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Syntax-prosody Interface in Perception of Right Dislocation in Mandarin

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Abstract

This article presents a perceptual experiment investigating the relative contributions of two prosodic properties in the perception of right dislocation in Mandarin. In contrast with the impression of pause in Mandarin right dislocation, the experimental results suggest that pause is acceptable in right-dislocated sentences since inserting a pause before the right-dislocated part does not significantly impact acceptability. Additionally, results show that there is an interaction between syntactic structure and prosodic properties. Non-NP right-dislocated sentences are more acceptable than NP counterparts. While pitch compression serves as a significant signal in the perception of NP right dislocated sentences, it does not significantly affect the perception of sentences with non-NPs. The distinction can be attributed to their different roles in the information structure of the main clause.

Index Terms: right dislocation, perception, Mandarin, pause, pitch prominence

1. Introduction

Right dislocation (RD) is very common in colloquial Mandarin, which refers to the grammatical phenomenon in which a sentence processes a component standing to the right of what we normally take to be sentence-final boundary [1].

Unlike English and other Western languages which require right dislocated anaphors coreferential with main clause referents, RD in Mandarin occurs with a wide variety of word categories and constructions, including pronouns, noun phrases, verb phrases, prepositional phrase, modal auxiliaries, adverbs, vocatives, and complex constructions such as subject+verb and subject+adverbials [2]. While there are disagreements regarding the syntactic process of RD in Mandarin (e.g. the base-generation account, rightward movement account, leftward movement account) [3, 4], the intonation of RD is cross-linguistically observed to involve pitch compression such as the reduction in pitch register or pitch range as well as the reduction in duration [5]. However, there's one thing that Mandarin seems to deviate from the cross-linguistic pattern. Although RD involves pause in other languages, Chao [6] and Lu [7] claimed that Chinese RD doesn't involve pause and Guo's experiment [2] supports this claim.

However, the conclusion of the intonation of RD in Mandarin suffers from two issues. First, it was deduced from general RD sentences, which ignored the syntactic and semantic differences among various RD phrases. Since RD has been analyzed as having afterthought, repair, emphatic, or additive focus functions [8], there might be intonational variation among RD realizing different pragmatic functions. For instance, a pitch prominence could appear on an emphatic RD phrase and a pause can occur before an afterthought RD phrase. Second, from an economic point of view, there might be redundant information when RD is associated with various linguistic signals. Therefore, investigating the relative contribution of different signals under controlled experiments could reflect their ranking of significance.

In this study, a perceptual experiment was conducted to investigate the interaction between syntax and prosody in the perception of RD in Mandarin. We focused on two types of RD phrases, nominal phrase (NP) and non-nominal phrase (non-NP) since they serve as different roles in the syntactic structure. NPs act as the internal arguments of the main clause whereas non-NPs are modifiers (manner, frequency) of the verb in the main clause. Examples are shown below. In the first example, 'Niuyue' is an NP and 'ganggang' is a non-NP in the second example.

(1.1) *jingchang xiaxue de*, *Niuyue*.
often snow REL New York
'(It) often snows, (in) New York.'

(1.2) *qi zixingche lai de*, *ganggang*.
ride bike come REL just now
'(We) came by bike, just now.'

The experiment aims to explore the role of pause and pitch prominence in perception of NP and non-NP RD sentences. Based on the theoretical analyses and empirical observations, two hypotheses were proposed as follows.

- Following the cross-linguistic observation, there is no significant difference in perception of RD sentences with and without pause in general.
- There is a significant difference in perception between NP and non-NP RD sentences in terms of pitch prominence.

2. Experiment

2.1. Overview

Since there are two factors (pause and pitch prominence) pattern together in natural speech, we detached them and created synthesized stimuli to assess their relative contribution. As is shown in Table 1, condition A (no pause, no prominence) is supposed to indicate the default prosody of RD sentence, while B (pause, no prominence), C (no pause, prominence), and D (pause, prominence) are manipulated conditions. To generate comparable sentences with prominence on the RD part, all the chosen RD sentences have the main clause ending with 'de', a discourse particle for confirmation. Since 'de' can also be regarded as a complementizer of a relative clause, RD sentences with a right-dislocated NP have an alternative reading as a relative clause followed by antecedent when the RD part is prominent. Hypothesis 1 predicts that in general, there is no difference between conditions A, C (no pause), and B, D (pause), whereas Hypothesis 2 predicts that the difference between A, B (no prominence), and C, D (prominence) is significant for NP but not non-NP RD sentences.

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Table 1: *Factors crossed in design of stimuli*

	no pause	pause
no prominence	A	B
prominence	C	D

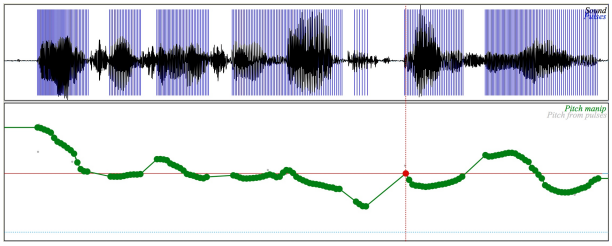

Figure 1: *RD Sentence with Prominence*

2.2. Stimuli

2.2.1. Recording

Eight target RD sentences (4 with NPs, 4 with non-NPs) and eight sentences in normal order (See Appendix) were recorded at normal speech rate by a native Mandarin speaker with a sampling frequency of 44100 Hz. The target sentences were recorded in two ways, either with prominence (relative clause reading) or with no prominence on the RD element (RD reading). Sentences in normal order were taken as both filler and anchor stimuli.

2.2.2. Synthesis

To control the effect of duration, all the recorded sentences were normalized in duration with Praat. The duration of non-RD sentences was shortened by 10 percent since in general the duration of an RD reading is 0.9 of that of a relative clause reading. After normalization, the recording of target sentences with prominence on the right dislocated part was taken as the stimuli of condition C. Stimuli of condition A was synthesized from those of condition C by manipulating pitch contour to mimic pitch compression of the corresponding sentences in RD reading. Example of pitch manipulation is shown in Figure 1 and 2. Stimuli of conditions B and D were generated from those of conditions A and C by inserting silence of 300 milliseconds (approximately equal to the duration of two syllables of the recorder) between two parts of a sentence.

2.3. Participants

Participants in the experiment were adult native Mandarin speakers in their 20s (N = 44). There were recruited online through social networking services and volunteered their time (4 minutes on average) without payment. Most of them were college students or graduate students.

2.4. Procedure

A total of 32 stimuli (8 sentences × 4 conditions) were created through manipulation and they were divided into four sets. The stimuli in each set were counterbalanced by Latin square so that each participant was presented with one of the conditions of each sentence. Within each set, 8 target sentences were arranged in a pseudo-random order and intermingled with the

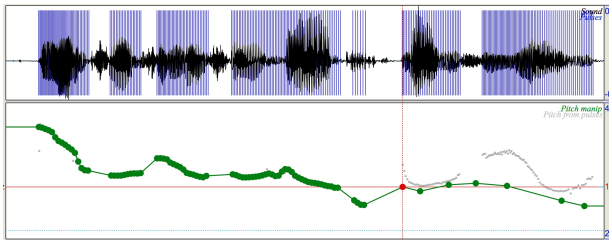

Figure 2: *RD Sentence with Pitch Compression*

equivalent number of filler stimuli.

The experiment was delivered through Qualtrics (online survey software). Using the randomizer of Qualtrics with the Evenly Present Elements option, each participant was randomly but evenly assigned to one of the four sets of stimuli. The stimuli were presented in a self-paced forced-choice task. Each stimulus was presented in a given dialogue context. Participants were asked to read the question in the dialogue, listen to the recorded answer and make judgments on the appropriateness of the answer by choosing from a five-point EAI scale [9] ranging from 1 (totally unacceptable) to 5 (totally acceptable). All materials were presented in Mandarin. An example of the experiment is given below. After listening to a recorded sentence, participants were asked to make one of the choices according to the question of dialogue.

(2.1) *nimen nali dongtian xiaxue ma?*
your place winter snow QUE
'Does it often snow in your place?'
a. totally acceptable (5)
b. almost acceptable (4)
c. equivocal (3)
d. a little unacceptable (2)
e. totally unacceptable (1)

3. Results and Analysis

Among the 44 participants, responses from 41 participants were fully complete. Since all the filler sentences were supposed to obtain a score of 4 or 5, responses from one participant were excluded from analysis because the score for one of the filler sentences was chosen as 1, with 640 responses (40 × 16 = 640) left for analysis. Figure 3 illustrates the mean value of acceptance of NP and non-NP RD sentences in four conditions. It can be seen that the mean values of all the conditions were above 3, showing that for native Mandarin speakers, there exists a wide range of tolerance of RD sentences in terms of variation in prominence and pause. Among four conditions, sentences in condition A (no prominence, no pause) with default intonation were most acceptable, whereas sentences in condition D (prominence, pause) were least acceptable. Within each condition, the mean value of the non-NP group was higher than the NP group. An independent-samples t-test indicated that scores were significantly higher for sentences with normal order (M = 4.61, SD = 0.22) than for RD sentences (M = 3.97, SD = 0.58), $t(536) = 8.12$, $p < .001$. When compared separately, scores on acceptability were significantly higher for filler sentences (M = 4.61, SD = 0.22) than for NP sentences of condition A (no prominence, no pause) (M = 4.13, SD = 0.32), $t(44) = 3.12$, $p > .05$, whereas scores were not significantly higher for filler sentences than for non-NP sentences of condition A (M = 4.49, SD

= 0.18), t(47) = 0.67, p $>$ .1. The results indicated that non-NP RD sentences with a default intonation were considered to be natural by native speakers.

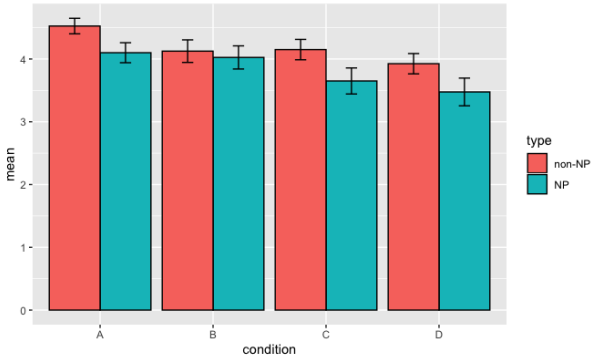

Figure 3: *Mean Value of Acceptability of NP and Non-NP sentences in Four Conditions*

3.1. Relative Contribution of Pause and Pitch Prominence

Table 2 summarizes the results of the linear model on the acceptability of RD sentences. It turns out that there was a significant difference between NP and non-NP group. Non-NP RD sentences were more acceptable than NP RD sentences (p $<$ .01). The effect of two factors shows that although there was a significant perceptual difference between sentences with and without pitch prominence (p $<$ .05), the difference between sentences with and without pause was not significant (p $>$ .05), which indicates that compared with pause, pitch prominence is a more significant signal in the perception of RD. The interaction of pause and no prominence was not statistically significant (p = .88).

Table 2: *Linear Model on Acceptability of RD sentences*

	β	SE(β)	t	p
(Intercept)	4.08	0.14	29.22	$<$.001
pause	-0.20	0.18	-1.13	.26
no prominence	0.41	0.18	2.33	$<$.05
NP	-0.37	0.13	-2.95	$<$.01
pause:no prominence	-0.04	0.25	-0.15	.88

3.2. Comparison of NP and Non-NP Sentences

To compare the role of two factors in the NP and non-NP group, a linear model was applied to data in two groups separately. The results are presented in Table 3 and 4. In terms of pause, there was no significant effect of pause on the perception of either NP or non-NP sentences (p $\geq$ .05), which was following the general results reflected in Table 2. In contrast, the effect of pitch prominence differed between NP and non-NP sentences. While pitch prominence was not a significant factor in the perception of non-NP sentences (p $>$ .05), it had a significant effect on the perception of NP sentences (p $<$ .05).

4. Discussion

The high acceptability of RD sentences, in general, reflects the flexible word order of colloquial Mandarin. According to Grice's theory of conversational implicatures [10], both the speaker and hearer should obey maxims of quality, quantity, relation, and manner. It is natural for the speaker to express the most relevant information first by changing word order during dialogue, leading to a variety of categories of RD.

Table 3: *Linear Model on Acceptability of NP sentences*

	β	SE(β)	t	p
(Intercept)	3.63	0.17	21.60	$<$.001
pause	-0.13	0.19	-0.65	.52
no prominence	0.50	0.19	2.58	$<$.05

Table 4: *Linear Model on Acceptability of Non-NP sentences*

	β	SE(β)	t	p
(Intercept)	4.19	0.14	30.67	$<$.001
pause	-0.31	0.16	-1.98	.05
no prominence	0.29	0.16	1.82	.07

A significant difference was reflected by comparing RD sentences with different intonation and syntactic structure. The interaction between syntax and prosody in the perception of RD sentences cast doubt on the previous claim about RD in Mandarin [6, 7, 2]. Results from the perceptual experiment verified the hypothesis proposed at the end of the introduction that pause is not an indispensable factor in the perception of RD, which corresponds to cross-linguistic observation and acceptability between distinct syntactic categories has different sensitivity to pitch prominence.

4.1. The Effect of Pause

The insignificant effect of pause contradicts the conclusion of production experiments of Guo (1999) [2] that pause is not allowed between RD sentences. Results from this study confirm cross-linguistic observation, showing that pause in between does not significantly affect the acceptability of RD sentences. Two possible explanations could account for this phenomenon. On one hand, native Mandarin speakers might not be sensitive to pause before the right dislocated part as the reversed word order could indicate the separation of two parts regardless of the pause. On the other, from the view of the economy, as there are other signals with significant effects, such as pitch compression, a pause is not an essential factor during perception. Since RD has various pragmatic functions, further studies into RD realizing different pragmatic functions would reflect the role of pause in the perception of RD.

4.2. The Effect of Pitch Prominence

Our experiment shows that pitch prominence has a significant effect on the perception of NP sentences, while for non-NP sentences, whether there is pitch prominence or not does not exert significant impact. The difference might be attributed to the information structure of NPs and non-NPs. In the stimuli, right-dislocated NPs serve as the subject of a sentence, representing arguments of the event, such as agent, object, location, time, which are supposed to be common ground or can be inferred from the main clause. By contrast, right-dislocated non-NPs are modifiers of the main clause, which convey the manner, frequency, possibility of the action. Since they are additional in-

formation that is not predictable from the main clause, they are more likely to be prominent when indicating emphatic function.

5. Conclusion

This study investigated the role of pitch prominence and pause in the perception of NP and non-NP RD sentences. The interaction between the syntactic category and prosody reflected in the perceptual experiment provides a fine-grained way of looking into RD. While RD sentences are highly acceptable in general, non-NPs are even more acceptable than NPs. Two variables (pause and prominence) play different roles in perception. Whether there is a pause or not does not have a significant effect, whereas pitch prominence has an essential influence on the perception of NP sentences. The difference is explained by both the economy of speech and information structure.

6. References

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A. Stimuli

(A.1) *jingchang xiaxue de, Niuyue*.
often snow REL New York
'(It) often snows, (in) New York.'

(A.2) *yizhi zheme shuohua de, Nanjing ren*.
always like this speak REL Nanjingers
'(They) always speak like this, the Nanjingers.'

(A.3) *zuo huoche qu de, zaochen*.
take train go REL morning
'(They) went by train, (in the) morning.'

(A.4) *quan dou xinggaocailie de, xiaohuoban*.
all excited REL buddies
'All (of them) were excited, the buddies.'

(A.5) *buzhenme kan dianying de, yiban*.
seldom watch movies REL in general
'(We) seldom watch movies, in general.'

(A.6) *qi zixingche lai de, ganggang*.
ride bike come REL just now
'(We) came by bike, just now.'

(A.7) *qichuanxuxu de, pa de*.
out of breath REL climb REL
'(I was) out of breath, (because of) climbing.'

(A.8) *Zhang laoshi xie de, yinggai shi*.
Zhang professor write REL should be
'Professor Zhang wrote (it). (It) should be (him/her).'

(A.9) *beifang dongtian hen leng de*.
north winter very cold REL
'(In the) north, it is very cold in winter.'

(A.10) *pingguo weidao ting bucuo de*.
apple taste pretty good REL
'The apples taste pretty good.'

(A.11) *xiao guniang shuohua hen wenrou de*.
little girl talk very gently REL
'The little girl talks very gently.'

(A.12) *zuotian zuo feiji qu de*.
yesterday take plain go REL
'Yesterday (we) went by plain.'

(A.13) *jibenshang meitian dou jiaban de*.
In general everyday all work overtime REL
'In general, (we) work overtime everyday.'

(A.14) *haoxiang zai Shanghai pai de*.
seem in Shanghai take (picture) REL
'(The pictures) seem to be taken in Shanghai.'

(A.15) *wo juede timu ting jiandan de*.
I think questions quite simple REL
'I think the questions were quite simple.'

(A.16) *hua de xuxurusheng de*.
paint REL animated REL
'The painting looks animated.'