began to threaten the sheep. Racing down to the village, the boy of course cried out even louder than before. Unfortunately, as all the villagers were convinced that he was trying to fool them a third time, they told him, “Go away and don’t bother us again.” And so the wolf had a feast.