Interaction of Syntax-marked Focus and Wh-question Induced focus in Standard Chinese

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Abstract

The present study mainly investigates the interaction of syntax-marked focus and wh-question induced focus on the formation of F0 patterns in Standard Chinese (hereinafter, SC). Acoustic experiment demonstrates that the syntax-marked (lian or shi) focus can co-exist with the wh-question induced focus. The results are two folds: (i) the two kinds of focuses can add together to trigger more obvious F0 prominence on the under-focus constituents and F0 compression on the post-focus constituents; (ii) they can realizes prominences simultaneously on difference constituents in one sentence. Therefore, the F0 pattern of SC presents itself to observe the nuclear prominence and pre-nuclear prominence classification as in English. Specifically, the single focus induces the nuclear prominence and the dual focus triggers both nuclear prominence and pre-nuclear prominence.

Index Terms: Syntax-marked focus, Wh-question induced focus, nuclear prominence, pre-nuclear prominence

1. Introduction

In Chinese literatures, the ‘lian…dou’ and ‘shi…de’ constructions are considered to be the typical structures to mark focus (refer to Fang [1], Liu and Xu [2], Xu [3] and Liu [4]). In grammatical studies, the ‘lian…dou’ structure is adopted to mark contrast, i.e., Fang [1] states that only the constituent immediately following lian is the focus bearing unit, and lian can be taken as the contrastive focus marker. She further explains the nature of the ‘NP’ after the marker lian: (i) within the lian sentence, the NP marked by lian is the most extreme element; (ii) the non-nominal element after lian bears the nature of a nominal. With regard to the ‘shi…de’ structures, shi is the closed equivalent of English copula “be,” and de is a particle with various functions: modification marker (Ross [5]), nominalizer (Chao [6]), and past-tense marker (Song [7]). Previous grammatical studies on the ‘shi…de’ construction mainly discuss its focus marking function, i.e., Liu [4] lists three kinds of strong focus marking of shi…de structure: (i) shi; (ii) shi+….+de, and (iii) shi+….+F+de+ NP. In addition to the discussions in grammatical aspect, Jia et al [8] deals with the phonetic realization of shi-marked focus at the sentential level, results of the study show that the intonational prominence bears corresponding relationships with the shi-marked items. The pitch range of the focused item is expanded and the pitch registers of constituents immediately following the shi-marked focus being compressed successively.

In regard with the acoustic analysis of wh-question elicited focus, previous studies have nevertheless show that the F0 and durational patterns exhibit both universal as well as language-specific features. Related to the F0 patterns, both English and Chinese show that the focus extensively modulates the global shape of the F0 curve, i.e., the pitch range of the under-focus constituents are expanded and the pitch range of the post-focus are compress while leaving the pitch range of the pre-focus constituent largely intact. Due to the existence of the tones in SC, the essential causes for the expansion of the pitch range of the focused item lie in the raising of the H tones and the lowering of the L tones (Xu [9] [10]). Further, when the focused constituent extends to more syllables, the whole constituents bears F0 changes, i.e., when five-syllable words are correctly focused and the whole focused constituents are affected by the focus, specifically, focus raises the H tones of each focused syllable and the magnitude of such rising is largest in the final syllable (Jia et al [11]).

From the previous studies on ‘lian…dou’ and ‘shi…de’ constructions in SC, it can be obtained that the analysis mainly concentrates on their syntactic or semantic function. The phonetic and phonological natures of the interaction of syntax-marked focus and wh-question elicited focus have not been clearly discussed. Therefore, the purpose of this study is to systematically explore the nature of prominences triggered by different kinds of focuses, i.e., the co-existences and conflicts of syntax-marked focus and wh-question elicited focus. The study further addresses the following questions: i) what is the effect of syntax-marked focus on the F0 prominence? ii) what constituents the differences of shi-marked focus and lian-marked focus? iii) what is the co-existing and conflicting manner of syntax-marked focus and wh-focus in one sentence? iv) what is the phonological nature of the prominences induced by the combined effects of focuses?

2. Methods

2.1. Materials

The aim of the experiment is to test the co-existences and conflicts of the syntax-marked focus and the wh-elicited focus. The important factors to be considered in the design of the materials are how to include these focuses in the target sentence so that we can observe various kinds of phonetic functions of them. The core set of the test-sentences is formed by the word order of “subject-verb-object” as the unmarked sentence, given in (i), specifically, S=Liumin, V=‘Tibad+O=Maolan, the lian, dou and shi…de sentence is composed by lian and shi being inserted into the proceeding position of the subject constituents in the unmarked sentence (Fang [1]). The insertion of Le0 in unmarked and lian…dou structure is to keep the phonetic balance with the shi…de construction, the sentences are listed in (ii)-(iii):

(i) Liu2 Min2 Ti2 Ba2 Mao2 Lan2 Le0. liu min elevate mao lan le (Liumin elevated Maolan).
(ii) Lian2 Liu2 Min2 Dou1 Ti2 Ba2 Mao2 Lan2 Le0. even liu min all elevate mao lan le (Even Liumin elevated Maolan).
(iii) Shi4 Liu2 Min2 Ti2 Ba2 Mao2 Lan2 De0.
3. Phonetic realization of interaction of different kinds of focuses

This part is concerned with the F0 patterns formed by the interaction of syntax-marked focus and wh-question elicited focus. In order to explore the co-existence and conflict of the focuses, specific context was designed so that the syntax-marked focus and the wh-elicited focus can form various relationships, e.g., co-existence on the same constituents or conflict with each other in the formation of the F0 patterns. Consequently, the F0 patterns conveyed by different kinds of focuses can be defined by phonological means. Further, a consistent correlation between the F0 patterning and syntax-marked focus can be expressed in terms of the phonological categories and not in terms of variation in physical continua.

3.1. Phonetic realization of syntax-marked focus

The major aim of this part is to explore the specific manner of the effect from *lian* and *shi* marked focus. F0 is taken as the parameter to investigate this effect. In particular, if the syntax-marked focus (*lian* or *shi* marked) is found to be consistently signaled by distinctive F0 means in SC, the effect of the focus should be captured in phonological means. In order to approach this goal, the following asking-answering pairs are adopted:

(i) Asking:  
`F1a Sheng1 Le0 Shen2 Me0 Shi4?`  
(What happened?)

Answering:  
a. `Lian2 Liu2 Min2[+LianF] Dou1 T12 Ba2 Mao2 Lan2 Le0.`
b. `Shi4 Liu MinM[+ShiF] T12 Ba2 Mao2 Lan2 De0.`
c. `Liu2 Min2 T12 Ba2 Mao2 Lan2 Le0.`

It can be observed that the *lian* and *shi* marked focuses always locate on the subject items “*liu2min2*”, and through the selection of the wh-operator ‘*F1a Sheng1 Le0 Shen2 Me0 Shi4?*’ the three target sentences locate in the same context. The only difference of these three sentences is the syntactic structure. Therefore, we can compare the effect from the syntax-marked focus and the unmarked sentence.

Figure 1 is adopted to illustrate the mean F0 in three syntactic structures: `Lian2 Liu2 Min2[+LianF] Dou1 T12 Ba2 Mao2 Lan2 Le0, Shi4 Liu MinM[+ShiF] T12 Ba2 Mao2 Lan2 De0, and Liu2 Min2 T12 Ba2 Mao2 Lan2 Le0.` The top part of the X-coordinate describes the contents of each syllable in the sentence, and the bottom illustrates the syntactic structure and the utterances, concretely, ‘*LianSB*’ denotes an utterance that contains a *lian*-marked focus distributing on the subject constituent. The designation ‘*ShiSB*’ denotes a *shi*-marked sentence with the subject item serving as the focused item, and ‘*Un*’ means the sentence is unmarked. The Y-coordinate illustrates the pitch range of the graph, and has a range of 110Hz-260Hz based on the average range of all the speakers.

![Figure 1: Mean F0 of Lian, Shi and unmarked sentences](image)

It can be obtained clearly from the above graph that there appears an F0 prominence in the contour ‘LianSB’. The prominence in the
sentence distributes on the subject constituent; i.e., the word “liu2min2”. Concretely, the “H” tones of the two syllables are obviously higher than the other syntactic elements within the sentence, while the ‘L’ tones are a little bit higher. Compared to the ‘Un’ contour, the subject constituent in a lian-marked sentence also exhibits a higher pitch register. The constituents locating after the lian-marked focus (e.g., Dou1 Ti2Ba2 Mao2Lan2 Le0) undergo compression and exhibit a lower pitch register than the unmarked sentence. With regard to the shi-marked sentence, the item that locates immediately after shi-marked focus exhibits the most obvious prominence among the three subject constituents. The pitch register distributing after the shi-marked subject obtains the lowest pitch register. A further One-Way ANOVA was conducted to compare the significance of the minimum and maximum pitch value differences induced by shi and lian focuses on the positions of subject, verb, and object. Results of the Bonferroni post hoc test shows that the maximum pitch values of all the syntactic entities in the contour are different from each other with $P_{\text{max}}$<0, however, the minimum value of the L tones of the Liuminshu is not significantly different from Liuminshu with $P_{\text{min}}$>0.

The study of the $F_0$ pattern in various syntactic structures developed here shows that the syntax-marker can affect the global $F_0$ patterns of the sentence. Specifically, the marked focus exhibits similar effect with the single wh-focus that it can exert $F_0$ prominence in under-focus position and compresses the $F_0$ ranges in post-focus positions. In comparison with the focus marker shi, lian shows a slight effect upon $F_0$ rising under focus and $F_0$ compression in the positions after the focus.

### 3.2. Syntax-marked focus and wh-focus on the same item

This part mainly deals with the additive effect from the syntax-marked focus and the wh-focus on the formation of the $F_0$ patterns in SC. Specifically, it concerns with the following issues: (i) the physical correlates of the effect from the addition of lian-marked focus or shi-marked focus with the wh-focus; (ii) the domain over which the focused constituents may extend; and (iii) the phonological means to represent the additive focus in the surface form. The target sentences for the examination of additive focuses are:

1. **Lian2 Shii2 Dou1 Ti2 Ba2 Mao2 Lan2 Le0?**
   - Even who all elevate mao lan le
   - (Even who elevated Maolan?)
   - Lian2 Liu2 Min22[Liumin]+F Dou1 Ti2 Ba2 Mao2 Lan2 Le0.

2. **Shi4 She2 Ti2 Ba2 Mao2 Lan2 De0?**
   - Is who elevate mao lan de
   - (It is who that elevated Maolan?)
   - Shi4 Liu2 Min22[Shi]+F Ti2 Ba2 Mao2 Lan2 De0.

The other two target sentences are identical with the (i)-a and (i)-b in part 3.1.

Figure 2 is the mean $F_0$ of the utterances with four kinds of focus conditions: the addition of lian-marked focus and wh-focus; the addition of shi-marked focus and wh-focus; the shi-marked focus and lian-marked focus. These focus conditions are described by the symbols in the bottom part of the graph. Specifically, ‘LianSB-F’ and ‘ShiSB-F’ denote the case in which the lian and shi marked focuses combine with the wh-focus. The designations ‘LianSB’, ‘ShiSB’ and the Y-coordinate denote the identical content with Figure 1.

The mean $F_0$ contour of ‘LianSB-F’ shows that the subject bearing units clearly exhibit pitch register rising and it is more obviously than the one in contour ‘LianSB’. Moreover, the pitch registers of the successive syllables are significantly compressed, which indicate a compressive effect from the focused subject items. As for the $F_0$ contour of ‘ShiSB-F’, it replicates the effect of the focus in ‘LianSB-F’ in the way that the sentential prominence locates on the word “liu2min2” and the pitch registers of the following syllables are compressed. The difference found between the two $F_0$ contours lie in the overall pitch range values. The additive focus from the wh-focus and the shi-marked focus exert more $F_0$ expansion on the prominence position and more reduction on the post-focus items. A One-Way ANOVA was conducted to investigate the significance of $F_0$ differences of the same constituents in various focus conditions, i.e., ‘LianSB-F’, ‘ShiSB-F’, ‘LianSB’, and ‘ShiSB’. Results of the Bonferroni post hoc values are also used to explore the significance of the minimum and maximum pitch values. Further evidence is found from the Bonferroni post hoc test in which the pitch registers of the constituents under the additive focus are significantly different from the single focus condition, with all the $P_{\text{min}}$<0 and $P_{\text{max}}$<0.

Thus, the result is that the lian-marked focus and shi-marked focus can combine with the wh-focus in the way that the entire pitch register is raised higher than the single lian or shi marked focus. And the post-focus constituents observe more compressive effects from the additive focus.

### 3.3. Co-existence of two kinds of focuses on different constituents

In the previous part, the mechanism of the additive effect upon the $F_0$ pattern is of main concern. This part mainly deals with the conflicts of the syntax-marked focus and the wh-focus on the formation of the $F_0$ patterning in the surface form. The following issues are addressed: (i) the acoustic correlates of two kinds of focuses in one utterance; i.e., syntax-marked and wh-focus; (ii) the phonological characteristics of the entities involved in expressing the two kinds of focuses. In order to approach this goal, the following *asking-answering* pairs are adopted:

1. **Lian2 Liu2 Min2 Dou1 Ti2 Ba2 Shei2 Le0?**
   - Even liu min all elevate who le
   - (Even Liumin elevated whom?)

2. **Shi4 Liu2 Min2 Ti2 Ba2 Shei2 De0?**
   - Is liu min elevate who de
   - (It is Liumin that elevated whom?)
   - Shi4 Liu2 Min22[Shi]+F Ti2 Ba2 Mao2 Lan2[Shi]+F De0.

The other sentence is identical with (i)-c in part 3.1. Figure 3 depicts mean $F_0$ of the contours with a double focus condition in

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1. The asking pair violates the Unique Strong Focus Principle which forbids the wh-operator after the shi.
one utterance: lian-marked focus and wh-focus, and shi-marked focus and wh-focus. The symbols in the bottom part of the figure illustrate the focus conditions. Specifically, ‘LianSB+F’ denotes the lian-marked focus also locates on the subject constituent, and the utterance also contains a wh-focus on the object position; the shi-marked ‘ShiSB+F’ contour denotes that, in addition to the shi-marked focus on the subject position, it is also a wh-focus on the object position; the ‘Un’ contour denotes that the sentence has no marked focus. The top part of the X-Coordinate displays the content of the syllables in the utterances, and the Y-Coordinate provides the pitch range.

Figure 3: Mean F0 of sentences in syntax-marked focus and wh-focus

It is claimed by Xu [10] and Jia et al [8] that wh-focus in SC exerts a compressive effect upon the F0 register after the focus. The discussion in section 3.1 demonstrates that the syntax-marked focus can trigger F0 rising in focus position and compress the F0 after the focused constituents. In the investigation of the co-existence of syntax-marked focus (lian-marked focus or shi-marked focus) and wh-focus, the following aspects need to be considered: (i) whether the syntax-marked focus can realize F0 prominence simultaneously with the wh-focus; and (ii) the F0 variation of pitch register in the position between the two prominences. Further investigation of the phonetic nature of the lian-marked focus in the ‘LianSB+F’ contour in Figure 3 reveals that the most obvious prominence distributing on the object position with the whole pitch register of the object item being raised. And, secondary prominence is due to the effect of the lian-marked focus which also exerts a prominence. There is no obvious pitch register lowering between the two focuses. It is apparent in the ‘ShiSB+F’ contour, that the F0 in Figure 3 exhibits two prominences, one locates on the subject position, and the other one distributes on the object position. Although ‘Shi4 Liu2 Min2 Ti2 Ba2 Shei2 De07’ (It is Liumin that elevated whom?) violates the USFP, the answering sentence can realize two prominences simultaneously which exhibit a similar acoustic mechanism with the lian-marked focus.

On the whole, due to the effect from both syntax-marked (lian or shi marked) focus and wh-focus, there appears two prominences in one target sentence. The specific manner of the two prominences is the raising of the pitch registers of the focus bearing units. These two prominences exists level difference with the wh-focus inducing the primary one, and the secondary one is triggered by the syntax-marked approach. Within these two syntax-marked focuses, the shi-marked one exerts a more obvious effect on F0 rising. Although in the ‘shi...de’ construction, the insertion of the wh-focus on the object constituents is ungrammatical, speakers can manifest the information distinction in terms of a prosodic aspect.

4. Conclusion and Discussion

The present study mainly investigates the co-existences and conflicts of syntax-marked focus and wh-question induced focus on the formation of F0 patterns. Results of the experiment demonstrate that the syntax-marked focus can trigger F0 prominence in the target sentence, and they can also co-exist with the wh-question in one target sentence. Specifically, (i) the single syntax-marked focus, i.e., shi-marked or lian-marked focus can realized F0 prominence, and the prominence corresponds with the marked focus; (ii) the syntax-marked focus (shi or lian marked focus) and the wh-induced focus can co-occur with each other on one item, and the focus bearing unit shows the most obvious F0 prominence; (iii) syntax-marked focus and the wh-induced focus can co-exist with each other on difference items in one sentence, and they can realize F0 prominences simultaneously. Evidences of F0 patterns of various kinds of focus obtain the phonological entities of nuclear accent and pre-nuclear accent as in English (Ladd [13], etc). When there is no wh-question induced focus, the syntax-marked focus can serve as the major cause for the generation of the nuclear accent. When the syntax-marked focus and the wh-focus locate on one item, they generate nuclear prominence together. Although the single focus (shi or lian marked focus) and the additive focus varies in the specific acoustic manifestations, they corresponds with the same phonological entity, nuclear prominence. When the wh-focus is inserted into the target sentence, the syntax-marked focus loses its effect on the generation of the nuclear prominence with the wh-focus serving as the anchor for nuclear prominence. Alternatively, the syntax-marked focus performs as pre-nuclear prominence in the sentence.

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6. References