

## A Study of the Relation between Intonation and Sentence Structures of the English Speech

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### ABSTRACT

*Intonation in English speech is an important research focus in English teaching. However, relatively less attention has been paid to the influence that sentence structures have on the use of intonation in English speeches. On the basis of Halliday's intonation theory, the present study investigated the relationship between intonation and sentence structures through mainly using Praat as well as Excel. Results showed that in complex sentences, speakers used more tone groups and marked tonicity than in simple sentences. However, Chinese students had more improper use of marked tonicity and tones in complex sentences compared to simple sentences. In order to improve the intonation in English speeches, it is necessary for Chinese students to have a better understanding of the meaning that the intonation can realize and the influence that sentence structures has on intonation.*

**Keywords:** Intonation, EFL learners, sentence structure

### INTRODUCTION

In the process of conducting verbal communication, intonation was one of the main auxiliary components (Chen, 1983). Intonation could remove grammatical ambiguity as well as express idea. Meanwhile, it could also convey the tone and attitude of the speaker (Chen, 2008). Currently, the studies in relation to intonation mainly concentrated on teaching and improvement (Wang, 2020; Ma, 2020; Teng, 2020). Related intonational studies also offered a special view for the cross-disciplinary studies and development, for instance, speech recognition and deep learning (Snow, 2017; Rieche, Snipes et al., 2019). Intonation played a significant role in speeches, for it could express speakers' attitude and indicated the logical relation between adjacent utterances (Halliday, 1967; Halliday & Greaves, 2008). In recent years, some scholars focused on the use of speeches in the medical field (Pannala & Yegnanarayana, 2020; Bieber & Gordon-Salant, 2020). Other scholars showed interests in the education and improvement of English speeches, including the teaching of English tones and some common rhetorical devices (He & Yang, 2020; Lin, 2020; Feng, 2020). It was worth noting that there was less research focusing on the intonation features of English speeches. Furthermore, rather less attention had been paid to the sentences type and intonation.

However, to improve the understanding of intonation that Chinese English as foreign language (EFL) learners used in speeches, knowing the influence that the sentence structures had on the use of intonation was necessary and significant. Thus, the present research aimed to investigate the relationship between sentence structures and intonation. Through following Halliday's (1967) intonation systems, the tonality, tonicity and tone systems of both Chinese EFL learners and English native speakers were analyzed. Meanwhile, the use of intonation that speakers used in different sentences types was investigated and compared. In order to achieve the purposes of carrying out the further comparison between the two groups of speakers and probing into the influence sentence types exerted on the use of intonation, Three research questions were formulated:

- (1) What is the influence of sentence structures on the use of tonality?
- (2) What is the influence of sentence structures on the use of tonicity?
- (3) What is the influence of sentence structures on the use of tone?

### Intonation

Intonation was a kind of suprasegmental phenomena with pitch movement as the main characteristics in human language (Chen, 2008).

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Early studies of English intonation could be traced back to the English pronunciation manual that appeared in the 16th and 17th centuries, while modern English intonation started from Sweet (1892). Over the hundred years, crucial exposition of intonation emerged. Reviewing the previous studies, according to the research methods, configurational approach, level approach and auto-segmental measured approach became the most three principal dimensions of intonation research (Chen, 2009).

### Intonation Systems Proposed By Halliday

On the basis of the information theory, Halliday (1967) put forward the intonation system, determining that there were three distinctive

systems encompassed in expressing meaning through intonation: the tonality, the tonicity and the tone. This concept made it possible to organically combine syntax, intonation and information when carrying out the research related to intonation. Regarding the intonation system, tonality could divide the utterance into several tone groups, and these tone groups could be regarded as the basic components of English intonation. Tonicity was the central part of the tone group and could be treated as the information focus. Tone referred to the move of the pitch. According to Halliday's classification (1967), there were five primary tones of English intonation systems. Besides, two complex tones were composed of the basic tones.

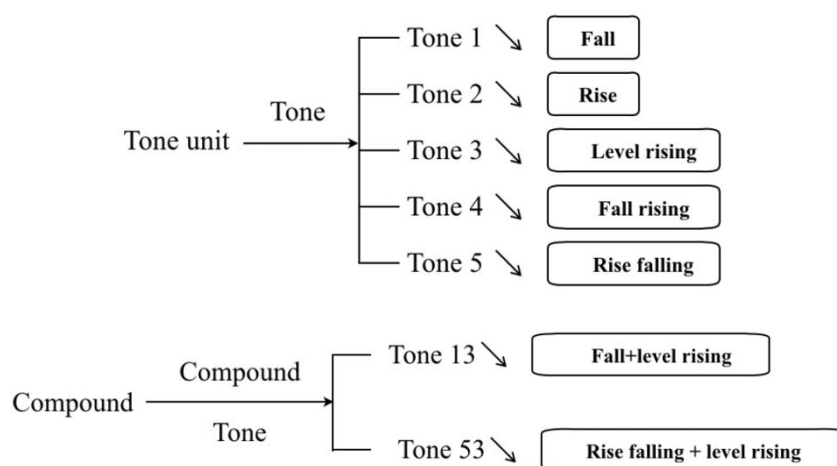


Figure1. Description of English tones (Halliday, 1967)

## RESEARCH METHODOLOGY

### Research Subjects and Description of the Corpus

The comparison between the native English speakers and Chinese EFL learners were conducted. Specifically, native English speakers (NES) and non-native English speakers (NNES), the Chinese students, were selected as

the research subjects of the present study. In details, the speech corpus of native speakers was composed of graduation speeches from famous universities in the United States. Besides, the corpus of Chinese EFL learners consisted of the final speeches of the 21<sup>st</sup> Century Coca-Cola Cup National English Contest. Furthermore, the total time, topics and the total number of speeches were controlled as strict as possible.

Table1. Description of the original corpora

CELC				ENSC			
Rank	Code of the speaker	Word tokens	Duration	Rank	Code of the speaker	Word tokens	Duration
1	NNES-1	491	3m58s	1	NES-1	1,361	9m2s
2	NNES-2	608	4m	2	NES-2	2,537	15m30s
3	NNES-3	459	3m45s	3	NES-3	1,895	15m33s
4	NNES-4	589	3m57s	4	NES-4	1,953	16m
5	NNES-5	554	4m10s	5	NES-5	1,353	11m30s
6	NNES-6	550	4m25s				
7	NNES-7	610	3m58s				
8	NNES-8	618	4m11s				
9	NNES-9	562	4m26s				
10	NNES-10	521	3m51s				

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11	NNES-11	628	4m10s			
12	NNES-12	587	3m51s			
13	NNES-13	593	3m53s			
14	NNES-14	545	3m56s			
15	NNES-15	550	3m56s			
16	NNES-17	503	3m53s			
17	NNES-18	588	3m57s			
In total		9,565	67m		9,099	67m34s

Since intonation could convey syntactic, pragmatic, emotional and other information, it was necessary to combine the intonation with some linguistic characteristics of utterance, involving sentence types (Chen & Bi, 2015). This study labelled the sentence structures of sentences at first. Then various types of structures that speakers used in the selected 23

speeches were counted. After that, different sentence structures native English speakers and Chinese EFL learners used in speeches were compared. Due to simple and complex sentences were the two most frequently used types in speeches, these two types were selected as the research focus in the present study.

**Table2.** Syntactic recognition of the research corpus

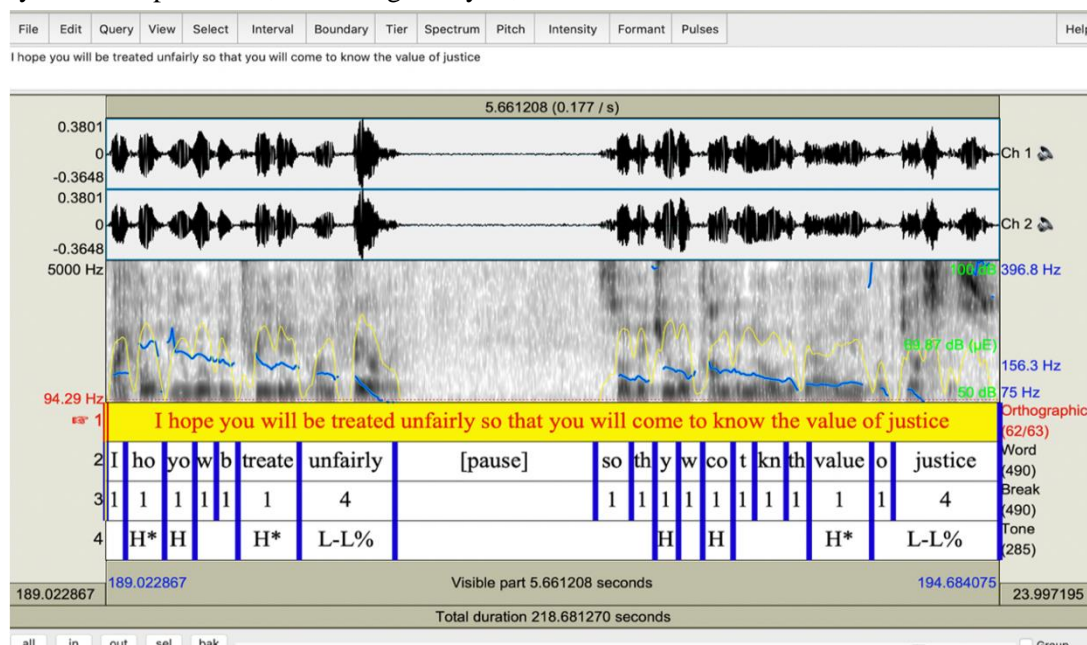
Classification Standard	Rank	Type	Frequency	Distribution
Classified by structure	1	Simple	495	46%
	2	Compound	79	7.34%
	3	Complex	447	41.54%
	4	Compound-complex	55	5.11%

### Research Tools and Data Processing

#### Praat

Praat, a cross-platform, multi-functional professional acoustic software, was mainly employed for experiments, including analysis,

annotation, processing and synthesis of digital voice signals, and could create a variety of language maps and text reports. In the present study, Praat was used to visualize the pitch events, and labelled the intonation features.



**Figure2.** Example of the use of Praat

#### Preview and Excel

Preview was the application in MAC OS for image files, such as JPG, PNG, and PDF files. In this study, firstly, Preview was used for labelling the sentence structures of speeches by marking up the same sentence structure with the

help of the same colour. In addition, tonality segmentation and marked tonicity of the tone units could be highlighted. Besides, the function of Preview made it very convenient for the author to search for the required data.

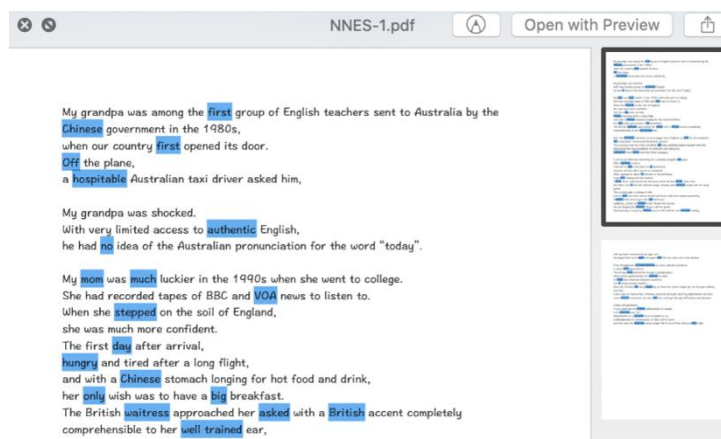


Figure3. Example of the use of Preview

Apart from the tools for recording and labelling the corpus, Excel was used to do some descriptive statistics. In the present study, some values including the sum, mean, maximum and minimum numbers were calculated through using Excel. Meanwhile, it could also provide the statistics basis for the conclusion that whether there existed the significant difference between two groups of data.

**Data labelling**

When labelling the sounds, Halliday’s (1967) tone system was followed. Tone 1, Tone 2, Tone 3, Tone 4, Tone 5, Tone 13, Tone 53 (T1, T2, T3, T4, T5, T13 and T53) were employed to mark distinctive tones of the speeches delivered by Chinese EFL learners and English native speakers.

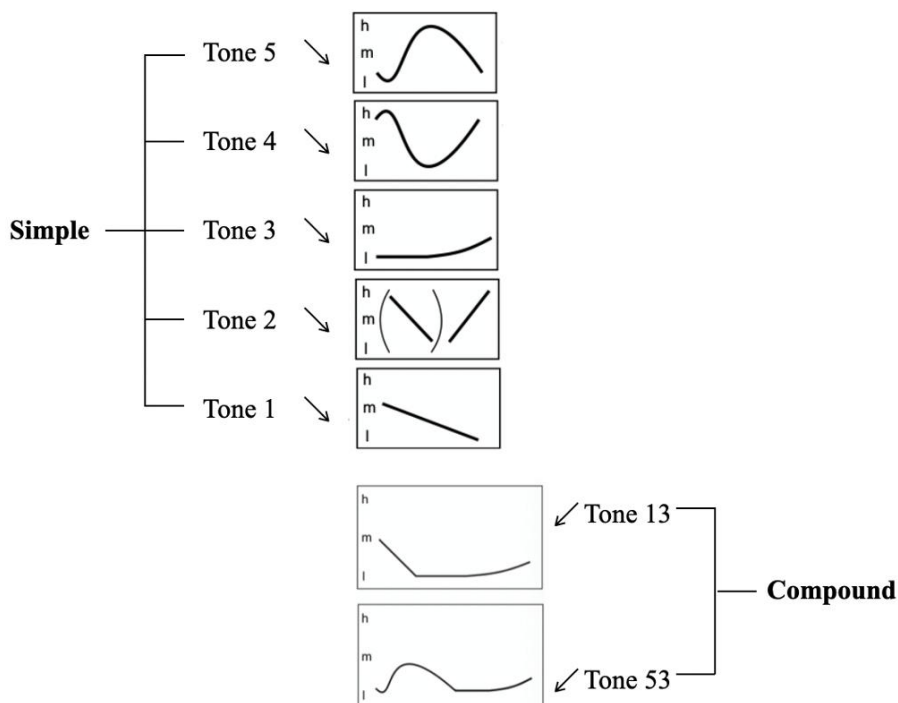


Figure4. Description of tones

**RESULTS**

**Relationship between Sentence Structures and the Tonality**

Table 3 presents the tonality segmentation in two kinds of sentence types that both Chinese EFL learners and English native speakers used in speeches. With reference to simple sentences, apparently, there were more tonality

segmentation in complex sentences (mean=63; sum=1072) than in simple sentences (mean=26; sum=427). Moreover, it was more frequently for speakers to use more than one tonality in complex sentences (distribution=4.4) than in simple sentences (distribution=1.2). It could be concluded that NES could skillfully divide information units into complex sentences by using multiple tone groups while almost always

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used one tone group in simple sentences so that listeners could have a better understanding.

Regarding the comparison between the use of tonality segmentation in the two kinds of sentence structures, it could be found that there appeared more tonality segmentation in complex

sentences (mean=68; sum=1160) than in simple sentences (mean=47; sum=796). NNES were more probably to divide sentences into several tone groups in complex sentences (distribution=5.5) than in simple sentences (distribution=3).

**Table3.** Comparison of the tonality segmentation in simple and complex sentences

Speakers	Items	Simple sentence	Complex sentence
NES	Mean	26	63
	Sum	427	1072
	Distribution	1.2	4.4
NNES	Mean	47	68
	Sum	796	1160
	Distribution	3	5.5

(Note: Distribution=Number of tonality/Number of simple or complex sentences)

Here two examples are used to illustrate the distinctive use of tonality segmentation in simple and complex sentences.

*Example:*

1) // You should look forward // (NES-1)

2) // And when you do // I think you may appreciate // that it was because of the support // of your classmates // in the classroom // on the athletic field // and in the dorms // (NES-1)

Two examples listed above show the division of tone units in simple and complex sentences. Regarding the tonality segmentation in simple sentence, there was only one tone group that speaker used when uttering the simple sentence. However, as for *Example 2*), in the complex sentences there were more than one tone group that speaker employed.

It could be demonstrated that NNES was able to understand that there should be distinctions in the employment of tone groups in two different sentence structures and could intentionally employ more tone groups to separate information units in complex sentences.

### Relationship between Sentence Structures and the Tonicity

**Table4.** Comparison of marked tonicity used in the two kinds of sentences

Speakers	Items	Simple sentence	Complex sentence
NES	Mean	14	28.9
	Sum	248	491
	Distribution <sup>1</sup>	1	2.1
	Distribution <sup>2</sup>	5.60%	45.90%
NNES	Mean	23	34.2
	Sum	391	582
	Distribution <sup>1</sup>	1.5	2.2
	Distribution <sup>2</sup>	5.80%	50.20%

(Notes: Distribution<sup>1</sup>=Number of marked tonicity / Number of simple or complex sentences;

Distribution<sup>2</sup>=Mean of number of marked tonicity / Mean of number of tone groups)

Table 4 shows the comparison of the use of marked tonicity used in the two kinds of sentence types. As for NES, the number of marked tonicity in complex sentences (mean=28.9; sum=491) was bigger than that in simple sentences (mean=14; sum=248). The two types of distributions also revealed that English speakers were more likely to employ marked tonicity in the complex sentences (distribution1=2.1; distribution2=45.90%) than in simple sentences (distribution1=1; distribution2=5.60%). Therefore, this could be drawn that when saying complex sentences in speeches, it was marked tonicity that NES regularly used to accentuate the core information or to emphasize the part where listeners should pay attention to. Nevertheless, English native speakers used unmarked tonicity more frequently to decrease the barrier of listeners' understanding. Considering the marked tonicity that NNES used in their utterance, Table 4 shows that Chinese EFL learners were more likely to use marked tonicity in complex sentences than in simple sentences (mean=34.2; sum=582). This was relatively similar to the situation that NES had when using marked tonicity in distinctive types of sentences.

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Example:

3) My grandpa was shocked.

4) My mom was much luckier in the 1990s when she went to college. (NNES-2)

Example 3) and Example 4) illustrate the distinctive use of tonicity in the different structures of sentences. In simple sentence, the speaker was more likely to use unmarked tonicity. However, in the complex sentence, it was more possible for speakers to use marked tonicity to accentuate the necessary information.

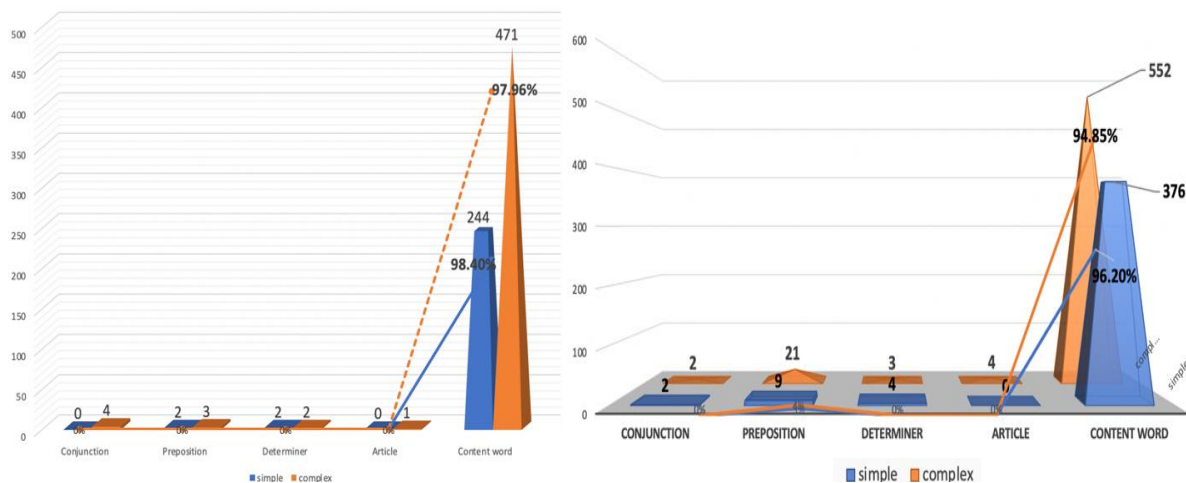


Figure 5. Comparison of the location of marked tonicity

(Note: the percentage shows the proportion of each part of speech in all used marked tonicity in simple and complex sentences)

As for NES, the place where marked tonicity located in both simple and complex sentences revealed that sentence types had a relatively limited influence on the marked tonicity that NES employed in their speeches. Specifically, in both kinds of sentence structures, content words (simple=244; complex=471) got the highest proportion among all parts of speech. Meanwhile, rather fewer function words were employed by using the marked tonicity. Yet a similar proportion (for instance, content words held 98.40% in simple sentences while 97.96% in complex sentences) listed above demonstrated that the sentence structure did not influence the selection of parts of speech when utilizing the marked tonicity. About NNES, in both simple and complex sentences, content words (simple=376/96.20%; complex =552/94.85%) got the highest proportion of marked tonicity, which was followed by the preposition (simple=9; complex=21). Because the proportions of content words in the two kinds of sentence types were about 95%, there was no significant difference of the proportion of these locations between simple and complex

For instance, the new information or the information that was contrasted with the information in the previous utterances.

Apart from the frequency and distribution of marked tonicity that speakers used in simple and complex sentences, the location of the unmarked tonicity also needs the further investigation. Figure 5 presents the comparison of the location of marked tonicity employed in the two kinds of sentence types. The left graph illustrates the using situation of NES and the right one shows that of NNES.

sentences. Thus, no concrete data could prove that sentence structures had a close relationship with the choice of parts of speech when Chinese EFL learners were using the marked tonicity.

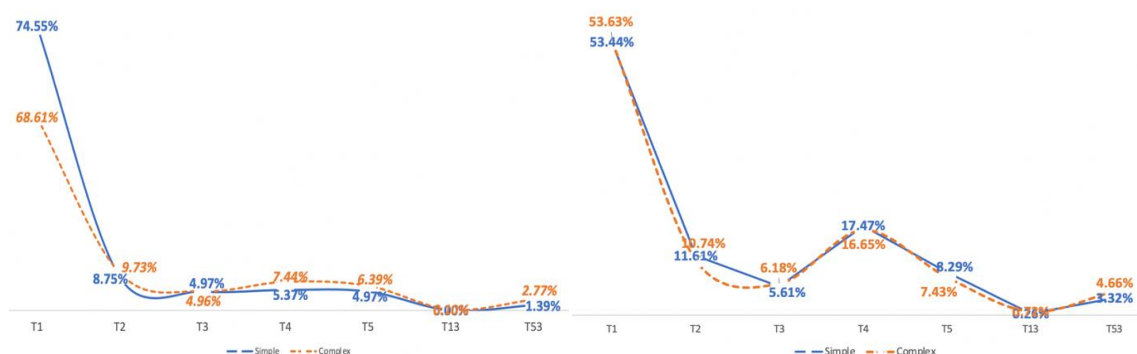
### Relationship between Sentence Structures and the Tone

Table 5 shows the comparison of distinctive tones that both English native speakers and Chinese EFL learners used in the two kinds of sentences. Tones including T1, T2, T3, T4, T5, T13, T53 were taken into consideration. From Table 5, there existed the significant difference of the use of tones that NES ( $p=.000^{***}<.001$ ) used in the different sentence structures. However, NNES ( $p=.137>.05$ ) did not pay much attention to the sentence structures when using distinctive tones. In order to explore the reason for the dissimilar situation of using tones by NES and NNES, Figure 6 was listed here to illustrate the concrete employment of all kinds of tones in simple and complex sentences. The figure listed in the left was the statistics of NES and the right one was that of NNES.

**Table 5.** Comparison of the use of tones in the two kinds of sentences

Speaker	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig.(2-tailed)
			Lower	Upper			
NES	3.25131	.32677	3.15518	4.45210	11.640	98	.000***
NNES	.60680	.06068	-.02942	.21137	1.499	99	.137

(Note: \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ )



**Figure 6.** Comparison of different tones that speakers used in simple and complex sentences

Compared with English native speakers, obviously Chinese students did not make the quite different choice of tones when uttering different kinds of sentences. In details, English native speakers used T1 less frequently in simple sentences (74.55%) than in complex sentences (68.61%). However, T1 that Chinese EFL learners used in speeches held the relatively quite similar proportion in the two kinds of sentences (simple=53.44%; complex=53.63%). Based on Table 5 and Figure 6, there should be the different use of tones in the different kinds of sentences. However, the difference between the NES and NNES indicated that NNES did not give their consideration to the change of sentence structures. Thus, NNES could not use different tones very properly to deal with complex sentences with more complicated information than simple sentences in most cases.

### CONCLUSION

Based on Halliday's intonation system, this research investigated the intonation features that speakers used in simple and complex sentences. Both English native speakers and Chinese EFL learners showed their consideration to the influence of that sentence structures exerted on the use of tonality segmentation and marked tonicity. In the complex sentences, more tone groups and marked tonicity would be used in speeches. Meanwhile, Chinese students had more incorrect use of marked tonicity in complex sentences than in simple sentences. For instance, they used more preposition in complex sentences. As for the relationship between the

sentence types and distinctive tones, compared with English native speakers, Chinese students did not show the difference of using tones in the two kinds of sentences types. In conclusion, the sentence structures did had the important influence on the use of English intonation when delivering speeches, Chinese students needed to pay more attention to improve their understanding on the relation between these two facets, learning that in most cases, complex sentences indicated more tone groups, marked tonicity and more vivid tones.

### ACKNOWLEDGEMENTS

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