

A survey on intelligibility between Japanese and Hong Kong high school students

Reiichi Nagakubo

Nanzan Junior and Senior High School

Abstract: This paper has clarified what phonological aspects are necessary for both the Japanese and Hong Kong high school students for them to be intelligible. For the native speakers, as the research results show, a few phonological mistakes did not have a strong effect on their intelligibility. Instead, unnatural semantic chunk of reading caused them trouble. To the non-native speakers, on the other hand, their inability to distinguish individual sounds easily led to unintelligibility, which is clear judging from their syntactically ill-formed sentences. Consonants and vowels alike are of significance for the Japanese students whereas consonants play a more important role in intelligibility for the Hong Kong students. Specifically speaking, the Japanese and Hong Kong students are not likely to pronounce a consonant at a word's final position. As an example of consonant substitution which is widely seen in the voice data, the /θ/ sound was substituted for a similar sound /s/ by the Japanese student and /tʃ/ in the case of the Hong Kong examinee. Aspiration in the /p/ sound at the initial position and plosion in /d/ sound are weak, which is why the native speakers had trouble dictating the words. As for vowels, long vowels are not pronounced long enough and diphthongs are changed into long vowels. The distinction between /æ/ and /ʌ/ is highly ambiguous. On the suprasegmental level, the factors of low understandability might be related to incorrectly placed stress and unnatural intonation. Unintelligibility caused by suprasegmentals is extremely low compared to consonant and vowel unintelligibility.

Key words: intelligibility, pronunciation, high school students, Japanese, Hong Kong

1. Introduction

As English has been used more widely between non-native speakers, intelligibility becomes a key factor for communication. Jenkins (2000) proposes Lingua Franca Core as a result of a series of her works on intelligibility, which describes the minimum phonological rules learners must follow. Some previous studies in which Japanese learners are the subjects report that consonants play a crucial role in intelligibility, while others emphasise the importance of vowels (Suenobu et al., 1992; Kashiwagi and Snyder, 2008; Kashiwagi and Snyder, 2014; Tsuzuki and Nakamura, 2009; Nishio and Tsuzuki, 2014). All the previous studies used either university students or adults for their subjects. However,

taking into consideration that many high school students have opportunities such as a short language learning programme or international exchanges, it would still be of great value to investigate the intelligibility problems of non-native high school students.

This paper is concerned with to what extent English read by both Japanese and Hong Kong high school students can be intelligible. I will begin with presenting a brief background in the research area of intelligibility, followed by the findings of some previous studies. Then I will go on to pose my research questions. After showing the findings, I will follow up with a discussion. Finally I will conclude the paper with summary.

2. Background

2.1 Lingua Franca Core

The English language has become international in large part because of British political imperialism in the nineteenth century and the economic supremacy of the American superpower in the twentieth century (Crystal, 1997). Kachru (1992) elucidates the spread of English, in his own words, ‘three circles of English’: the Inner Circle where English is used as a native language in countries such as the USA, the UK, Canada and et cetera; the Outer Circle in which English is spoken as a second language as in India, the Philippines and Malawi; and the Expanding Circle where people learn English as a foreign language, such as in Japan, China and France. English is unique in that the speakers both in the Outer and in the Expanding Circles outnumber those in the Inner Circle. Non-native speakers have therefore claimed the unpossessed status of English, leading to the creation of a variety of English known as world Englishes amongst sociolinguists. Under these circumstances some scholars have advocated the idea of the goal of English teaching not being native-like but being mutually intelligible (Smith, 1985; Jenkins, 2000; Kachru and Smith 2008).

With the English language being used not only between native speakers but also between non-native speakers, the analysis of intelligibility in terms of phonological aspects has been rigorously scrutinised under the concept of ‘English as Lingua Franca.’ Amongst the leading researchers is Jennifer Jenkins, who has presented the ‘Lingua Franca Core (hereafter LFC). The LFC is a list of pronunciation features which are considered to be essential in order for a speaker to be intelligible in communication. It is categorised into four phonological components. First, all English consonant sounds are necessary with the exceptions of /θ/, /ð/ and [ʃ]. The plosives /p/, /t/, and /k/ must be aspirated when occurring at the initial position in a stressed syllable. Second, consonant clusters of an initial word must be clearly articulated. However, when learners have difficulty producing consonant clusters, it is acceptable to insert schwa between consonants. Third, vowel quantity rather

than vowel quality must be preserved. The /ɜ:/ is the only phoneme of the vowels necessary to be pronounced accurately mentioned in LFC. Finally, nuclear stress must be placed correctly (Jenkins, 2000). This paper will examine the validity of the LFC through the intelligibility investigation between native speakers and non-native speakers as well as between non-native speakers and other non-native speakers.

2.2 Pronunciation Teaching in Japan

As the number of foreign tourists has been growing increasingly, some companies such as ‘Rakuten’ and ‘Uniqlo’ have used English as an intra-company language, the importance of English has been shared by many Japanese people. The workers in these companies commonly use English between non-native English speakers. Nevertheless, Japanese people have little opportunities to experience a variety of Englishes in the classroom. Some authorised English textbooks for junior high school students include several characters whose nationalities are not limited to English-speaking countries. They are from the countries such as India, Brazil, Tanzania and et cetera. The abundance of characters’ nationalities reflect the reality of English as an international language. Their voices, however, do not indicate the reality of English functioning as a global language. The accent recorded on the CDs of all authorised English textbooks is confined to General American.

That being said, Japanese-influenced English with ‘katakana’ pronunciation is common in the classroom as a result of the great emphasis on communicative approach (Teshima, 2011). Since the learning of phonetic symbols is not compulsory, Japanese learners in junior and high schools alike do not acquire systematic pronunciation knowledge. Teshima, unsatisfied with the status quo, proposed a phonetics-based instruction in which teaching segmentals as well as suprasegmentals be implemented. Suenobu, on the other hand, suggested simplified pronunciation teaching. Broadly speaking, he states vowel addition as shown in [dorinku] for ‘drink’ which makes the pronunciation sound like ‘katakana’ English does not cause any intelligibility trouble (Suenobu, 2010).

2.3 Intelligibility

With the spread of world Englishes, or local varieties of English, the intelligibility between different English speakers deserves careful attention. Although the definition of intelligibility varies from researcher to researcher, it is of great significance to briefly look at Kachru and Smith’s framework of intelligibility.

Kachru and Smith (2008) illustrate three ideas for intelligibility studies: intelligibility, comprehensibility, and interpretability (pp. 61-64). Intelligibility is explained as ‘the

recognition of a word or another sentence-level element of an utterance.’ The measurement of intelligibility can be checked by having the listener repeat a sentence or using dictation. The intelligibility is high if one can repeat each word in a sentence correctly even if s/he does not understand what the whole sentence means.

The second notion, comprehensibility, is stated as ‘the recognition of the meaning attached to a word or utterance, i.e. the contextual meaning of the word in a sociocultural setting as well as the illocutionary force of an utterance.’ For example, if one can regard the sentence, ‘Please be prepared to leave the area by 3:00 p.m.’, as a polite request, then his or her comprehensibility of the utterance is high.

The final concept, interpretability, is referred to as ‘the recognition by the hearer/reader of the intent or purpose of an utterance, i.e. the perlocutionary effect the speaker/writer is aiming at. In answering a telephone call saying ‘Is Sean there?’, the interpretability is high if s/he says, ‘One moment please.’ after understanding that the caller is requesting to speak with Sean. The literal response, ‘Yes, he is.’ is not enough for communication to be done smoothly.

This paper is concerned with the first two conceptions, intelligibility and comprehensibility. Intelligibility will be measured through how correctly a subject can dictate each word in a sentence whereas comprehensibility will be through the comprehensibility score according to the Likert Scale ranging from 1 to 5, both of which will be shown more in detail in Chapter 4.

3. Literature Review

3.1 Previous Studies on Intelligibility

Suenobu et al. (1992) had Japanese university students make a five-minute speech in English, and then chose 52 sentences which included mispronounced words. They asked 48 Americans to dictate only mispronounced words and thereafter a whole sentence. Through the error analysis they clarified mainly two things. One was that intelligibility was high with a context. To be more precise, the subjects, generally speaking, could write mispronounced words correctly if given a whole sentence. They went on to analyse the tendency of errors from a phonological viewpoint. The highest error type was consonant deletion. The percentage of correct answers with consonant deletion was 23.3% with context and 48.8% without context respectively. Their findings about consonant error leading to unintelligibility conformed to Jenkins’ LFC.

Kashiwagi and Snyder (2008), on the contrary, made a different statement regarding segmentals. In their study, vowels crucially influenced intelligibility more than consonants.

They had 20 university students read aloud two sentences excerpted from an English textbook consisting of 50 words on average. Then they asked three Americans and three Japanese to listen to and dictate the participants' recorded voices, further evaluating how strong their accents were. They discovered that intelligibility did not necessarily correlate with the strength of accent. Regarding intelligibility, not only segmental factors but also suprasegmental factors such as, misplaced word stress had an effect on intelligibility. The findings of their study were consistent with the study by Kashiwagi et al. (2006) in three points. First, no matter how strong one's accent was, it did not impede intelligibility. Second, vowel errors rather than consonant errors led to unintelligibility. Third, errors caused by suprasegmental level were not so severe as to influence intelligibility.

Kashiwagi and Snyder (2014) used the voices taken from 19 university students and 1 American native speaker as their experimental subjects. As a first step they collected 40 voices read aloud by 20 subjects. As a next step they had three Americans and three non-native speakers living in the United States dictate those recorded voices. Furthermore, they had a short text read aloud by 20 examinees, which were all different from the sentences used in the first step, evaluated in terms of how strong their accents were. They also conducted an investigation on six evaluation items which were considered to be difficult to acquire for most Japanese learners: 1. the distinction of /æ/, /ɑ:/ and /ʌ/, 2~4. the correct pronunciation of /ð/, /r/, and /l/. 5. naturalness of intonation, 6. smoothness in terms of linking, elision, assimilation and so on. They showed that there was no correlation between accentedness and intelligibility, and that the distinction of /ɑ:/ and /ɜ:/ and the correct pronunciation of /l/ were the most problematic factors of unintelligibility. When the Japanese subjects were listened to by non-native listeners, intelligibility was lower than when listened by native speakers. This finding bolstered Jenkin's theory (2000, 2002), according to which it might be because non-native speakers depend overly upon pronunciation information.

Tsuzuki and Nakamura (2009) started their study by pointing out that the research by Suenobu et al. (1992) had the subjects read aloud a prepared sentence, which would be inappropriate in analysing whether a message was correctly reached or not. In addition, the examinees in the study by Kashiwagi et al. were ordinary university students who did not use English for any purpose. Furthermore, they insisted on the intelligibility being evaluated not by understanding of word level but whether a message was accurately reached. They therefore chose the subjects belonging to a graduate school science department who had an oral presentation in an international conference. The texts they used for the experiment came from either *New York Times* or *Time*. After collecting voice data from 21 subjects,

they chose 10 sentences for their analysis and asked 11 native speakers to dictate them, evaluating the understandability using 5-grade Likert scale. Their analysis found out that the most common error was caused by consonants, such as consonant deletion and consonant substitution, and that few suprasegmental errors, with the exception of incorrectly stressed pronunciation, influenced intelligibility.

Nishio and Tsuzuki (2014) pointed out that consonants played a crucial role for intelligibility for segmentals. Likewise, incorrectly stressed arrangement of words, compound words, or phrases for suprasegmentals led to unintelligibility. As in Tsuzuki and Nakamura's study in 2009, they chose the students studying in the science department as their experiment's subject since they were more likely to use English in making a presentation in an international conference. Of 75 sample sentences collected from Japanese learners of English they selected nine sentences for the experiment and added one sentence spoken by a native speaker as a control sample, reaching ten in total. Ten judges dictated and evaluated these ten sentences. Regarding segmental level, their findings through acoustic analysis were as follows. (1) Consonant errors were more common than vowel errors. Japanese learners had trouble distinguishing between /l/ and /r/. (2) English plosives such as /p, t, k/ are strongly aspirated when they are put at the initial position of a word. In contrast, Japanese speakers did not put strong aspiration to those consonants. On top of that, voiced plosives and voiced fricatives were changed into unvoiced and vice versa. (3) As for vowels, incorrectly pronounced vowel length caused unintelligibility. (4) For suprasegmentals, the position of wrongly assigned stress was another factor of unintelligibility.

3.2 Research Questions

As we have already made a survey of several studies on intelligibility exclusively targeted at Japanese examinees, there have been as yet hitherto no research papers in which subjects are high school students. Almost all of the participants for the study on intelligibility conducted so far are university students. Recently there have been many chances for Japanese high school students to have overseas experiences, whether they be for participating in a short-term English study programme or for attending an international conference. Where people from different countries gather, English is used as a communication tool. They do not always hear native speaker's English; they rather hear English by non-native speakers. It is therefore urgent to analyse what phonological features by non-native high school students can cause intelligibility problem. The three main research questions are as follows:

1. To what extent can non-native speakers' English be understood by native

speakers?

2. To what extent can non-native speakers' English be understood by other non-native speakers?
3. If it is not understood properly, what phonological features can have influence upon unintelligibility?

4. Method

4.1 Participants

The participants for the recording part of this study were seven Japanese high school students and seven Hong Kong high school students, whose English proficiency level was B1 in CEFR. In the dictation part, two Japanese high school students, two Hong Kong high school students and four American English teachers participated. Again, all of the participants except native participants had a B1 level command of English in CEFR. Those who took part in the recording part were excluded from joining the dictation part since they knew some of the stimulus English sentences. None of the subjects were accustomed to the counterpart's variety of English except for the fact that American English teachers living in Japan had a few years of exposure to English spoken by Japanese.

4.2 Procedure

In the recording part, each participant was given three sentences to read. Prior to their voices being recorded, participants were given practice time and were allowed to either consult a dictionary or ask an instructor about unknown words. The 21 voices collected were, thereafter, combined in one CD. See Appendix 1.

In the dictation part, two Hong Kong high school students dictated 21 Japanese speakers' voices, evaluating them according to understandability (2 people × 21 sheets). Two Japanese high school students likewise dictated Hong Kong speakers' voices, evaluating them according to understandability (2 people × 21 sheets). Two American English teachers dictated two Japanese high school students' voices (2 people × 21 sheets) and another two American English teachers dictated two Hong Kong high school students' voices (2 people × 21 sheets). The data collected amounted to 168 dictation sentences (42 from Japanese high school students, 42 from Hong Kong high school students and 84 from American English teachers).

5. Results

As mentioned in 2.3 intelligibility score is calculated by how correctly a subject can dictate

each word in a sentence.¹ Table 1 shows both intelligibility scores and understandability scores. NS stands for native speakers, and NNS for non-native speakers. The far left column shows the stimulus sentence numbers. Next to it are the Japanese high school students' intelligibility scores (JHS) shown. These figures are an average score of how accurately two native speakers dictated Japanese high school students' voices. The next column displays average understandability scores evaluated by the native speakers to the Japanese high school students' readings. Likewise the fourth and fifth columns from the left show an average score of Hong Kong high school students' intelligibility (HKHS) and understandability judged by two other native speakers. As for the four columns on the right hand side, the left two columns show average intelligibility scores and understandability scores of Japanese high school students assessed by two Hong Kong high school students. The other two columns show average intelligibility and understandability scores of Hong Kong high school students appraised by two Japanese high school students. At the bottom of each column is the average figure for the respective items shown.

Table 1

Intelligibility scores and understandability scores by eight judges

	NS				NNS			
	JHS(%)	Understand-ability score	HKHS(%)	Understand-ability score	JHS(%)	Understand-ability score	HKHS(%)	Understand-ability score
1	80	3.5	90	3.5	40	2.5	80	4
2	100	3.5	100	4	33	2.5	50	2
3	100	3.5	92	3.5	38	1	8	1.5
4	75	2.5	25	1.5	0	3	0	1
5	83	2	50	1	8	2	8	1
6	92	3.5	67	1.5	21	1	13	2
7	80	2	80	2	10	3.5	50	3
8	100	3	88	4	63	2	44	2
9	100	2.5	67	2	39	1	33	2
10	100	5	100	5	75	4	69	2.5
11	88	4	50	2	44	4.5	25	1.5
12	100	3.5	96	4	42	2.5	35	2
13	100	5	100	5	75	4.5	75	3
14	80	2.5	80	4	55	1	65	4
15	90	2.5	90	3.5	45	2	40	2.5
16	100	4.5	100	4.5	100	5	50	3
17	83	3	83	5	42	4	58	2
18	100	4	100	3.5	30	1	23	2.5
19	88	3.5	100	5	25	4	100	4.5
20	88	3	100	5	63	4.5	93	4
21	96	3.5	89	4	46	3	64	2.5
	92%	3.3/5	83%	3.5/5	43%	2.8/5	47%	2.5/5

Overall, intelligibility scores as well as understandability scores evaluated by native speakers are higher than those by non-native speakers. The word match ratio of native speakers to Japanese high school students is 92% and to Hong Kong high school students 83% whereas non-native speakers' intelligibility scores and understandability scores judged by non-native speakers are less than 50%. The reason why the intelligibility score of Japanese high school students when evaluated by native speakers is higher than that of Hong Kong subjects seems to lie in the fact that the native speakers involved in this survey had been living in Japan for about one year and were accustomed to the Japanese accents. Non-native subjects have few chances to use English outside the classroom both in Japan and Hong Kong. On top of that, high school students learn standard English in school, whether it be American English or British English, which means they don't have the opportunity to listen to different varieties of English. This could be the main reason why their intelligibility and understandability scores are low.

Let us move on to the figures with grey background in Table 1, in which intelligibility scores are higher than the average but understandability is lower than the average. For native speakers the higher the intelligibility scores are, the higher the understandabilities become with the exception of number nine. Despite the fact that sentence nine read by a Japanese student was accurately dictated by native speakers, their understandability score was only 2.5. The reason seems to be related to unnatural semantic chunk. Although the reader read the sentence accurately, he read the first three words in one breath and after a little pause he continued reading the rest as in 'Ruth thought she / would be wealthy within three years'. By contrast, when non-native speakers dictated and evaluated the other non-native speakers' English, they left many blanks on the dictation sheets. This is partly because they may have had difficulty syntactically composing a sentence when they came across words difficult to listen to. Even though they dictated sentences with accuracy and a percentage of more than average, its intelligibility score was at best 63%, which could be the result of low score of understandability. Let us focus on sentence 14 read by a Hong Kong high school student, to which Japanese judges evaluated with a score of 1. The sentence was read as [hi: wɒn tu: hæ næm pleɪs nɪə hɪz des]. There are some wrong pronunciations in this sentence, which could have led to great difficulty in their comprehension.

6. Discussions

In this chapter the results of the analysis will be shown. Let me show you how the results have been analysed. The results are confined to four native speakers' judgements since non-

native speakers left a lot of blanks on their evaluation sheets, making it difficult to make a fair analysis. In the sentence numbered one two native judges took [prei] read by a Japanese for ‘play’. One possible reason for this misunderstanding might be because they substituted /r/ for /t/. This is labeled as consonant substitution. Table 2 shows frequencies of possible reasons analysed through looking at errors. For native judges, their errors by consonants and vowels were the same in number when they dictated the voices of Japanese high school students. Unlike the result of Japanese subjects’ analysis, errors related to consonants are more than twice as frequent as ones concerning vowels in dictating Hong Kong high school students’ voices. 6.1 shows more detailed error analysis of Japanese high school students and 6.2 exhibits the results of Hong Kong high school students.

Table 2

Phonological error analysis of Japanese and Hong Kong high school students

		JHS	HKHS
consonants	deletion	4	16
	substitution	7	20
	weak voiced	1	0
		12	36
vowels	deletion	0	0
	substitution	11	15
	addition	1	0
		12	15

6.1 Error Features of Japanese High School Students

In this section the results of phonological error types of Japanese high school students will be analysed. Table 3 is a list of error features, which were clarified through the voices of seven Japanese subjects.

Table 3

Error Features of Japanese High School Students

phonological feature	Word	Native Pronunciation	Japanese Pronunciation	Error Word	Numbers of Judges	Possible Reasons	
consonants	deletion	Woods	/wodz/	[wod]	Wood	2	/dz/ → [d]
		placed	/pleist/	[pleis]	place	1	/t/ → [∅]
		piled	/paild/	[pail]	put	1	/l/ → [∅]
	substitution	pray	/prei/	[prei]	play	2	/r/ → [ɾ]
		Smith	/smiθ/	[somiso]	Mrs Liz	1	/θ/ → [s]
		wanted	/wɒntɪd/	[wɒnts]	wants	2	/tɪd/ → [ts]

		hard	/hɑ:d/	[hɑ:t]	heart	2	/d/ → [t]
	weak voiced	hard	/hɑ:d/	[hɑ:t]	heart	2	weak voiced [d]
vowels	substitution	heel	/hi:l/	[hi]	hill	2	/i:/ → [ɪ]
		fan	/fæn/	[fʌn]	front	2	/æ/ → [ʌ] [ɒ]
		bowl	/bəʊl/	[bɔ:l]	ball	2	/əʊ/ → [ɔ:]
		leaving	/li:vɪŋ/	[livɪŋ]	living, giving	2	/i:/ → [ɪ]
		coast	/kəʊst/	[kɔ:st]	cost	1	/əʊ/ → [ɔ:]
		rope	/rəʊp/	[ru:p]	root	2	/əʊ/ → [u:]
	addition	lamp	/læmp/	[lʌmp]	long	1	/æ/ → [ʌ]
incorrectly placed stress	Smith /'smɪθ/ → /'sɒmɪsθ/						
unnatural semantic chunk	Ruth thought she / would be ...						
substituting weak form for strong form	to /tə/ → /tu:/						

Errors on the segmental level are larger than those on the supra-segmental level. Segmental errors are divided into two groups: consonants errors and vowel errors. Let us first look at consonant deletion. All examples of consonant deletion are seen in the final position of a word. A Japanese subject did not pronounce the final consonant of the word, ‘Woods’ in a stimulus sentence clearly enough to be heard. This phenomenon was also seen in verb inflection. The stimulus sentence numbered 14 begins with ‘He wanted to have ...’ but one judge wrote ‘He wants ...’ seemingly because the final consonant /ɪd/ was not distinctively pronounced. In the case of ‘piled’ one native judge took it for ‘put’, which was not a matter of plural ‘s’ or inflection. Ambiguous mumbling utterance of a speaker caused the judge to dictate a totally different word.

Next, consonant substitution will be focused. The distinction between /l/ and /r/, as was often reported in previous studies, was not clearly made by Japanese speakers. In fact, the pronunciation of /prei/ for ‘pray’ was pronounced [prei]. Japanese speakers used neither lateral or rhotic consonant. They instead used tap for both /l/ and /r/ sounds. It seems that the tap sound in this case was understood as /l/ sound. In the sentence, ‘Come and pray with me.’ both judges took ‘pray’ for ‘play’. Although there were some other sentences where /r/ was used, native speakers did not confuse Japanese speakers’/l/ sound with /r/ sound. It might be seen that context sometimes helped the judges to guess sentences no matter how incorrectly Japanese speakers pronounced them. The stimulus sentence, ‘Woods won the twenty-mile walking race’, for example, includes the word ‘race’ and a Japanese speaker clearly pronounced [reis] instead of /reis/. The noun ‘race’ has an adjective, ‘walking’ and the verb is ‘won’, which made it easy for the native judges to guess the context. As a result they wrote the whole sentence with accuracy. Both native judges dictated the word ‘hard’ as

'heart' in part because the /d/ at the end of the word was not clearly vocalized. Most of the errors regarding consonants occur in the final position of a word.

Concerning vowels, most errors are related to vowel substitution. Japanese speakers' distinction between long vowel and short vowel is not clear. The word, 'heel' in the sentence, 'Look at the heel.' was taken as 'hill' and likewise the word 'leaving' in the sentence, 'I am leaving with my brother.' was dictated as 'living'. The length of the vowels by Japanese speakers was not audibly understood by native judges. The sound of diphthongs in the words 'coast' and 'bowl' were not made clear in the same light. The final characteristic regarding vowels is the substitution of /ɑ:/ as in 'hard' for /ɜ:/ due to a slight mouth opening. Another feature is addition of a vowel. The sentence numbered six has 'Miss Smith' as the subject of the sentence. A Japanese subject pronounced /somisɔ/ with the stress on /ɔ/ on the first syllable, which made it difficult for the native judge to grasp the word. One judge considered 'Smith' to be 'Miss Liz'. This misunderstanding must also be related to incorrectly placed stress on the supra-segmental level.

On the supra-segmental level there was one word which has incorrectly placed stress as was mentioned above. The pronunciation of 'Smith' was largely influenced by the fact that the Japanese language has only open syllable. Furthermore, unnatural semantic chunk was seen in sentence nine, 'Ruth thought she would be wealthy within three years'. A Japanese speaker bundled the first three words and after a little pause he continued to read out the others. This supra-segmental problem, however, did not affect the dictation task by native speakers. They were able to write down the whole sentence with no mistakes. Japanese speakers were unable to distinguish between weak form and strong form in function words. Every function words, especially prepositions had strong form. Sentence twelve, 'Those girls want to go out simply to show off their new coats.' has two 'to's. A Japanese speaker pronounced both 'to's not as /tə/ but as /tu:/. The same thing was observed in 'of'. Every 'of' in the 21 stimulus sentences were pronounced /ɒv/ as strong form. It must be because high school students do not know the difference between strong form and weak form.

6.2 Error Features of Hong Kong High School Students

Here Error features of Hong Kong high school students will be shown in Table 4, followed by some analyses.

Table 4

Error features of Hong Kong high school students

phonological feature		Word	Native Pronunciation	Cantonese Pronunciation	Error Word	Numbers of Judges	Possible Reasons
consonants	deletion	look	/lʊk/	[lɔ]	low	2	/k/ → [∅]
		Woods	/wɔdz/	[wɔd]	Wood, Who's	2	/dz/ → [d]
		Ruth	/ru:θ/	[u:s]	You	1	/r/
		placed	/pleɪst/	[pleɪs]	laced	2	/t/ → [∅]
		hard	/hɑ:d/	[hɑ:]	how	2	/d/ → [∅]
		food	/fu:d/	[fu:]	foot	1	/d/ → [∅]
		would	/wɔd/	[kɔ]	could	2	/d/ → [∅]
		at	/ət/	[ʌ]	as	2	/t/ → [∅]
	piled	/paɪld/	[paɪd]	pied	2	/l/ → [∅]	
	substitution	pray	/preɪ/	[pleɪ]	play	1	/r/ → [l]
		race	/reɪs/	[ləɪs]	life	2	/r/ → [l]
		theater	/θiətə/	[tʃiətə]	children	2	/θ/ → [tʃ]
		coats	/kəʊts/	[kəʊz]	clothes	1	/ts/ → [z]
		wanted	/wɒntɪd/	[wɒnts]	wants	2	/tɪd/ → [ts]
		wealthy	/welθi/	[wevɪ]	heavy	2	/θ/ → [v]
		lost	/lɒst/	[nɒst]	nose	2	/l/ → [n]
		would	/wɔd/	[kɔ]	could	2	/w/ → [k]
		the	/ðə/	[zə]	as	2	/ð/ → [z]
		knees	/ni:z/	[kez]	car, cane	1	/n/ → [k]
		John's bowl	/dʒɒnz bæʊl/	[tʃɔ:nz bæ:ɪ]	transfer	2	/dʒ/ → [tʃ]
lamp		/læmp/	[næmp]	nun	1	/l/ → [n]	
vowels	substitution	allowed	/əlaʊd/	[ələʊ]	around, around	2	/aʊ/ → [əʊ]
		heel	/hi:l/	[hɪɪ]	hill	2	/i:/ → [ɪ]
		walking	/wɔ:kɪŋ/	[wɜ:kɪŋ]	working	2	/ɔ:/ → [ɜ:]
		fan	/fæn/	[fʌn]	fun	2	/æ/ → [ʌ]
		leaving	/li:vɪŋ/	[lɪvŋ]	living	2	/i:/ → [ɪ]
		John's bowl	/dʒɒnz bæʊl/	[tʃɔ:nz bæ:ɪ]	transfer	2	/ɒ/ → [ɔ:]
		John's bowl	/dʒɒnz bæʊl/	[tʃɔ:nz bæ:ɪ]	transfer	2	/əʊ/ → [ɜ:]
		knees	/ni:z/	[kez]	car, cane	1	/i:/ → [e]
incorrectly placed stress		cheerfully /'tʃiəfəli/ → /tʃiəfə'li/					
substituting weak form for strong form		to /tə/ → /tu:/					

Consonants errors as well as vowel errors are often seen in Table 4. As for deletion of consonants, the frequency is four times higher compared to that of Japanese high school students. The consonant cluster of a word initial position, such as ‘Smith’ and ‘pray’

were clearly pronounced, however, it is likely to be deleted when it is placed at the final position of a word. The deletion of consonants at the end of a word is commonly seen both in Japanese and Hong Kong high school students. The most frequent phenomena is consonant substitution. I will focus on some of the phenomena that are exclusively seen amongst Hong Kong high school students. The sound of /θ/ was substituted for either /f/ or /tʃ/. It is thought that the subjects used a similar sound for a consonant unfamiliar to their native language. The same holds strong to the voiced sound /ð/. The sounds /θ/ and /ð/ are seen neither in Cantonese nor in Japanese. But Japanese speakers in general seem not to substitute /θ/ for /f/ and likewise /ð/ for /d/. Though not shown by the data Japanese speakers are, generally speaking, inclined to substitute /θ/ and /ð/ for /s/ and /z/ respectively. The final feature seen in consonant is substitution of /l/ for /n/. This phenomenon was seen in two words, 'lost' and 'lamp'. As Setter et al. (2010) states that in some cases, /l/ is produced as [n] by speakers of Hong Kong English, and /n/ is produced as [l] (p.21), this /n/-/l/ merger is characteristic of Hong Kong English.

Errors in vowels are in most part similar to mistakes observed in Japanese subjects. The length of a long vowel was not distinctively enough, ending up with a short vowel as in /lɪvŋ/ for 'leaving' and /hɪl/ for 'heel'. Another characteristic is the substitution of diphthongs for a long vowel. It seems that both Hong Kong English learners and Japanese English learners had some trouble producing diphthongs.

Lastly, word stress on the supra-segmental level will be mentioned. The word 'cheerfully' was pronounced /tʃɪəfə'li:/ not /tʃɪəfəli/, which might have sounded strange to the judges. Although there were some uncommon intonations, they are excluded from this research analysis. The distinction between strong form and weak form, like Japanese subject's case, was not distinctively made. Hong Kong speakers also pronounced almost all the function words using strong form.

7. Conclusion

The present study has clarified the answers to three questions. Concerning the first question, to what extent non-native speakers' English can be understood by native speakers, the analysis has made it clear that high intelligibility does not necessarily result in high understandability of the native speakers. The native speakers dictated the stimulus sentences with the percentage of more than 80%, however, their understandability scores were at best 3.5 on average. The possible reasons of the result will be described as the answers to the third question below. With regard to the second question, to what extent non-native speakers' English can be understood by other non-native speakers, the results judged

by the non-native speakers presented a stark contrast to those evaluated by the native speakers. The intelligibility was less than 50% and the understandability score was at best 2.8. Both Japanese and Hong Kong students left many blanks on their evaluation sheets when dictating the voices, which means that they could not syntactically comprehend the sentences. That could be why their understandability scores were much lower than those of native speakers. The possible explanations to the third question, what phonological features can influence unintelligibility, are as given below. Both Japanese and Hong Kong subjects had the tendency of not pronouncing a consonant at a word's final position. In addition, consonant substitution was widely seen in the voice data. Specifically, the /θ/ sound peculiar to English was substituted for a similar sound /s/ by a Japanese student and /tʃ/ by a Hong Kong examinee. Aspiration in the /p/ sound at the initial position and plosion in /d/ sound were weak, which was why the native speakers had trouble dictating the words. As for vowels, long vowels were not pronounced long enough and diphthongs were changed into long vowels. The distinction between /æ/ and /ʌ/ was highly ambiguous. On the supra-segmental level, the factors of low understandability might be related to wrongly placed stress and unnatural intonation. Their frequency was extremely low compared to consonant and vowel unintelligibility.

LFC puts an emphasis on consonants rather than vowels. The present research, however, has shown that vowels are also important to the Japanese students in order for their English to be intelligible. Considering the result of the Hong Kong students, where consonant errors occur twice as frequent as vowel errors in intelligibility, consonants need to be pronounced correctly. At the same time stress on a word need to be correctly put as LFC expresses it as a proper nuclear stress.

This paper did not investigate the possible unintelligibility causes of non-native speakers judged by different non-native speakers due to the limitation of the data. This task, nevertheless, will be necessary because intelligibility research between non-native speakers can lead to learner's rational acquisition in view of English mostly being used between non-native speakers.

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Notes

i This paper adopts word match ratios. The calculation is as follows: sentence No.1, [10(5

words in a sentence×2 judges)-2(2 words transcribed incorrectly)]÷10(5 words in a sentence×2 judges)×100(%)=80%.

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Appendix 1

Read the following sentences aloud.

1. Come and pray with me.
2. On a fine day a fire broke out on the fifth floor.
3. The soldiers who served in the war are allowed to enter this college.
4. Look at the heel.
5. Woods won the twenty-mile walking race.
6. Miss Smith got seven good seats at the theater for Saturday night.
7. The fan didn't last long.
8. His knees received several cuts in the crash.
9. Ruth thought she would be wealthy within three years.
10. The first train leaves at ten past six.
11. John's bowl is lost. Have you seen it?
12. Those girls want to go out simply to show off their new coats.
13. Please correct the papers.
14. He wanted to have a lamp placed near his desk.
15. I heard he had studied the behavior of birds hard.
16. Enjoy your date!
17. I am leaving with my brother.
18. Next to the smoking-room was a large dining hall where the fire was burning cheerfully.
19. I like the coast.
20. He was carrying a rope over his shoulder.
21. In the United States food is never piled on the back of the fork.