

Intonation Patterns of Wh-questions from Chinese EFL learners

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Abstract

The present study investigates Chinese EFL (English as a foreign language) learner's intonation pattern of wh-questions on the basis of AM theory. When the nuclear accent is at the end of the sentence, the American speakers tend to apply a falling tone (H*L) with either a low or high boundary tone. The Chinese learners usually apply the same falling tone (H*L) or a rising-falling tone (L*HL) on nuclear accent. However, the Chinese learners always produce a pre-nuclear accent on the word 'what'. Sometimes, the Chinese learners adopt a rising tone (L*H) on nuclear accent with a high boundary tone. When the nuclear accent is in the middle of the sentence, both the American and Chinese speakers use a falling tone (H*L) or a rising-falling tone (L*HL) on the nuclear accent. However, the Chinese learners emphasize some word after the nuclear accent without any prosodic boundaries between them. This phenomenon indicates that the Chinese learners might put a post-nuclear accent on the words after the nuclear accent.

Index Terms: Chinese EFL learner, pitch patterns, wh-questions

1. Introduction

In the previous literatures, Shao [1] proposes that the prosody of English functional intonation acquired by Chinese EFL learners becomes a research hotspot in the related field. These studies involved four main kinds of functional intonations, i.e., declarative intonation, question intonation, decretory intonation and exclamatory intonations.

Shack [2] examines production of one native female Mandarin speaker's English intonation when producing declarative, echo questions, and yes/no questions, finding that the Chinese speaker used the same general intonation patterns for statements, 'or not' questions as well as for the 'did' and unmarked questions. Chen [3] adopts Halliday's theory to analyze the intonation pattern differences between American speakers and Chinese EFL learners with respect to tonicity, tonality and tone. As a pioneering empirical study on Chinese EFL learners' intonation at home, this research tries to summarize the learners' patterns of tone groups, nuclear accent placement and nuclear contours for different types of sentences. Wang [4] observes distinction in prominent distribution and nuclear contour patterns in seven sentence types (i.e. declarative sentence, imperative sentence, exclamatory sentence, yes-no question, tag question, *wh*-question and declarative question) between the British speakers and the Chinese learners. The author also tries to build up the constraint ranking of prominence distribution for British speakers and Chinese speakers and to analyze English nuclear contour structure within the theoretical framework of OT. However,

there is only either one Chinese speaker or one sentence for each sentence type in the above researches, far from enough to summarize the varied intonation patterns of one certain sentence type.

For Mandarin Chinese, Shen [5] represents an overlay model of Chinese intonation. According to this model, the 'intonation minimum' of Standard Chinese consists of three tunes: Tune 1 for assertive, Tune 2 for unmarked questions and particle questions, and Tune 3 for A-not-A question. Hu [6] makes study on *wh*-questions, yes-no questions and echo questions of standard Chinese and points out that *wh*-words in *wh*-questions are the focus of sentence, whereas in yes-no questions, VPs are the focus.

From the overview of the previous study, it can be obtained that the intonation pattern of *wh*-questions produced by Chinese EFL learners need to be studied in great detail. The present paper, in this regard, intends to analyze the F₀ contours of *wh*-questions produced by the Chinese learners. Comparisons will be conducted between Chinese EFL learners and American speakers to find out the problems of Chinese EFL learners' *wh*-question intonation patterns. In this way, their relationship with Chinese intonation patterns and negative transfer of L1 can be further explored.

2. Method

2.1. Materials

The speech materials adopted for this paper contains six *wh*-questions. The length of the sentences varies from two to eight words, all of which begin with the word 'what' and are put into different contexts to indicate the focus of the sentences to the speakers.

Table 1 *List of the speech materials in this research*

Id	Text
0184	What's wrong?
0163	What are you saying?
0151	What does he do for a living?
0176	What's wrong with the blessed thing?
0190	What's the matter with the wretched machine?
0173	What makes you think he'll do any better?

The recording materials are selected from the CELSCOM corpus which is designed by Nokia Research Beijing and 'Speech and Discourse Processing' Key Lab of Chinese Academy of Social Sciences [7]. It collects English materials produced by Chinese EFL learners with different dialects to provide training data for English speech recognition of Chinese

speakers with regional accents and to benefit second language learning and Computer Aided Language Learning (CALL) systems.

2.2. Speakers

Seven Americans and twelve Chinese served as subjects in this research. American speakers were from west coast of America, one is female, and six were male. Chinese speakers were from Beijing; their native language is Standard Chinese, seven are female, five had male. All of them had no self-reported speech or hearing disorders.

2.3. Annotation and data extraction

All the sound files were annotated on the basis of the following process: i) All ‘wav’ files were segmented by automatic segmentation software, and then the boundaries of each phoneme were modified manually; ii) The prosodic information such as prominence, prosodic boundaries and boundary tones were annotated on the basis of ToBI and IViE [8]; iii) The F_0 for each target sentence was then extracted by Praat script and manually modified.

An American expert was invited to check the result of transcription, mainly nuclear accents and prosody structures. In order to neutralize the pitch differences due to gender and personal varieties, the F_0 values was transferred from Hz to semitone values and then normalized in five tone letter space.

3. Result and analysis

3.1. Comparisons of the nuclear accent distribution pattern between Chinese EFL learners and American speakers

It’s worthwhile to clarify that the nuclear accent distribution pattern is based on the American teachers’ judgment of stressed words and pauses. The pitch pattern of nuclear accent is also analyzed on the basis of the American teachers’ perceptual result.

Table 2 displays the distribution of nuclear accent in the six *wh*-questions that have been produced by American and Chinese speakers. In this table, ‘S’ stands for speakers, ‘A’ represents American and ‘C’ means Chinese.

From the table, we can see that the American speakers are always consistent in their choice of nuclear accent regardless of the length of the sentences. When there are two words in the sentences, most Chinese learners can reach an agreement in the selection of nuclear accent (about 80% in the sentence ‘what’s wrong’). The agreement is decreasing with the increasing length of sentences. When there are six words in the sentences (in the sentence 0151), less than half Chinese learners could put nuclear accent on the same words. The agreement of the selection of nuclear accents between American and Chinese speakers decreases with the increasing length of the sentences. The Chinese learners put nuclear accent on words that are not accented by the American native speakers.

What’s more, The Chinese learners tend to assign nuclear accent to more words in one sentence. They begin to break the sentences into two or even more intonational phrases when the sentences are extended to six words, i.e. in the sentence ‘what’s wrong with the blessed thing’.

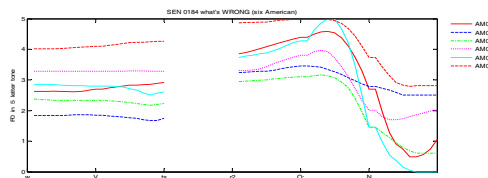
Another observation is that the American speakers rarely put nuclear accent on the word ‘what’, whereas the Chinese EFL learners were inclined to assign nuclear accent to this word no matter the sentences were broken into more than one intonation phrases or not.

Table 2 The distribution of nuclear accent in the six *wh*-question sentences

id	S	Nuclear words		
		what's	wrong	what's& wrong
0184	A	1	6	
	C	1	9	2
0163	A		7	
	C	2	7	3
0176	A		6	1
	C	1	8	3
0151	A		4	3
	C	2	5	3
0190	A	5	1	1
	C	4	1	4
0173	A	4		1
	C	3	2	2

3.2. Comparisons of pitch patterns of *wh*-questions between Chinese EFL learners and American speakers

The analysis of pitch patterns is based on the results described above. From the data, we can see that by putting the *wh*-questions into different context, we achieve the sentences with different nuclear locations. Most of American speakers put the nuclear accent on a word that is at the end of the sentence in the sentence 0184, 0163, and 0173 while they accent the word in the middle of the sentence in the sentence 0176, 151 and 0190 (marked with grey in table 2). In order to make comparisons of pitch patterns of nuclear accent between the American and Chinese speakers, only the sentences marked with grey in the above table will be analyzed. In this part, the study will start with the sentences with final nuclear word, and then move on to the sentences with middle nuclear accent.



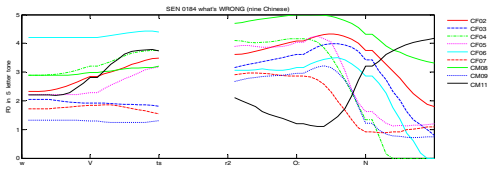


Figure 1 Time-normalized F_0 contours of SEN 0184 what's WRONG

Figure 1 shows Time-normalized F_0 contours of SEN 0184 'what's wrong' with the word 'wrong' as nuclear accent by the American speakers and Chinese learners. In the following figures, the words in capital symbolize nuclear accent produced by the speakers. Figure 1 shows that both American speakers and Chinese learners adopt a falling tone on nuclear accent with a low boundary tone (H*LL%). Yet, apart from falling tone, one Chinese learner (CM11) uses a rising tone on nuclear accent with a high boundary tone (L*HH%)

Figure 2 shows that American speakers adopts the same intonation pattern as the last sentence, a falling tone on nuclear accent with a low (H*LL%) boundary tone. Most Chinese learners prefer a rise-fall tone (L*HL) with a low boundary tone. The pre-nuclear accent on the word 'what' can be also observed in this sentence. The above phenomenon can also be observed in the figure 3 which shows the F_0 contours of the sentence 'what makes you think he'll do any better' with the word 'better' as the nuclear accent.

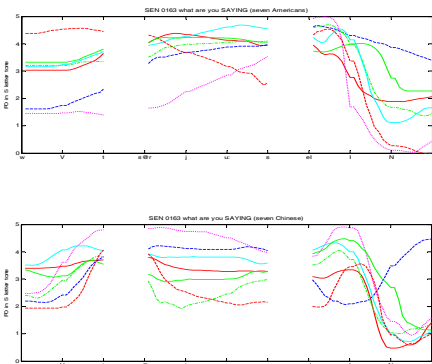


Figure 2 Time-normalized F_0 contours of SEN 0163 what are you SAYING

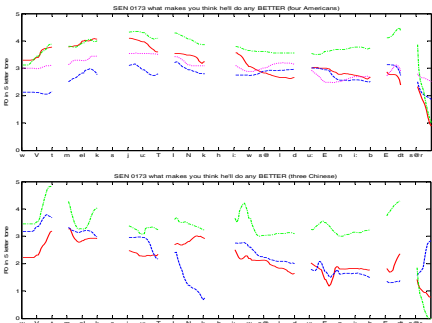


Figure 3 Time-normalized F_0 contours of SEN 0173 what makes you think he'll do any BETTER

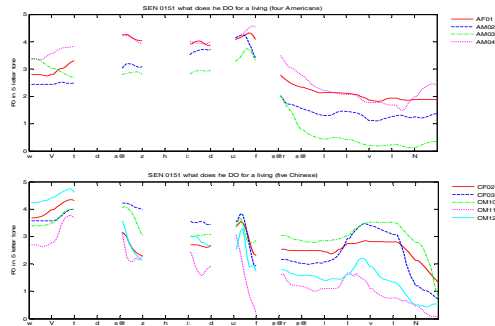


Figure 4 Time-normalized F_0 contours of SEN 0151 what does he DO for a living

From figure 4, it can also be seen that American speakers apply a falling tone (H*L) or a rise-fall tone (L*HL) on the word 'do'. Chinese learners use the same pitch pattern for nuclear accent as American speakers.

Another phenomenon to note is that, apart from the nuclear accent on the word 'wrong', some Chinese learners (CF04 and CM08) also accent the word 'living'. However, according to the result of American teachers' perceptual experiment, there is no boundary within the sentence, i.e., Chinese learners take the whole sentence as one intonation phrase.

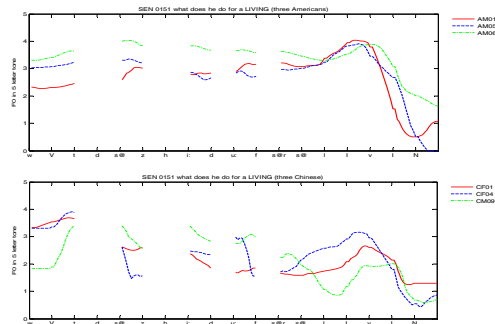


Figure 5 Time-normalized F_0 contours of SEN 0151 what does he do for a LIVING

Figure 5 shows that pitch patterns of sentence 0151 with nuclear accent on the word 'living'. By comparison, we can see the intonation patterns in the figure 4 and figure 5 are different from each other, which confirms the speakers included in figure 4 have put nuclear accent on the word 'do' instead of the word 'living'. Yet, the pitch excursion of the word 'living' in the figure 4 can not be ignored.

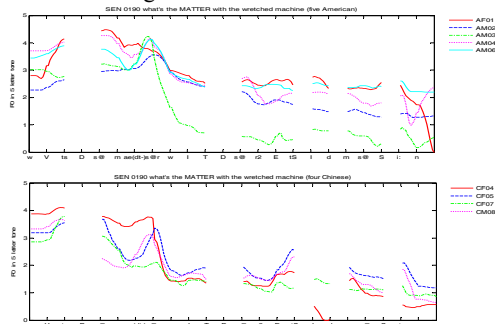


Figure 6 Time-normalized F_0 contours of SEN 0190 what's the MATTER with the wretched machine

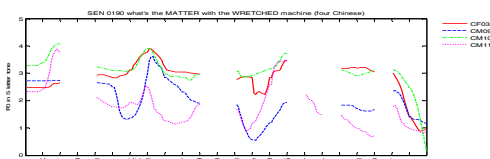


Figure 7 Time-normalized F_0 contours of SEN 0190 *what's the MATTER with the WRETCHED machine*

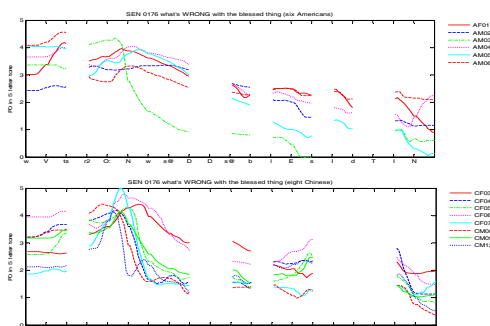


Figure 8 Time-normalized F_0 contours of SEN 0175 *what's WRONG with the blessed thing*

From figure 6, it can be obtained that both American speakers and Chinese learners adopt a rise-fall tone (L*HL) on nuclear accent. Also the word 'wrenched' was accented by the Chinese learners. It is possible that these four Chinese learners broke this sentence into two different intonation groups. But figure 7 shows pitch patterns of the same sentence with nuclear accents on the words 'matter' and 'wretched', which are different from the pitch patterns in the figure 6. The same problems can also be found in the figure 8 which shows F_0 contours of SEN 0175 'what's WRONG with the blessed thing'.

4. Conclusions

From the present research, it can be obtained that when the nuclear accent is located at the final position of the sentence, the American speakers tend to apply a falling tone (H*L) with either a low or high boundary tone. Chinese learners usually apply a falling tone (H*L) or rise-fall tone (L*HL) on the nuclear accent. However, the Chinese learners are inclined to put a pre-nuclear accent on the word 'what'. Sometimes, the Chinese learners use a rising tone (L*H) with a high boundary tone on nuclear accent. When the nuclear accent is in the middle of the sentence, both the American and Chinese speakers use a falling tone (H*L) or a rise-fall tone (L*HL) on nuclear accent. This confirms the conclusion that Chinese EFL learners might unconsciously 'borrow' high-level or high falling tone from their native language to nuclear accent in their English [9]. The results also show the Chinese learners might also have accented some words after the nuclear accents without any prosodic boundaries between them.

Apart from nuclear accent, the Chinese learners always assign a prenuclear accent to wh-word in wh-questions. Ladd [10] claims that in English, the wh-word does not normally bear the most prominent accent. Yet, languages without wh-movement (i.e. languages in which the wh-word does not stand at the beginning of the wh-questions) do put nuclear accent on wh-word. Hu [6] has made a phonetic study on prosody patterns

of wh-words in wh-questions, yes/no-questions and echo questions in Standard Chinese. The production data from four speakers show that wh-words are the focus of wh-questions, whereas in yes-no questions, VPs are the focus. This may explain why the Chinese learners put accent on the wh-word in wh-questions, which is further evidence of a possible negative by Chinese EFL learners in their English intonation study.

What's more, some Chinese learners also have post-nuclear accent in WH-questions when the nuclear accent is in the middle of the sentence. McGory's [11] study has also found that Chinese learners produced pitch accents on target words that were in post-focus positions, whereas English speakers did not. But this question needs more research and further evidence to verify it.

5. Acknowledgements

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