Prominence Patterns of Focus in Standard Chinese

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ABSTRACT

The present study mainly investigates the prominence patterns of focus in Standard Chinese (Hereinafter, SC). The focus is classified into three types, i.e., single focus with various kinds (*wh*-question induced focus, *shi*-marked focus and *lian*-marked focus); double focus with various placements (adjacent and non-adjacent constituents); multiple focus with various distributions (adjacent and non-adjacent constituents). Results of the acoustic analysis revealed that the distribution of the prominence shows symmetric relation with the focus in the *single* and *double* focus conditions. All the syllables in the focus domain contribute to the F_0 prominence, e.g., all the *H* and *L* tones being raised significantly. However, under multiple focus conditions, the prominence does not associates with the focus in the way that only the rightmost item serves as the anchor to realize prominence.

Keywords: various kinds of focus, different numbers of prominences, phonetic realization

1. INTRODUCTION

Chomsky[1][2] and Jackendoff [3] defined *focus* in terms of the discourse notion of *presupposition*, focus is the non-presupposed part of the sentence. The phenomenon of focus has been the subject of detailed cross-linguistic investigation for many years. It has been discussed from different points of views. These different points of view include, semantic/pragmatic perspective (Ladd[4], Bolinger[5]), syntactic perspective (Jackendoff[3]), and phonetic perspective (Copper et. al [6]). In Chinese literatures, focus is mainly approached in two aspects: (i) acoustic features of *wh*-question elicited focus; (ii) the syntactic approach to mark focus. In (i), Xu [7] and Chen [8] adopt F_0 and duration as the parameters to explore the specific features of focus. Results show that the focus can modulate the overall F_0 shapes of the sentences, whereas the focus can only exert local effects on duration of the under-focus and the adjacent constituents. As for the syntactic approach towards focus, many research concentrate on the focus markers in SC, i.e., *Shi4*(is) and *Lian2* (even), and the formula of these two markers are constructed as: '*shi…de*' and '*lian…dou*' (Fang [9]). However, the nature of the focused items is different from each other (Liu and Xu [10]).

Previous paragraphs have shown that, although the phonetic realization of focus and the grammatical function of focus in SC have commonly been discussed, phonetic studies of focus rarely have noticed the prominence patterns induced by the variations of focus conditions, that is, different kinds, domains and numbers of foci. The present study, in this regard, examines the prominence patterns triggered by various focus conditions, in particular, it endeavors to answer the following questions: i) what constituents the acoustic differences of difference kinds of focus, i.e., *wh*-question induced focus the *shi* & *lian* marked focus? ii) how the prominence varies when the focus scope is changed? iii) when the number of focus is designed differently, how the prominence distribution varies accordingly?

2. Methodology

The major aim of this study is to explore the variations of the prominence pattern exerted by the changes of the focus conditions in SC. The study employs the controlled speech and the acoustic analysis to approach the research goal. Previous examination has demonstrated that F_0 is the most important parameters to mark focus in various languages (Fry [11]). Therefore, the study also adopts F_0 as the parameter to investigate the variations of prominence patterns.

2.1. Materials

The main object in the experiment design is to select the syntactic items to constituent the target sentences and design the intended focus environment. The following aspects are taken into consideration in the material selection: (i) segmental composition of the target words, all the syllables in the sentence are selected with voiced initials, specifically, Subject = Mai4Li4(Maili); Verb= Nüe4Dai4(maltreat); Adverb= Ban4Ye4(midnight);

Object=Lu4Na4(Luna)[1]; (ii) form of sentences, they are classified into two types, e.g., short sentences are designed with the word order of "S+V+O+Le0"; long sentences are as: S+Ad+V+O+Le0 [2]; (iii) various types of focus conditions, the *syntax*-marked focus is approached by the insertion of the focus markers in the position preceding the "S" item: "*Shi*+S+V+O+De0", and "*Lian*+S+Dou1+V+O+Le0 [3]. The variations of the number and domain of focus are approached through *wh*-questions and focus conditions of the target sentences are listed in part 3. The target sentences are as following (i)-(iv):
(i) Mai4 Li4 Nüe4 Dai4 Lu4 Na4 Le0.
  mai li maltreat lu na le
  (Maili maltreated Luna)
(ii) Shi4 Mai4 Li4 Nüe4 Dai4 Lu4 Na4 De0.
  is mai li maltreat lu na de
  (It is Maili that maltreated Luna)
(iii) Lian2 Mai4 Li4 Dou1 Nüe4 Dai4 Lu4 Na4 Le0.
  even mai li all maltreat lu na4 le
  (Even Maili maltreated Luna)
(iv) Mai4 Li4 Ban4 Ye4 Nüe4 Dai4 Lu4 Na4 Le0
  mai li midnight maltreat lu na le
  (Maili maltreated Luna at midnight)

2.2. Recording and annotation

The target sentences with *wh*-operators are in the recording schema with two times repetitions. Eight SC speakers, four females and four males, aged 20-45, were recruited as participants. During the recording procedure, one of the speakers was asked to read the *wh*-question and the other one was required to read the target sentence as the answer to the question. For one target sentence, we obtained 32 samples for statistical analysis.

All the "wav" files were conducted through the following steps: (i) the auto-segmentation software was adopted to segment the syllabic boundaries; (ii) the boundaries were checked by hand to ensure the accuracy of the data; (iii) PitchTier files were modified by hand; (iv) F_0 data was extracted by praat script with one syllable being selected ten points so as to normalize the duration.

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[1] Among the four syntactic items, the subject and object are common Chinese names. And, the S, Ad, V and O are used as the abbreviation for the four constituents in the following part.

[2] Insertion of *le0* is to mark the past tense of the sentence.

[3] Within the *shi...de* construction, the *de* is a particle with various functions, i.e., past-tense marker (Song [12]), and within the *lian..dou* construction, *dou* is the marking of the semantic Center (Liu and Xu [10]). The placement of the *le* in *lian...dou* structure is to meet the phonetic balance with the *shi...de* structure.

3. Prominence patterns in various focus conditions

In this part, the prominence patterns are investigated from three aspects: (i) the comparison of the F_0 of *wh*-question induced focus and the *syntax*-marked focus, i.e., *shi*-marked focus and *lian*-marked focus; (ii) F_0 patterns of double focus with different domains; (iii) prominence variations of multiple focuses with various distributions.
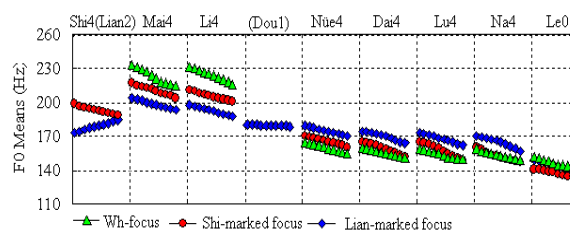
3.1. Prominence patterns of different kinds of foci

This sub-part mainly discusses the differences and similarities of F_0 prominences from different kinds of foci. The target sentence together with the *wh*-questions is listed in the following (i)-(iii):
(i) Shei2 Nüe4 Dai4 Lu4 Na4 Le0?
  who maltreat lu na le
  (Who maltreated Luna?)
  Mai4 Li4[wh-F] Nüe4 Dai4 Lu4 Na4 Le0.
(ii) Shi4 Mai4 Li4[Shi-F] Nüe4 Dai4 Lu4 Na4 De0.
(iii) Lian2 Mai4 Li4[Lian-F][4] Dou1 Nüe4 Dai4 Lu4 Na4 Le0.
Through the approaches, different kinds of foci are obtained, i.e., the *wh*-focus in (i), the *shi*-marked focus (ii), and the *lian*-marked focus in (iii).

Figure1 illustrates the F_0 means of the above three target sentences. Within the figure, the top part of the X-coordinate describes the contents of each syllable, and the bottom part is the focus conditions of each utterance, specifically, '*Wh*-focus' denotes the focus is the *wh*-operator, the '*shi*-focus' stands for the focus is marked by *shi* while '*lian*-focus' is marked by *lian*.

Figure 1: F_0 Means of *wh*-focus, *shi*-marked focus and *lian*-marked focus

Although the grammatical nature of focused item is different from each other, the prominence pattern performs both *similar* and *different* characteristics. Specifically, as for the *wh*-focus, it can trigger F_0 prominence in the under-focus position and compress the F_0 register of the

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[4] The symbols of [wh-F], [Shi-F] and [Lian-F] are adopted to stand for *wh*-question induced focus, *shi*-marked focus and *lian*-marked focus, respectively.

constituents immediately following the focus. Specific features of F_0 show that the pitch register of each syllable in the focus domain is raised in the way that both the *H* and *L* tones are lifted significantly. With regard to the two *syntax*-marked foci, i.e., *shi*-marked foci and *lian*-marked focus, the prominence bearing anchor is also the focused items. Further, the F_0 registers of the entities distributing after the foci observe the compressive effect from the *shi*-focus and *lian*-focus, respectively. The difference among these three foci is the magnitude of the foci, the wh-focus occupies the first place, and the *lian*-marked focus exerts the weakest effect.
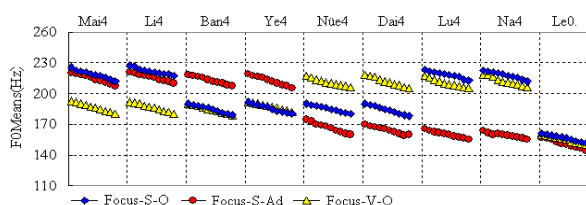
3.2. Prominence pattern of double foci with different distributions

In this part, it examines the variations of the prominence patterns induced by double foci, which are classified into three types: i) the foci distribute on two *non-adjacent* positions; ii) the foci distribute on two adjacent items at both sentences *initial* and *final* positions. The sentences together with the *wh*-questions are listed in bellow (i)-(iii):
(i) Shei2　Ban4 Ye4　Nüe4 Dai4 Shei2 Le0?
　　who　midnight　maltreat　who　le
　　(Who maltreated whom at midnight?)
Mai4 Li4[Wh-F] Ban4 Ye4 Nüe4 Dai4 Lu4 Na4 [Wh-F]Le0.
(ii) Shei2　Shen2 Me0 Shi2 Hou0 Nüe4 Dai4 Lu4 Na4 Le0?
　　who　when　　　maltreat　lu na le
　　(Who and when maltreated Luna?)
Mai4 Li4[Wh-F] Ban4 Ye4[Wh-F] Nüe4 Dai4 Lu4 Na4 Le0.
(iii) Mai4 Li4 Ban4 Ye4 Zen3 Me0 Shei2 Le0?
　　mai li　midnight　do what who le
　　(Maili do what to whom at midnight?)
Mai4 Li4 Ban4 Ye4 Nüe4 Dai4[Wh-F] Lu4 Na4 [Wh-F]Le0.
The F_0 pattern in the above foci conditions are illustrated by 'Focus-S-O', 'Focus-S-Ad' and 'Focus-V-O'. Specifically, 'Focus-S-O' means the focus is placed on 'S' and 'O' constituents, 'Focus-S-Ad' stands for the case that foci distribute on 'S' and 'Ad' items, and 'Focus-V-O' indicates the focus distributing on 'V' and 'O' items.

Figure 2: F_0 Means of double focus with different distributions

The phenomenon of double foci has been examined in English, e.g., Eady et al [13] investigated the F_0 features of double focus and proposed that it can induce two F_0 prominences, and whether a sentence contains one or two foci in English, the main difference between single focus and dual focus sentences is the F_0 performances of the word between the two foci. A dual-focus sentence does not exhibit a lowering F_0 that follow the focused item. We can also obtain from the figure that there exists no F_0 lowering between the two foci in SC. As for 'Focus-S-Ad', it also contains two foci, the only difference between this contour and the previous one is the position of focus placement. As for 'Focus-V-O', it also exert F_0 prominence in the focused positions. The difference between this prominence pattern and the 'Focus-S-Ad' is that the sentence final one does not trigger F_0 variations in the proceeding items.

3.3. Prominence patterns of multiple foci with different distributions

In this sub-part, it mainly deals with the variations of prominence patterns triggered by multiple foci, the numbers of the foci are enlarged from two constituents to three ones, i.e., three *adjacent* constitutes and three *non-adjacent* constituents. The *wh*-questions and its corresponding target sentences are listed in (i)-(iii):
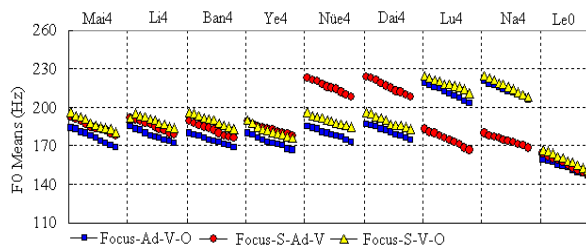(i) Shei2　Shen2 Me0 Shi2 Hou0 Zen3 Me0 Lu4 Na4 Le0[5]?
　　who　when　　do what　lu na　le
　　(Who and when do what to Luna?)
Mai4 Li4[Wh-F] Ban4 Ye4[Wh-F] Nüe4 Dai4[Wh-F]Lu4 Na4 Le0.
(ii) Mai4 Li4 Shen2 Me0 Shi2 Hou0 Zen3 Me0 Shei2 Le0?
　　mai li　when　　　do　what who le
　　(Maili when and where do what to whom?)
Mai4 Li4 Ban4 Ye4[Wh-F] Nüe4 Dai4[Wh-F] Lu4 Na4 [Wh-F]Le0.
(iii) Shei2 Ban4 Ye4 Zen3 Me0 Shei2 Le0?
　　who midnight do what　who le
　　(Who do what to whom at midnight?)
Mai4 Li4[Wh-F] Ban4 Ye4 Nüe4 Dai4[Wh-F] Lu4 Na4 [Wh-F]Le0.
Figure3 illustrates the F_0 means of the above three target sentences. Within the figure, 'Focus-S-Ad-V' strands for the case that the foci are placed on subject, adverb and verb constituents, 'Focus-Ad-V-O' means the foci are on adverb, verb and object entities, and 'Focus-S-V-O' indicates the focus are

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[5] According to Zubizarrreta [14], multiple constituents can be focused leaving one as the non-focused (presupposed) item.

distributed on non-adjacent items, namely, subject, verb and object constituents.

Figure 3: F_0 Means of multiple focuses with different distributions

Examination of the above figure reveals that the two contours, e.g., 'Focus-S-Ad-V' and 'Focus-Ad-V-O', although the subject and the adverb items serve as the focus anchor, they perform no F_0 prominence. In regard with contour 'Focus-Ad-V-O', the foci are placed on adverb, verb and object constituents, and only the object constituents realize F_0 prominence. The similarity between these two contours lies in the fact that the rightmost constituents serve as the prominence bearing unit and exhibit F_0 raising. Closer examination of the contour 'Focus-S-V-O' shows that, although it has different focus distribution with contour 'Focus-Ad-V-O'[6], F_0 contour shows similar feature in the way that the prominence locates on the object constituents with the other constituents being unaffected by the focus.

4. Discussion and conclusion

The study adopts F_0 as the parameter to examine the prominence pattern induced by different *kinds* and *numbers* of foci in SC. The focus contains the following categories: i) single focus with different kinds, i.e., *wh*-question induced focus, *shi*-marked focus and *lian*-marked focus; ii) double focus with different placements; iii) multiple focus with various distributions. Results demonstrate that the prominence distribution shows symmetry relation with focus placement under *single* and *double* focus environments. Specifically, under single focus condition, no matter what kind of the focus is, the distribution of prominence associates with the focus with the F_0 in the focus scope being raised obviously. The only difference among these different kinds of focuses is the *magnitude* of the prominence. In double focus condition, the prominence also associates with the focus no matter it distributes on adjacent or non-adjacent

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[6] When the focus distributes on S, Ad and O, the result is identical the contour 'Focus-Ad-V-O' and 'Focus-S-V-O'.

constituents. However, in multiple focus conditions, the prominence and the focus shows asymmetric relations, no mater where the focus is placed, only the rightmost item serves as the anchor to bear prominence. To sum up, the prominence patterns of SC are affected by variations of focus conditions, and these two entities exhibit both *symmetric* and *asymmetric* relations.

5. Acknowledgements

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