

Prosodic marking of topic constructions in Mandarin Chinese

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Abstract

This study examines the prosodic marking of topic constructions in Mandarin Chinese. The findings suggest that, even though on the surface there are prosodic markings that differentiate topics from comments, the difference is the product of the prosodic phrasing, coupled with the declination and final lowering, in that a topic construction is usually decomposed into two prosodic constituents. This study highlights the importance of taking prosodic hierarchy into consideration in prosodic studies.

1. Introduction

1.1. Topic constructions (TCs) in Mandarin Chinese

Mandarin Chinese is a topic-prominent language (Li & Thompson, 1981: 15). A topic is typically a noun phrase that names what the sentence is about, whereas a comment describes what happens to the topic. A topic always occurs in sentence-initial positions; a topic can be separated from the comment by a pause or by one of the pause particles (optional). Generally speaking, there are three types of TCs in Mandarin Chinese: TCs of topicalization, TCs of left dislocation, and the Chinese-style (or dangling) TCs (Chen, 1996). Most linguists agree that topics serve as a discourse device to organize utterances coherently.

1.2. Prosodic marking of topics

Discourse structure is oftentimes prosodically marked (Venditti and Hirschberg, 2003). In English, foci and topics correlate with pitch accents (Fery and Krifka, 2009). English topics are often marked by the L+H* pitch accent (Steedman, 2000). By contrast, accent (or pitch accent) in Asian languages only plays a minor role in encoding topics (Fery and Krifka, 2009).

1.3. Research questions

This study investigates the prosodic marking of TCs in Mandarin Chinese. Specifically, the following two questions are addressed: 1) what are the prosodic markings of topics and comments in Mandarin TCs? and 2) What are the differences in prosodic marking between topics and comments in Mandarin TCs?

2. Methodology

2.1. Materials

Written scripts were used to elicit natural speech, in which the target TCs are embedded. The length of topics ranges from two to four syllables. Three types of topics (Chen, 1996) are used, namely TCs of topicalization, TCs of left dislocation, and Chinese-style (dangling) topics. Examples of the three types of TCs are given below.

(1) TC of topicalization

苹果 我 很 爱 吃。

[píngguǒ]_{topic}[wǒ hěn ài chī]_{comment}

Apple I very love eat

'I love eating apples'

(2) TC of left dislocation

老张 你最好 别 告诉他。

[lǎozhāng]_{topic}[nǐ zuì hǎo bié gàosù tā]

comment

Old Zhang you had better not tell him

'You had better not tell Old Zhang'

(3) Chinese-style (dangling) topic

物价 纽约 最 贵

[wùjià]_{topic}[Niǔyuē zuì guì]_{comment}

Price NewYork the most expensive

For a certain type of TC of a certain length, two sentences are used. Thus altogether there are 18 TCs: 3 (types of TCs) * 3 (syllable length of topics) * 2 (two sentences) = 18 TCs.

2.2. Subjects

Four female speakers (average age: 27) of standard Mandarin participated in the recording.

2.3. Recording procedure

Two subjects worked together when recording. They were instructed to situate themselves in the target situation and try to produce speech as naturally as possible. Subjects switched roles when recording so that each subject produced all the TCs.

2.4. Transcription and acoustic measurements

The data of (the topic-final and the comment-initial) syllable duration, and the maximal and minimal F0 in topics and comments were obtained by running two Praat scripts¹, with manual checkup after the automatic retrieval of the data.

3. Data analysis and discussions

3.1. Syllable duration of topics and comments

Analysis of variance (ANOVA) were conducted on the syllable duration, with position (two levels: pre-boundary², post-boundary), syllable number of topics, and topic type as independent variables. ANOVA results show that position and topic type are significant ($F_{1,126}=54.1362$, $P < .01$; $F_{2,126}=10.8470$, $P < .01$); the syllable number is marginally significant ($F_{2,126}=2.6952$, $P = 0.07$); and there is the interaction between position, syllable number, and topic type ($F_{4,126}=2.8940$, $P < .05$).

Paired T-test shows that pre-boundary topic-final syllables are significantly longer than those post-boundary comment-initial ones ($t_{71} = 7.5319$, $P < .01$). Thus, a clear lengthening effect was found on the topic-final syllables. Such lengthening effect also implies that Mandarin speakers tend to break a TC into two prosodic constituents, prosodic words or prosodic phrases. Post-hoc Tukey test conducted on syllable duration in different topics show that syllables in dangling topics are significantly longer than those in the other two types of topics ($t=2.898$, $p < .05$; $t=3.617$, $p < .01$).

¹ <http://www.helsinki.fi/~lennes/praat-scripts/>

² The boundary here refers to the boundary between the topic and the comment.

Post-hoc Tukey test was conducted on the syllable duration in topics with different number of syllables. No significance was found.

3.2. F0 comparison of topics and comments

3.2.1. Pitch range analysis

The pitch range is the difference between the maximal F0 and the minimum F0 in a topic or comment. ANOVA results show that both syllable number and topic type are significant ($F_{2,126}=3.447$, $P < .05$; $F_{2,126}=3.5108$, $P < .05$). Post-hoc Tukey tests show that the pitch range in topics with four syllables is wider than that in topics with two syllables ($t=2.503$, $P < .05$), and that the pitch range in dangling topics is wider than that in topics of topicalization ($t=2.420$, $P < 0.05$). The statistic results here suggest that TCs with dangling topics of four syllables have the widest pitch range. This makes dangling topics different from the other two types of TCs.

3.2.2. Relative pitch range in topics and comments

In the above analysis of pitch range, the F0 data was not normalized. Thus it might be speculated the non-significance in pitch range between topics and comments is caused by the non-normalized data. Davis (2004) used the ratio of the H target to the L target in the post-posed in Mandarin as a measurement for the degree of the compression in pitch range, namely the larger (than one) the ratio, the wider the pitch range. Due to the nature of ratios, this treatment serves as a kind of normalization of the F0 data. Drawing on Davis, we compare the pitch range ratios of the topics and comments to see whether there is difference in the compression of pitch range between topics and comments.

ANOVA was conducted on the pitch range ratios in topics and comments, with position, syllable number, and topic type as independent variables. Both position and topic type are significant ($F_{1,126}=13.3225$, $P < .01$; $F_{2,126}=3.6022$, $P < .05$). Paired T-test on position shows that the pitch range ratios

in topics are significantly narrower than those in comments ($t_{71} = -3.9275, P < .01$). Post-hoc Tukey test on topic type shows that ratios of pitch range of all three types are not significantly different from each other, although the pitch range in topicalization TCs is marginally narrower than that in the other two types of TCs ($t_{dangl} = -2.271, P = .06$; $t_{dist} = -2.104, P = .09$).

3.2.3. Pitch range comparison between the topic and the comment

Drawing on Davis (2004: 85), another ratio is used as well to compare the pitch range of topics and comments. This ratio is defined as below: if the ratio of the maximal F0 to the minimal F0 in the topic is R1, and the ratio of the maximal F0 to the minimal F0 in the comment is R2, then the comparison ratio of the pitch range R is $R1/R2$. According to Davis, this ratio can help examine whether the pitch range in topics and comments are the same or not. If this ratio is one, it means that the pitch ranges in topics and comments are the same. And the smaller the number, the narrower is the pitch range discrepancy.

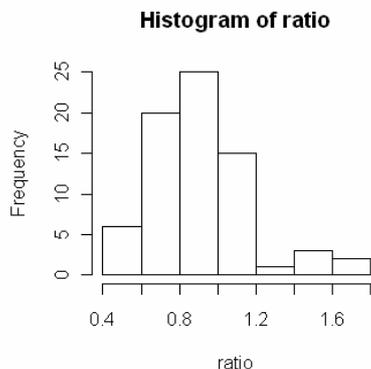


Figure 1: Histogram of ratio of pitch range ratios of topic and comments

Figure 1 shows the distribution of the comparison ratio R. It can be seen that the distribution of this ratio is left skewed, indicating that there are more ratios less than one than ratios greater than one. The result implies that the topic tends to have narrower pitch range than the comment, and the pitch range in topics is more compressed than that in comments.

3.2.4. Summary of F0 analysis

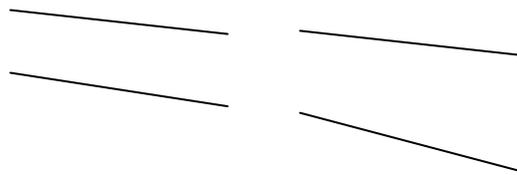
The analysis of F0 data without normalization shows that the F0 pitch range does not differ between topics and comments, even though the pitch range in TCs with four-syllable topics is wider than that in other TCs with two- and three-syllable topics, and the pitch range in dangling topics is wider than that in the other two types of topics.

The analysis based on the ratios of the maximal F0 and the minimal F0 reveals different results. Both the comparison of the relative pitch range in topics and comments and the analysis of the pitch range ratio in topics and comments show that the pitch range in topics is narrower than that in comments.

Declination, namely the global tendency of F0 to decline over the course of an utterance, exists in many languages, including Mandarin Chinese (Shi, 2003; Wang and Lin, 2003). To see the declination in TCs, two paired T-tests were conducted on the maximal F0 and minimal F0 in topics and comments. The results show that the maximal F0 in topics is higher than that in comments ($t(71)=6.4885, P<.01$), and that the minimal F0 in topics is higher than the minimal F0 in comments as well ($t(71)=9.0803, P <.01$).

Wang and Lin (2003) show that declination exists in Mandarin Chinese and the F0 base line declines more quickly than the F0 top line, which they attribute to the F0 final lowering. Taking into consideration the declination and the final lowering, the pitch range pattern found in TCs can be schematically illustrated as in Figure 9 below.

Thus the F0 patterns of TCs in Mandarin Chinese seem to be merely the result of the declination and final lowering of the whole sentence. Wang and Xu (2006) find the raising of the minimum F0 in some (new) topics (although what they refer to as topics are merely subjects). The patterns shown in Figure 2 can accommodate Wang and Xu's finding as well.



Topic Comment

Figure 2: Schematic illustration of the F0 top line and F0 base line in Mandarin TCs.

4. Concluding remarks

TCs are pragmatic structures. Even though on the surface there are prosodic markings that differentiate topics from comments, our analysis shows that the difference in prosodic marking between topics and comments is the product of the prosodic phrasing, coupled with the declination and final lowering, in that a topic construction is usually decomposed into two prosodic constituents. This study also shows that the dangling topics behave differently from the other two types of topic constructions. These findings provide additional evidence for the hierarchical nature of prosody, namely prosody is the hierarchically organized structure of phonologically defined constituents and heads (Beckman, 1996). Therefore, any prosodic analysis must take into consideration the prosodic phrasing or prosodic structure.

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