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A Comparative Study on Intonation Difference Between Chinese EFL Speakers and Native English Speakers Based on Visual Phonetic Software Praat

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Abstract

Acoustic features such as intonation are attached great importance by all English learners around the world, so as the Chinese EFL speakers. The study mainly conducts a comparative study between Chinese advanced EFL speakers and native speakers, analyzing the differences in intonation and the reasons behind it. Phonetic software Praat was used to visualized these voice data after the experiment. The result shows that all these Chinese advanced EFL speakers possess the awareness of intonation variation, but the detailed intonation variation is still quite different from the native speakers. The reason for this phenomenon is that most Chinese advanced EFL speakers fail to understand the extra-linguistic information conveyed from intonation variation. Acquiring phonetic theory and correcting intonation under the assistance of visual phonetic software are two practical methods to solve this problem.

Key words: Intonation; Pitch; Praat; Speech visualization software

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1. INTRODUCTION

Under the unprecedented trend of globalization, English undeniably becomes a must for people, especially the younger generations around the world. Different from the past, people should not only grasp the skill of reading, writing and listening in English, but more importantly, become a master in speaking English. During the pronunciation or intonation practice, English learners are struggling with accent problem due to the negative transfer of the mother tongue. Thus, nowadays, except for the traditional method of correcting pronunciation or intonation such as shadowing, computer-aided pronunciation tools also leap to the non-native speakers' sight.

1.1 Research Background

According to Oxford online dictionary, intonation refers to the rise and fall of the voice in speaking. During a face-to-face communication, people can catch effective message from the content of words, the speakers' intonation, body language, facial expressions and so forth, in which the sentence's meaning can be totally reversed in different intonation. Thus, as an intonation language, the pitch, loudness, speech rate and pause of colloquial English can be regarded as the indispensable prerequisite of a successful conversation. English intonation mainly possesses four functions, namely attitudinal function, discourse function, grammatical function and accentual function. Decent and euphonic intonation can help expresser convey information in a more accurate and efficient way.

China is a profound country with splendid history and large population, where numerous people learn English as their second language from an early age. Unlike the exam factory in the past, Chinese people currently pay more attention to spoken English with the mainstream guidance of quality-oriented education. Nevertheless, English and Chinese belong to different language system, namely Indo-European and Sino-Tibetan, which brings Chinese EFL (English as a Foreign Language) learners considerable difficulties in second language intonation acquisition.

1.2 Purpose of the Research

The essay aims to find out the intonation difference between Chinese EFL speakers and native speakers with the assistance of speech visualization software Praat. Via visual intonation comparison, second language learners may recognize their problem more intuitively, so that they could improve their phonetic appearance through adjusting their pitch, intensity, stress, pause and so on. In this way, Chinese EFL speakers can imitate the intonation and pronunciation of native speakers consciously. Hence, they might recognize the regular pattern of native intonation and draw inferences about other cases from one instance.

1.3 Significance of the Research

According to the British linguist Roger Kingdon (1958), intonation is the spirit of language. To some extent, second language learners may not realize their problems in intonation unless they listen to the same sentence or speech uttered by native speakers. It is utmost important for EFL learners to be aware of the place where the word should be stressed and where should it be paused, instead of listening to the tape tautologically but fail to catch the intonation pattern of the sentence. Only acquiring the general intonation knowledge, such as interrogative sentence should be uttered in a rising tone and declarative sentence should be expressed in a falling tone, is far from enough. In order to be native, second language learners should follow the intonation rules in detail.

2. LITERATURE REVIEW

The number of research about intonation is not in the minority. Authors who show interests in intonation tend to explore the aspects in terms of phonology teaching, intonation pattern, stressed syllable, tonicity, tone group and so forth. Scholars now not only focus on theoretical research phonetics, but also its application in teaching or studying English like computer assisted language learning.

2.1 Research in Western Countries

The research of intonation in the western world can be traced back to 16 century. Over hundreds years of discussion and debate, scholars reached a consensus that intonation is a suprasegmental feature which all languages possess and embodied by the pitch variation. Halliday (1967), the representative personage of western linguistics, pointed out that intonation can be divided into three levels, namely tonality, tonicity and tone (the three Ts). To be specific, tonality refers to division of speech into tone groups or intonation phrases; tonicity is the placement of tonic and nucleus; and tone means different melodic contours. What need to be stressed is that intonation could convey the information behind the words. For example, rising tone usually implies uncertainty or doubt, while falling tone normally stands for affirmation. Except from the general classification of rising and falling tone, intonation could be further divided into falling-rising tone, rising-falling tone and level tone. According to scholar Halliday (1994) and Brazil (1980), level tone implies the information which has not been decided whether it is certain or not; rising-falling tone stands for foreground information and falling-rising tone background information.

2.2 Research in China

In recent years, many Chinese scholars also attach great importance to English intonation, in which intonation teaching account for a large proportion. They tend to conduct empirical studies such as doing case study to test whether learners can improve their intonation appearance via computer assisted language learning. Furthermore, scholars find out that most of the researches about Chinese EFL learners still remains on the descriptive level, but lacks of the support and analysis of experimental data and linguistic systematic knowledge. Although Chinese government and educators emphasize the important of intonation repetitively, there are still two negative tendencies of oral English learning: first, teachers mainly impart English knowledge but ignore intonation teaching; second, teachers only focus on the pronunciation of single words instead of the intonation of the whole sentence.

3. EXPERIMENTAL STUDY

Empirical study refers to a kind of research method that the author collects, observes and analyzes data in an attempt to test the correctness of his/her hypothesis. In the narrow sense, the empirical research method is that analyzing the interaction and quantitative relationship between relevant elements through quantitative analysis technology. As for a generalized perspective, the empirical research method regards practice as the research starting point and experience as the basis of science. Thus, people generally classified empirical study into two main categories, namely mathematical empirical research and case-based empirical research. In this chapter, the author aims to give a comprehensive introduction to the experimental study from three aspects, namely research questions, methodological tool and materials as well as participants.

3.1 Research Questions

This experimental study is implemented to figure out the following questions:

Firstly, what are the differences and similarities between Chinese EFL learners' and native speakers' intonation in declarative sentences, interrogative sentences, imperative sentences and exclamatory sentences?

Secondly, what are the reasons behind these differences and similarities?

Thirdly, what are the merits and demerits of the computer assisted intonation software for English learners?

3.2 Methodological Tool and Materials

With the rapid development of technology, it is not difficult for programming personnel to design sound visualization software, such as Better Accent Tutor, Praat (doing phonetics by computer) and so on, for the purpose of teaching and learning intonation and pronunciation. In this study, the author chooses software Praat as methodological tool. Praat is a speech visualization program designed by Professor Paul Boersma and assistant professor David Weenink at the department of Phonetics, the University of Amsterdam, and can be downloaded freely on the internet. Praat is a multi-functional software with easy-to-operate interface. It can be used to analyze the spectrum, pitch, intensity, formant and pulses of the voice in a pictorial and statistic way. In addition, Praat has been widely applied in many emerging fields such as speech or sound synthetic, linguistic data statistics and analysis as well as teaching assisted phonetic test. Since the main focus of this task is intonation analysis, parameter about pitch such as minimum pitch, maximum pitch and average pitch in the pitch contour draws more attention from the author.

In order to compare the Chinese EFL speakers' and native speakers' intonation in a multi-dimensional way, the author choose four sentences as samples in this task, in which each sentence belongs to different sentence category: declarative sentences, interrogative sentence, imperative sentences and exclamatory sentences. The author chooses the sentences from the book *Teaching Pronunciation──A Reference for Teachers of English to Speakers of Other Languages,* which is published by Cambridge University Press and written by Marianne Celce-Murcia, Donna M. Brinton and Janet M. Goodwin. The major reason why the author chooses this book is that *Teaching Pronunciation* is the core of a comprehensive course in pronunciation pedagogy designed to provide ESL/EFL teachers with a thorough grounding of sound system, including both segmental and suprasegmental aspects, as well as abundant corresponding exercise for students to practice. The author selects four sentences from *Teaching Pronunciation*, namely "John, we are waiting for you." (declarative sentence), "Did you cook dinner after you got home?" (interrogative sentence), "Just drop me off the corner, please." (imperative sentence), and "How lovely and sweet she is!" (exclamatory sentences). These sentences are selected due to its routine use.

3.3 Participants

The participants of this study are composed by twenty Chinese EFL speakers and twenty native speakers in the United Kingdom. In order to avoid the variables in gender and age, all the participants the author chose are female from 20 to 30. In addition, all participants are required to record the sentences in a quiet room with resonant voice to ensure the software could recognize the voice clearly.

What need to be mentioned is that these twenty female Chinese EFL speakers all got seven points in IELTS speaking test. It means that their pronunciation of words are articulate and easy to understand. According to IELTS score criteria, Chinese participants' ability is relatively close to native speaker from the perspective of fluency and coherence, lexical resource, grammar and pronunciation. Thus, it is reasonable to believe that apart from intonation, Chinese and native participants' possess basically the same expression ability. As for native speakers, they are university students in Wales where boasts a profound history of speaking English as its official language.

3.4 Procedures

Before data collection, all participants were informed the purpose of the experiment and authorized the use of recording data. In addition, participants were given ample time to familiarize themselves with the selected sentences before the formal recording. In order to ensure the clarity and accuracy of phonetic data, the whole experimental process happened in a quiet room with a voice recorder. During the formal recording, participants were asked to read the material in a natural state, and there is a short break for adjustment after each sentence is recorded,.

4. FINDINGS

After collecting data from all participants, the author imports data to the software Praat separately according to the sentence pattern. Apart from Praat, the author also needs to analyze the data under the assistance of EXCEL. The main focus in this chapter is to find out the intonation similarities and differences via the pitch number and pitch contour.

4.1 Findings in Declarative Sentences

Declarative sentence refers to a kind of sentence pattern that states a fact or declares one's view. It usually ends with a full stop and should be read in a falling tone. The example the author chose in this sentence pattern is "John, we are waiting for you.", which is commonly used in daily life. The pitch and intensity parameters and pitch contour are shown as follows:

Table 1
Declarative sentence's parameters

Participants	Mean pitch (Hz)	Mean pitch range (Hz)	Intensity average (dB)
Native Speakers	218.79	109.13	71.04
Chinese EFL speakers	212.95	137.20	65.89

According to the statistics in Table 1, the mean pitch and intensity average of native speakers is higher than that

of Chinese EFL speakers, while the data in mean pitch range is exactly the opposite. The mean pitch range can be regarded as an epitome of intonation fluctuation, since the intonation variation is caused by the change between maximum pitch and minimum pitch. The statistics shown is mean pitch range represents that Chinese EFL speakers with seven points in IELTS speaking test possess the awareness of intonation variation. Nevertheless, the detailed differences of intonation between Chinese EFL speakers and native speakers will occur when the pitch contour was printed out.

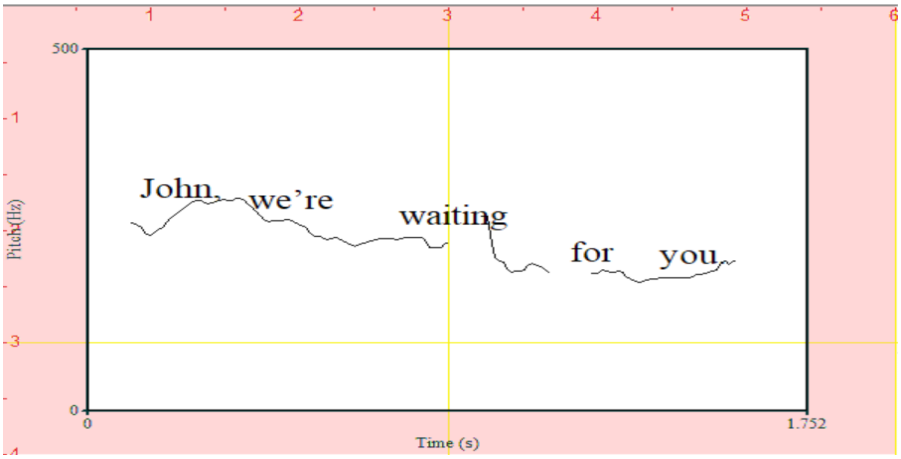

Figure 1
The Pitch Contour of a Native Speaker

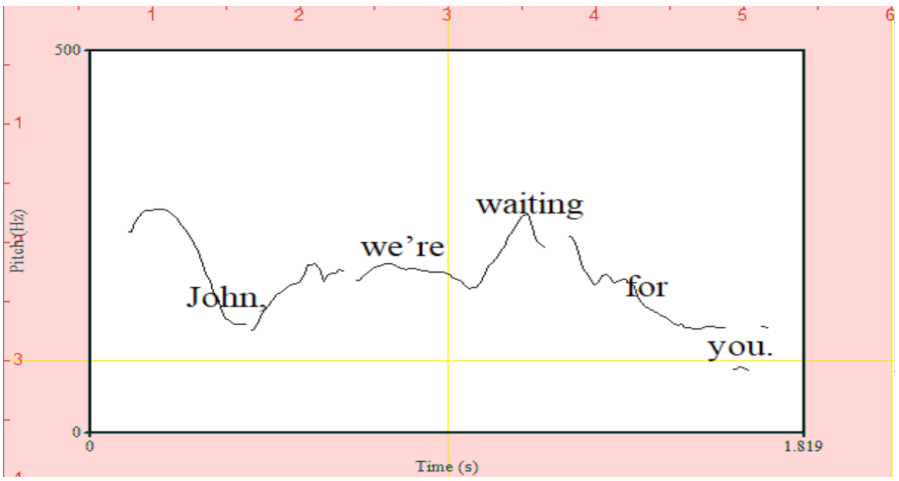

Figure 2
The Pitch Contour of a Chinese EFL speaker

Although the author only makes one pitch contour figure from each side, many typical and representative differences can still be analyzed from the two pictures, since similarities are contained and hided among the two sides. The two figures above reveal the pitch variation of single words when speakers utter the sentence, which demonstrates how the native speakers and Chinese EFL speakers deal with the same word in a different intonation. Starting with the first word "John", the native speakers chose to utter it in the falling-rising tone, while the Chinese EFL speakers express it in the rising-falling tone. Furthermore, the last two words "for you" were expressed relatively in a level tone (low rising tone), but in a falling tone from the Chinese EFL speakers.

As the author has mentioned in chapter two, extra-linguistic information could be implied in intonation. Rising-falling tone stands for foreground information and falling-rising tone background information. We can compare the different intonation and the hidden information behind it. When calling the name "John", native speakers uttered in a falling-rising tone, implying that John is background information. In other words, all people at present knew John. However, Chinese EFL learners fail to convey this implicit information in a rising-falling tone. In addition, as for the intonation of "for you" at the end of the sentence, both sides deal with it in an opposite way. Native speakers expressed it in an almost level tone, showing the inner meaning of "we are not sure if we will continue waiting for John"; while Chinese EFL learners revealed the message that "we will certainly wait for John" in a falling tone.

4.2 Findings in Interrogative Sentences

The main social function of interrogative sentences is to raise a question or ask for information. It usually ends with a question mark and should be expressed in a rising tone in most cases. The sample sentence in this part is "Did you cook dinner after you got home?" After data analysis, the pitch and intensity parameters and pitch contour are shown as follows:

Table 2
Interrogative sentence's parameters

Participants	Mean Pitch (Hz)	Mean Pitch Range (Hz)	Intensity Average (dB)
Native Speakers	217.75	141.42	69.60
Chinese EFL speakers	212.97	139.40	65.51

Comparing with the data in Table 1, the number of the mean pitch and the intensity average is relatively the same in Table 2. With regards to mean pitch range, both native speakers and Chinese EFL speakers utter the interrogative sentences in a more up-and-down way than that of declarative sentences. In this case, the mean pitch range of native speakers is a little higher than that of Chinese EFL speakers, which shows that the Chinese EFL speakers who gain seven points in IELTS speaking test are basically close to native speaker from the perspective of pitch range. However, it is not reliable to infer that Chinese high-level EFL speakers can utter interrogative sentences comparatively the same as native speakers. Specific pitch contour are produced as follows:

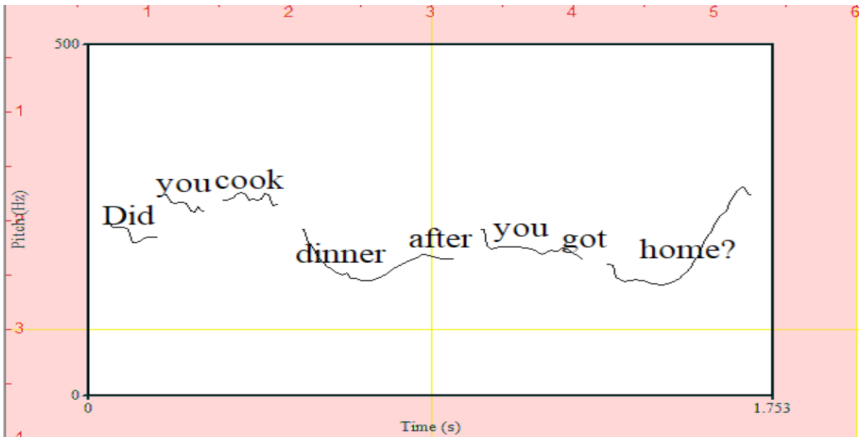

Figure 3
The Pitch Contour of a Native Speaker

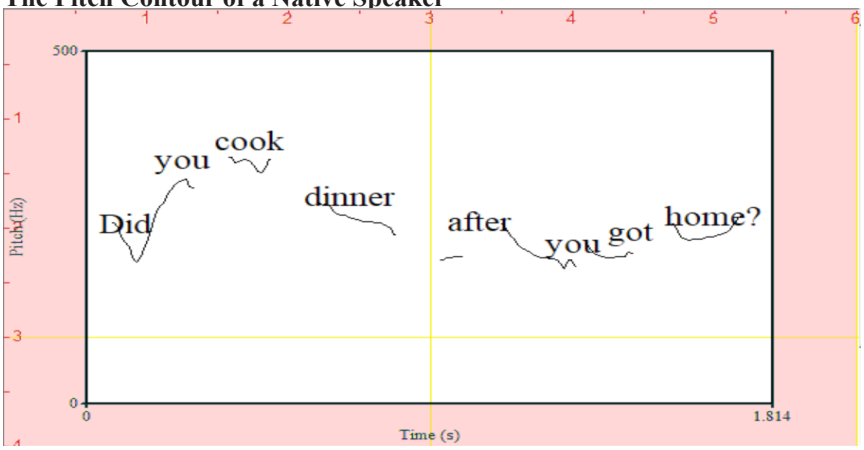

Figure 4
The Pitch Contour of a Chinese EFL speaker

As above, the author chooses to pick up two speakers' voice severally from each side. Intuitively, the variation of pitch wave is much more obvious than that of declarative sentences in this case. In general, the shape of these two pitch contours is similar, starting with rising tone and falling-rising tone in the end. To be specific, both the native speakers and Chinese EFL speakers begin with the first three words, "did you cook", in a rising tone, but Chinese speakers' tonal variety is much more distinct. The most significant difference implies in the last word of the sentence. Despite both native speakers and Chinese EFL speakers uptrend the intonation of the word "home", it is evident that the slope of native speakers is much steeper than that of Chinese EFL speakers.

There is little doubt that interrogative sentence should be uttered in rising tone to express queries. Chinese advanced English learners have mastered this skill and also can utilize linking word skill in oral English (words

"did you" is linking when reading it). However, taking a panoramic view of these pitch contours, the tone peak of native speakers is on the last sentence word "home", while Chinese speakers on the word "cook". Furthermore, comparing with native speakers, intonation variation in the tail of interrogative sentences is far from adequate for Chinese EFL speakers. It shows that the position and magnitude of the rising tone are not well understood by Chinese learners.

4.3 Findings in Imperative Sentences

Imperative sentence is a sentence pattern that can be used to express command, request, advice, warning, prohibition and so forth. In this part, the author selects "just drop me off the corner please." as sample sentence. Like the two sentence patterns above, the pitch and intensity parameters and pitch contour are shown as follows:

Table 3
Imperative sentence's parameters

Participants	Mean Pitch (Hz)	Mean Pitch Range (Hz)	Intensity Average (dB)
Native Speakers	215.06	142.43	70.26
Chinese EFL speakers	221.80	137.62	65.37

In this part, Chinese EFL speakers' mean pitch is higher than that of native speakers, while lower in mean pitch range and intensity average. The fluctuation of pitch in imperative sentences is relatively close to interrogative sentences, but still much larger than that in declarative sentences. The pitch range of Chinese EFL speakers who acquire seven points in IELTS speaking test is not considerable, gaping only 4.81Hz with the native speakers. The author also needs to draw the concrete pitch contour to implement a further analysis.

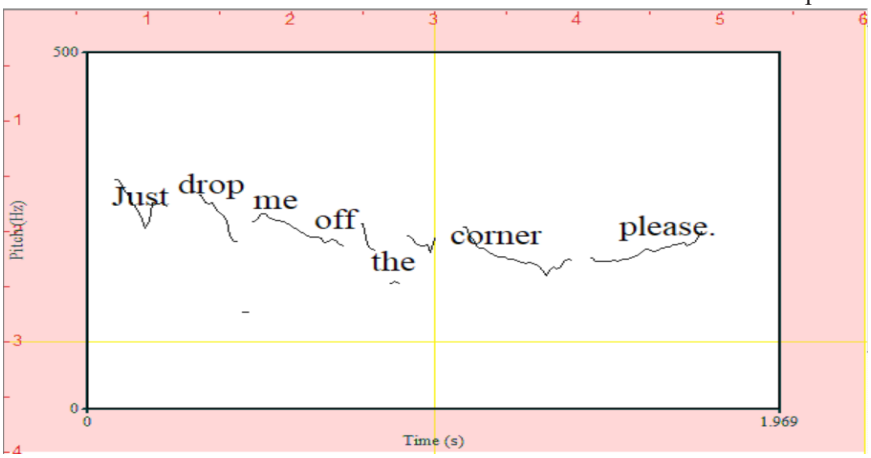

Figure 5
The pitch contour of a native speaker

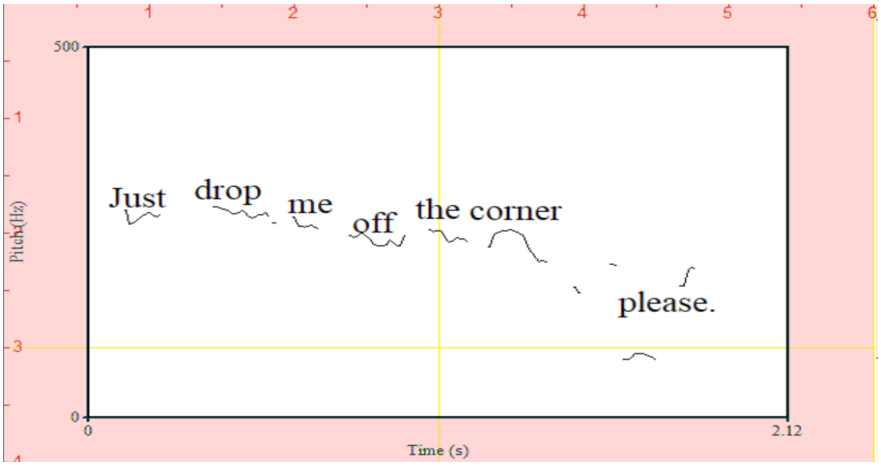

Figure 6
The pitch contour of a Chinese EFL speaker

Based on the two contours above, similarities and differences co-exist between two groups of participants. Both sides read the sentence in a falling-rising tone in the whole picture, but the intonation of each word is disparate. For instance, the word "drop" is uttered in a falling tone with extremely steep slope by native speakers; while for Chinese EFL speakers, the intonation variation of the word "drop" can be rarely seen. In addition, the pitch contour of the word "please" is continuous in figure 5, but intermittent in figure 6. The discontinuous pitch contour shows that the frequency of sound is slow and uneven at that point.

Analyzing the information behind intonation variation, we can infer that native speakers are more assertive about "put me down", as the the falling tone of "drop" is much steeper. Additionally, in native speakers' opinion, the place "corner" is a background information (uttering in a falling-rising tone), which means that the address of "corner" is known by both driver and speaker. On the other hand, the Chinese speaker failed to express this meaning in a rising-falling tone. Another difference shows from the word "please", Chinese learners is more abrupt when making request due to its intermittent pitch contour.

4.4 Findings in Exclamatory Sentences

Exclamatory sentence is a type of sentence pattern that expresses strong emotional feeling such as pleasure, anger, sorrowful, joy and so on, and normally ends with exclamation point. In this part, the author selects the sentence "how lovely and sweet she is!" as experimental material. As above, the pitch and intensity parameters and pitch contour are necessary to make a detailed analysis.

Table 4
Exclamatory sentence's parameters

Participants	Mean Pitch (Hz)	Mean Pitch Range (Hz)	Intensity Average (dB)
Native Speakers	228.18	169.05	70.67
Chinese EFL speakers	231.98	144.95	66.57

In this section, the mean pitch range and intensity average of the native speakers are higher than that of the Chinese adept EFL speakers, while the result of the mean pitch is reverse. The exclamatory sentence's mean pitch range is the highest among the four sentence patterns both for the native speakers as well as the Chinese EFL speakers. Additionally, the difference value of the mean pitch range reaches 24.1Hz between both sides, which is also the most considerable gap in this whole experiment. The selected pitch contours are shown as follows:

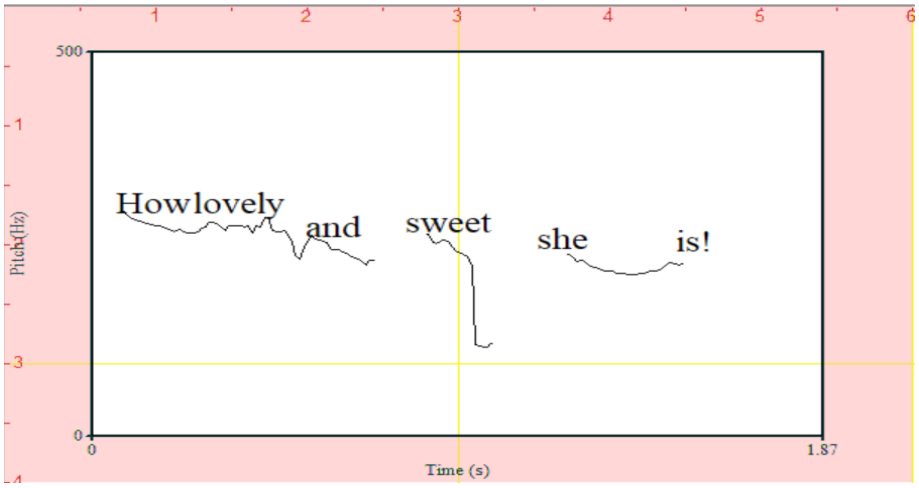

Figure 7
The pitch contour of a native speaker

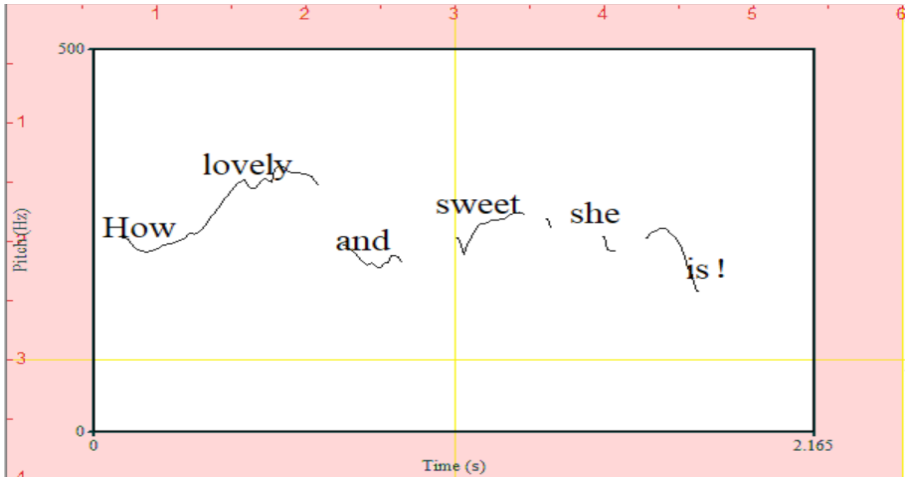

Figure 8
The pitch contour of a Chinese EFL speaker

Admittedly, both native speakers and Chinese EFL speakers read the sentence in accordance with the emotional requirement of exclamatory sentences, since the contour fluctuation is quite distinct in the pictures.

However, the detailed differences from the separate word level cannot be ignored. At the beginning of the sentence, the native speaker's tone tend to be flat, but the Chinese EFL speaker rise the tone, especially when comes to the word "lovely". The second intonation difference emerges from the word "sweet". To be specific, the native speaker utters it with a sharp falling tone, whereas the Chinese EFL speaker with a slow rising tones. Furthermore, at the tail of the sentence, the native speaker ends it without apparent intonation change, but the Chinese EFL speaker utters it with a falling tone.

The ups and downs of exclamatory sentence is the most intense one among these four sentences. Native speaker uttered it in a falling tone from the whole picture to show its affirm, with the word "sweet" in a drastic falling tone. However, Chinese learner read the sentence in a more up-and-down way. Since both of the adjectives "lovely" and "sweet" are expressed in a rising tone, it sounds like the "lovely" and "sweet" are uncertain.

To sum up, in terms of the number of pitch range alone, there is little difference between the Chinese EFL speakers with seven points in IELTS speaking test and the native speakers. However, compared from the perspective of pitch contour, the tone may entirely different, or even opposite when both sides deal with the same word in the same context. Therefore, it is reasonable to conclude that even the Chinese advanced EFL speakers who possess the awareness of intonation variation, but still may fail to catch the accurate tone change of every single word.

DISCUSSION

Comparing the performance of these two groups, we notice that Chinese EFL speakers who gained 7 points in IELTS speaking test cannot communicate in English exactly in the same intonation as native speakers. Many of them read them all depend on their language intuition instead of understanding the principle and implied meaning behind intonation. There are several reasons causing this phenomenon.

Firstly, Chinese English teacher overlook imparting the knowledge of pronunciation and intonation, including the concept of tone, syllabus and so forth. Students may not practice it designedly and are unable to aware the importance of intonation. Secondly, the method for students to practice oral English is backward. Traditionally, Chinese students who are eager to practice native-like English have no options but listen to the tape repetitively and read after it mechanically. In this way, students could not gain objective feedback, so that are unavailable to correct and improve their intonation scientifically. Last but not least, students pay less attention to the extra-linguistic information that could convey beyond words. Many problems would be solved if they could see through the appearance to perceive the essence.

Facing these insufficiencies, apart from imparting phonetics knowledge at school, speech visualized software like Praat could also plays its assistant role in helping EFL students to practice oral English. Under the help of Praat, students could compare their pitch and intensity contour with native speaker, so that adjusting their pitch, intensity, stress and pause intuitively. Students can get targeted practice in this method, then twice as much can be accomplished with half the effort.

CONCLUSION

The study is about a comparative study on intonation difference between Chinese EFL speakers and native English speakers. The findings of this experiment show that despite these Chinese EFL speakers pay attention to intonation variation in reading sentences, inaccurate tone still occur frequently in detail. In addition, Praat is the tool to intuitively visualize the sound into numbers, acoustic wave, pitch contours and so forth, which provides significant assistance to sound analysis and intonation practicing. Admittedly, there are some inadequacies in this study, including the limited participant number and sentence examples, which should be improved in the future study.

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