

## **An OT Analysis of Informational Focus in Mandarin Chinese**

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This paper provides an OT account for the realization of informational focus in Mandarin Chinese. The analysis is based on the conclusion drawn in my dissertation (Li 2009) that informational focus in Mandarin is realized *in-situ* with prosodic prominence (sentential stress), but no part is in particular prosodically more prominent if the entire sentence is the focus or when the sentence-final element is the focus. I treat this as a case of ‘do something except when...’, more specifically, ‘stress the focused element except in the sentence-final position’ in my analysis. Enlightened by Samek-Lodovici (2005), I account for the patterns in Mandarin by proposing three types of constraints: syntactic constraints, \*FinalStress and Stress-Focus and ranking SF lower than the other two. I also Compare Mandarin with Italian and English and show that Mandarin is just a specific case in the language typology of the realization of informational focus through the interaction of various grammar components.

### **1. Introduction**

The purpose of this paper is to provide an Optimality Theoretic analysis of the realization of informational focus in Mandarin Chinese. According to Xu (2004) and Li (2009), informational focus of Mandarin is realized through the interaction between prosody and syntax. On one hand, the focused element receives sentential stress (via pitch and duration) and on the other hand, the sentence-final position also seems to play an important role in the mechanism. When the focus is in the sentence-final position, it does not consistently receive a stress. This is the reason why it is sometimes confusable with the case of the entire sentence being under focus (broad focus), in which case there is no part in the sentence that is prosodically more prominent than other parts. Obviously prosody and syntax both play important roles in marking informational focus in Mandarin. This can be well accounted for by the OT model through constraint ranking. This paper is an effort in this area. More specifically I follow the same line of analysis of languages such as Italian and English by Samek-Lodovici (2005) and adopt most the constraints in her work.

This paper is organized as below. Section 2 is a brief overview of definitions of some key concepts related to focus and the realization of informational focus in Mandarin

Chinese. Section 3 is the detailed OT analysis of the realization of informational focus in Mandarin including a comparison of Mandarin Chinese with Italian and English in Samek-Lodovici (2005). I conclude the paper with section 4.

## 2. Background

### 2.1. Key concepts

Focus is a concept in pragmatics or information structure (Lambrecht 1994). According to Lambrecht (1994), Focus is the difference between Assertion and its Presupposition. The definitions of the three concepts are cited below.

- (1) Assertion: The proposition expressed by a sentence which the hearer is expected to know or take for granted as a result of hearing the sentence uttered. (p52)
- (2) Presupposition: The set of propositions lexicogrammatically evoked in a sentence which the speaker assumes the hearer already knows or is ready to take for granted at the time the sentence is uttered. (p52)
- (3) Focus: The semantic component of a pragmatically structured proposition whereby the assertion differs from the presupposition. (p213)

Focus can be further classified in two ways (Li 2009). First, it can be classified into Informational Focus and Contrastive Focus.

- (4) A focus is an *Informational Focus* when it is a focus and does not explicitly contradict with a set of stated or predicted alternatives.
- (5) A focus is a *Contrastive Focus* when it is a focus and explicitly contradicts with a set of stated or predicted alternatives.

Another way to classify focus is to classify it into Narrow Focus and Broad Focus depending on the scope of the focus.

- (6) When only part of the sentence is under focus, we say that the focus is a *Narrow Focus*.
- (7) When the entire sentence is under focus, we say that the focus is a *Broad Focus*.

All of the four logical combinations between the two pairs of concepts exist. In the following examples, *faguo* ('France') in (8b) is a narrow informational focus, *faguo* ('France') in (9b) is a narrow contrastive focus, the entire sentence in (10b) is a broad

informational focus and the entire sentence except *bu shi* ('no') in (11b) is a broad contrastive focus. The foci are underlined.

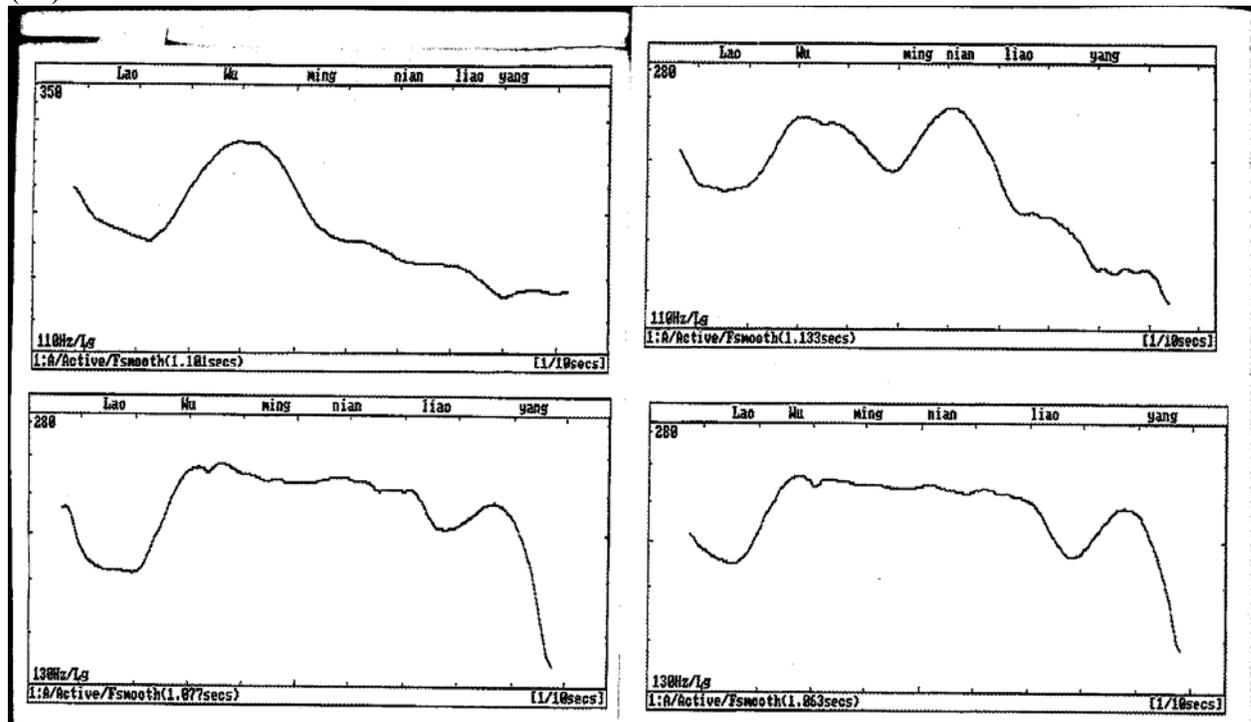
- (8) a. Q: Zhangsan yao qu nar?  
Zhangsan will go-to where  
'Where will Zhangsan go?'
- b. A: Zhangsan yao qu faguo.  
Zhangsan will go-to France.  
'Zhangsan will go to France.'
- (9) a. Q: Zhangsan yao qu meiguo ma?  
Zhangsan will go-to US Q. Part  
'Will Zhangsan go to the United States?'
- b. A: bu, Zhangsan yao qu faguo.  
no, Zhangsan will go-to France  
'No, Zhangsan will go to France.'
- (10) a. Q: zuijin you shenme xinwen?  
recently have any news  
'Has there been any news recently?'
- b. A: Zhangsan yao qu faguo.  
Zhangsan will go-to France  
'Zhangsan will go to France.'
- (11) a. Q: zuijin you shenme xinwen? Zhangsan yao qu faguo ma?  
recently have any news Zhangsan will go-to France Q. Part  
'Has there been any news recently? Will Zhangsan go to France?'
- b. A: bu shi, Lisi hui meiguo le.  
No Lisi return-to US ASP  
'No, Lisi has returned to the United States.'

## 2.2. Phonetics, phonology and syntax of informational focus in Mandarin Chinese

According to Gärding (1987), Jin (1996) and Xu, Y. (1999), Mandarin, like many other languages, uses stress to indicate where the focus is in a sentence. Two main correlates of Mandarin sentential stress are duration and pitch. Loudness does not play an important role in indicating stress in Mandarin. As for pitch, pitch height is not so much an important cue as pitch range (the difference between the lowest point of pitch and the highest) in Mandarin. More specifically, the duration of a focused element is greatly lengthened and the pitch range of it is greatly expanded. What is also very important is that the pitch range of the immediate post-focus element is greatly compressed, although its duration is also slightly lengthened. It is the sharp contrast between the expanded pitch

range of the focused element and the compressed pitch range of the post-focus element that indicates the informational focus in Mandarin. In addition, when the entire sentence is under focus, namely, in the case of broad focus, no part in particular receives more stress in the sentence unlike languages like English where the sentence-final position is the default position for stress in the case of broad focus. Interestingly, stress on sentence-final focus is not as prominent as focus in other positions, which makes the overall pattern similar to that of broad focus. The following diagrams from Jin (1996) show pitch contours of the same sentence uttered under four different focus conditions. The focus falls on the sentence-initial subject (upper left), the sentence-middle time adverbial (upper right), the entire sentence (lower left) and the sentence-final verb (lower right) respectively.

(12)



We can see that the pitch contour of the sentence under broad focus condition (lower left) and that of the sentence under sentence-final narrow focus condition (lower right) are almost identical except that in the case of broad focus, the pitch of the beginning of the sentence tilts up a little bit more than that of the sentence-final narrow focus. In the perception experiments, the two patterns were highly confusable and yielded the highest error rate. Yet informants still seemed to be able to distinguish them to a certain degree, but probably not just by the stress pattern on the sentence-final element per se.

Based on the phonetic facts outlined above, Xu, L. (2004) and I (Li 2009) draw similar conclusions on the realizations of informational focus in Mandarin Chinese. Both believe that stress is an important device to mark informational focus in Mandarin. In addition, both acknowledge the special status of the sentence-final position and conclude that stress is not necessary to mark sentence-final informational focus and is also not utilized to mark broad focus. Yet although both researchers think that both prosody and syntax are involved in the mechanism of focus realization in Mandarin, they differ in some significant ways too. Xu, L. (2004) claims that syntax is the primary device and prosody is the compensatory device in focus marking and the sentence-final position is the default position for informational focus in Mandarin. On the other hand, in my dissertation, I claim the opposite, namely, prosodic marking is primary and syntactic marking is compensatory; additionally there is no default position for focus in Mandarin as there is no focus-triggered movement whatsoever involved in Mandarin grammar. For details of the similarities and differences between the two studies, please refer to Xu's work (2004) and my dissertation (Li 2009). In this paper, I will keep holding my view which can be summarized as below:

- (13) a. Informational focus is realized *in-situ* prosodically (by sentential stress) except when the focused element is at the end of the sentence, in which case no stress in that position is necessary.
- b. In the case of broad informational focus, no part in the sentence is prosodically more prominent than any other part.

In the next section, I will provide an OT account for the pattern of informational focus in Mandarin.

### **3. OT analysis of informational focus in Mandarin Chinese**

Since its incidence (Prince & Smolensky 1993 & 2004), Optimality Theory has brought about abundant research in the area of phonology. Faithfulness constraints and markedness constraints are generalized to capture language specific rules and language universal principles. Unlike phonological principles or rules in the traditional derivational approach, these constraints can all be violated and the outputs are a result of compromising between these constraints. The constraints are ranked according to their degree of violability in a specific language and the final form the language takes is the optimal output by violating the constraints minimally. A big advantage of OT is that it provides a convenient tool to represent linguistic typology with great explanatory power. The fact that different languages display different properties is simply a result of different rankings of the same set of universally available constraints.

The application of the OT approach has soon expanded from the area of phonology to other areas in linguistics. It seems particularly fruitful in the interfaces between two areas in grammar such as phonology-morphology interface, or phonology-

syntax interface. In this section I will use the formal tool of OT to analyze the interaction between prosody and syntax in the manifestation of informational focus in Mandarin Chinese.

### 3.1. OT analysis of informational focus in Italian and English

Samek-Lodovici's work (2005) is particularly enlightening to my analysis. She makes detailed OT analyses to account for informational focus patterns in languages like English, Italian and more. In this paper, I extend the same kind of analysis to Mandarin. But in order for the readers to have a full understanding of my analysis, I need to briefly introduce Samek-Lodovici's approach using her examples of English and Italian first.

Samek-Lodovici uses four types of constraints to explain the interaction between prosody, syntax and focus. They are prosodic constraints, syntactic constraints and prosody-syntax interface constraints and another interface constraint that maps stress to focus. These constraints and their definitions as used by Lodovici are listed below.

- (14) Syntactic constraints:  
 Stay: No traces.  
 EPP: Clauses have subjects.
- (15) Prosodic constraints:  
 Head-P (H-P): Align (P, R, Head (P), R)  
 Align the right boundary of every phonological phrase with its head.  
 Head-I (H-I): Align (I, R, Head (I), R)  
 Align the right boundary of every intonational phrase with its head.  
 Head-U (H-U): Align (U, R, Head (U), R)  
 Align the right boundary of every utterance with its head.
- (16) Phonology-syntax interface constraints:  
 Wrap: Each lexically headed XP is contained inside a phonological phrase P.  
 StressXP: Each lexically headed XP must contain a phrasal stress (where 'phrasal stress' refers to the head of a phonological phrase P).
- (17) Phonology-pragmatic constraints:  
 Stress-Focus: for any  $XP_f$  and YP in the focus domain of  $XP_f$ ,  $XP_f$  is prosodically more prominent than YP.

Stay and EPP were originally proposed as constraints by Grimshaw (1993, 1997) and then used in many studies, among which are Samek-Lodovici (1996a, 2001), Bakovic (1998) and Vikner (2001). The content of these constraints simply follows generally accepted principles in generative syntax. In OT, the two constraints mean that languages disfavor movement of constituents and subjectless clauses respectively.

Proposed by Truckenbrodt (1995), Head-P (H-P) and similar constraints in its group stipulate the directionality of the main stress within each phonological domain. Depending on the language under analysis, the R(ight) in these constraints may be changed to L(eft) as needed.

The two phonology-syntax interface constraints Wrap and StressXP are based on proposals in Truckenbrodt (1995) too. These two constraints combined guarantee that one lexically-headed syntactic phrase (such as DP or VP) corresponds to one phonological phrase and receives one prosodic prominence. The prosodic constraints with a Right parameter and the phonology-syntax interface constraints together favor the alignment of a P-phrase (or I-phrase or Utterance)'s right boundary with the syntactic right boundary of a lexical maximal projection.

The Stress-Focus constraint maps stress to focus. It simply reflects the traditional view that follows the classical observation by Jackendoff (1972) that focus phrases are more prominent than non-focused ones. Note that the 'focus domain' in the definition refers to the entire sentence (usually corresponding to an Intonational Phrase), not just the focus.

Using these constraints, Samek-Lodovici accounts for how syntax and prosody interact to manifest the informational focus in different languages. Usually in a specific language, either syntax or prosody plays a more important role in determining the positioning of the focused element. To explain the difference, the constraints are ranked differently in different languages. Let us first look at Lodovici's examples from Italian and English to illustrate how these constraints are at work in specific languages. Then I will apply the same type of analysis to Mandarin Chinese.

Zubizarreta (1998) proposes a *p*-movement, namely prosodically motivated movement to explain the relationship between prosody and focus in Italian, illustrated in the following examples, cited in Samek-Lodovici (2005) (his (21) and (22)). The capitalization indicates sentential stress.

- (18) a. What happened?  
 b. [Gianni ha vinto la CORSA]<sub>f</sub>.  
 John has won the race  
 'John won the race.'  
 c. \* [Ha vinto la corsa GIANNI]<sub>f</sub>.  
 has won the race John  
 '(intended) John won the race.'
- (19) a. Who won the race?  
 b. L'ha vinta GIANNI<sub>f</sub>  
 It-has won John  
 'John won it.'

- c. \*Gianni<sub>f</sub> l'ha VINTA  
 John it-has won  
 '(intended) John won it.'

It is well-known that Romance languages such as Italian and Spanish allow post-verbal subjects. However, sentences with post-verbal subjects are not used freely. As an answer to questions like 'what happened?', i.e. in the case of broad focus, a sentence with a post-verbal subject is ruled out, as shown in (18c) above, because it would be interpreted as having *Gianni* as the only focus in the sentence. For precisely the same reason, (19b) is the perfect answer to the question in (19a) asking about the subject. And (19c) with a pre-verbal subject becomes pragmatically inappropriate in this context. Based on examples like these, Zubizarreta concludes that in Italian, as in many other languages, informational focus is realized with sentential stress, and more specifically for Italian, the position for sentential stress must be the final position in the sentence. As a consequence, the element that receives the interpretation of informational focus must occur sentence-finally. Therefore, she proposes that the rightward movement of pre-verbal subjects is motivated by prosodic requirement, hence the term *p*-movement. Another property of Italian is that broad focus also receives a sentence-final stress.

In accounting for these facts in Italian in OT, Samek-Lodovici ranks prosodic constraints higher than syntactic constraints as word order in Italian seems more flexible and always acts so as to meet the prosodic requirement of sentence-final stress. Higher than both is the Stress-Focus constraint. The tableau in (20) exemplifies the case of broad-focus (the format is slightly revised to be consistent with the conventions of OT tableaux). The prosodic constraints Wrap and StressXP are not included here or in the following tableaux because they are satisfied by all the candidates listed and are not directly relevant to the analysis. Remember the directionality parameter is set as Right in both H-I and H-P. The subscripted *f* indicates the focused element, *t* stands for trace. The traces are there corresponding to the moved subject and verb because I think Samek-Lodovici follows the VP-shell hypothesis and the VP-internal subject hypothesis. Capitalization in the examples indicates sentential stress.

(20) Broad focus: Gianni ha RISO. ‘John has laughed.’

	SF	H-I	H-P	EPP	Stay
☞ a. Canonical structure with final stress (        x    ) I (x)    ( x    ) P [S aux [V [t t]]] <sub>f</sub>					**
b. Clause-final subject with final stress (        x    ) I (        x    ) P [aux [V [S t]]] <sub>f</sub>				*!	*

(20) is a case of broad focus. Two candidates are evaluated with regard to the sentential stress pattern. Candidate a takes an ordinary SVO word order and has two trivial violations of the lowest ranked Stay because both S and V moved out of their base-generated positions. Candidate b not only violates Stay because V moved out of the lower VP domain, but also has a fatal violation of the higher-ranked EPP as the sentence lacks a subject. Therefore candidate a wins out and the final output is the canonical SVO structure with a sentence-final stress.

The next example shows how syntactic requirements give in to prosodic ones under a narrow-focus condition.

(21) Narrow focus on subject: Ha riso GIANNI. ‘John has laughed.’

	SF	H-I	H-P	EPP	Stay
☞ a. Clause-final subject with final stress (        x    ) I (        x    ) P [aux [V [S <sub>f</sub> t]]]				*	*
b. Canonical structure with final stress (        x    ) I (x)    ( x    ) P [S <sub>f</sub> aux [V [t t]]]	*!				**
c. Canonical structure with initial stress (x         ) I (x)    ( x    ) P [S <sub>f</sub> aux [V [t t]]]		*!			**

When the subject is under narrow focus, i.e. when the sentence is used to answer a question such as ‘who laughed?’, candidate a with a post-verbal subject wins out despite the violations of EPP and Stay. What rules out candidate b, the canonical SV structure, is that the final sentential stress falls on the verb instead of the focused subject, violating the highly ranked SF. As for candidate c, although the subject receives stress, it does not occur in the sentence-final position, violating H-I which is higher than EPP and Stay. This makes candidate c lost to candidate a as well.

Now let us look at some examples from English. English forms a contrast with Italian. In English, the word order is relatively rigid while the prosodic pattern is quite flexible. The main stress is assigned rightmost in focus-neutral, namely broad focus context; otherwise the main stress is assigned *in-situ* to the focused element. This pattern is illustrated in the following examples.

(22) (Context: What happened?)  
John has given a book to MARY.

(23) (Context: What has John given to Mary?)  
John has given a BOOK to Mary.

English shares with Italian the characteristic that under broad-focus condition the default sentential stress position is rightmost, but differs from Italian in that syntactic requirements play a more important role in restricting where the main stress is under narrow-focus condition. Lodovici captures this difference by ranking syntactic constraints higher than prosodic ones for English. Consider the following examples in English.

(24) Broad focus: John has LAUGHED.

	SF	EPP	Stay	H-P	H-I
☞ a. Canonical structure with final stress (        x ) I (x)        (x) P [S aux [ t V ]] <sub>f</sub>			*		
b. Clause-final subject with final stress (        x ) I (        x ) P [aux [V [S t]]] <sub>f</sub>		*!	*		

Under the broad-focus condition, candidate b is ruled out for the same reason the same pattern is ruled out in Italian (see (20)). Here the higher ranking of syntactic constraints than prosodic constraints is not crucial yet. Look at tableau in (25) below.

(25) Narrow Focus on subject: JOHN has laughed.

	SF	EPP	Stay	H-P	H-I
a. Canonical structure with final stress ( x ) I (x) (x) P [S <sub>f</sub> aux [t V]]	*!		*		
b. Clause-final subject with final stress ( x ) I ( x ) P [aux [V [S <sub>f</sub> t]]]		*!	*		
c. Canonical structure with initial stress (x ) I (x) ( x ) P [S <sub>f</sub> aux [t V]]			*		*

In (25), all three candidates tie in terms of violation of Stay. Candidate a loses because it violates the highest ranked SF due to the lack of sentential stress on the focused subject. Candidate b loses because it does not have a subject, violating EPP. Although candidate c also violates another constraint in addition to Stay, it is a trivial violation of a lower ranked H-I by contradicting the required Right directionality. Therefore candidate c with a normal SVO order and sentential stress on the subject wins out.

Above I briefly sketched Samek-Lodovici's analyses of the focus patterns in Italian and English. What is important in the analysis is that the same set of constraints is used and only the ranking of the syntactic constraints and the prosodic constraints is reversed, in reflection of the language-particular properties with respect to the interaction between syntax and prosody. The analysis is powerful and concise, and typologically convenient. In the next section, I will use the same approach to analyze the case of Mandarin Chinese.

### 3.2. OT analysis of informational focus in Mandarin Chinese

Mandarin Chinese shares with Italian and English the general tendency of marking focus with sentential stress. It resembles English more than Italian in that it has a relatively rigid word order and no prosodic requirements or other structural requirements force the focused element to move to a certain position. But Mandarin also differs from both English and Italian in that in the case of broad focus, no sentential stress is present. Additionally, a sentence-final narrow focus does not bear sentential stress either. In a word, stress does not fall in the final position.

Below are sentences of Mandarin Chinese to which I will apply the OT analysis. Again, capitalized words indicate where stress is. (26) is a case of broad focus and (27) is a case of narrow focus on the predicate *bing le*. It is seen that formally (both syntactically and prosodically) they are identical. They keep the ordinary subject-verb word order and no part bears sentential stress. (28) is a case of narrow focus on the subject *Zhangsan* and *Zhangsan* bears and must bear the sentential stress. In this case, a post-verb subject is impossible.

- (26) (context: What happened?)  
 Zhangsan bing le.  
 Zhangsan sick ASP  
 ‘Zhangsan got sick.’
- (27) (context: What happened to Zhangsan?)  
 Zhangsan bing le.  
 Zhangsan sick ASP  
 ‘Zhangsan got sick.’
- (28) (context: Who got sick?)  
 ZHANGSAN bing le.  
 Zhangsan sick ASP  
 ‘Zhangsan got sick.’

In general, like other languages, focus needs to be marked prosodically in Mandarin. So the constraint SF is valid in Mandarin. In Italian, stress must occur at the end of the sentence, whether it is the case of narrow focus or broad focus; In English, stress must occur at the end of the sentence in the case of broad focus. In either language, the prosody REQUIRES the stress to occur sentence-finally. Mandarin Chinese, however, seems to be just the opposite of Italian: its prosody PROHIBITS the stress from occurring sentence-finally regardless of whether it is the case of narrow focus or broad focus. Other than that, stress occurs pretty much wherever the focused element needs to be per requirements of syntax.

Therefore, I treat the case of Mandarin Chinese as a case of ‘do something except when...’ in OT, namely ‘stress the focused element except in the sentence-final position.’ I would like to replace the prosodic constraints H-P, H-I and so on with a markedness constraint: \*FinalStress.

- (29) \*FinalStress: No stress should occur in the sentence-final position.

This markedness constraint should be ranked higher than SF. \*FinalStress can be seen as a special case of a general principle that holds a group of phonological phenomena

together: Nonfinality, which applies to a wide range of phenomena including stress assignment and syllable weight. (See Prince & Smolensky 2004) I would also like to revise the constraint SF in two ways for Mandarin. First, if no part is informationally more prominent than other parts in the same sentence, then there should not be any part that is prosodically more prominently than other parts. A stressless broad focus sentence should not be considered a violation of SF. Second, I propose that SF be interpreted as a one-to-one correspondence between stress and focus. It is violated when a focused element is not assigned a sentential stress or when a non-focused element is assigned a sentential stress. When the stress falls on a wrong constituent, therefore, it counts as two violations. The modified definition of the constraint SF is as follows.

- (30) Stress-Focus: for any XP and YP in the same sentence, XP is prosodically more prominent than YP if XP is informationally more prominent than YP, and vice versa.

Here ‘informationally more prominent’ is understood as ‘under focus’ and the ‘sentence’ corresponds to the Intonational Phrase in prosodic hierarchy.

With these considerations in mind, here are the relevant constraints and their ranking I temporarily follow in Mandarin:

- (31) \*FinalStress >> SF>>EPP>> Stay

Let us now look at the case of narrow focus on subject in Mandarin.

- (32) Narrow focus on subject. ZHANGSAN bing le. ‘Zhangsan got sick.’

	*FinalStress	SF	EPP	Stay
a. Canonical structure with final stress x [S <sub>f</sub> aux [t V ]]	*!	**		*
☞ b. Canonical structure with initial stress x [S <sub>f</sub> aux [t V ]]				*
c. Canonical structure with no stress [S <sub>f</sub> aux [t V ]]		*!		*
d. Clause-final subject with final stress x [aux [V [S <sub>f</sub> t]]]	*!		*	*

Four candidates are evaluated in (32). Candidate a is an ordinary SV sentence with stress on the predicate *BING le*. It not only violates Stay in that the subject moves from internal of the VP, but also violates SF twice in that the stress is assigned to a wrong constituent. Candidate d would correspond to the sentence *Bing le ZHANGSAN*. Although *Zhangsan* does receive the stress, the sentence violates EPP and Stay, and also \*FinalStress. Candidate c, corresponding to a sentence that would be uttered under broad focus, violates Stay and SF once because the focused subject does not get any stress. Candidate b, *ZHANGSAN bing le*, which turns out to be the winner, only violates the low ranked Stay.

In fact, (32) does not differ from English in any significant way. Let us turn to the case of broad focus.

(33) Broad focus: *Zhangsan bing le*. ‘Zhangsan got sick.’

	*FinalStress	SF	EPP	Stay
a. Canonical structure with final stress x [S aux [t V ]] <sub>f</sub>	*!	*		*
b. Canonical structure with initial stress x [S aux [t V ]] <sub>f</sub>		*!		*
☞ c. Canonical structure with no stress [S aux [t V ]] <sub>f</sub>			*	*
d. clause-final subject with no stress [aux [V [S t]]] <sub>f</sub>			*!	*

All four candidates violate the lowest ranked constraint Stay. Candidates a assigns the stress on the predicate and violates the highly ranked \*FinalStress. In addition, it violates SF. Although the entire sentence is under focus, there is no part within the sentence that is informationally more prominent than other parts, so the verb should not receive any stress. Candidate b assigns the stress on the subject and so also violates SF, as well as Stay. The winner candidate c lacks a main stress in the sentence but does not violate SF according to its definition. It only violates Stay. Candidate d is incorporated to show the effect of EPP. The result proves that EPP is either ranked higher than or the same as Stay.

From the above two examples, it looks like that the ranking of the four constraints \*FinalStress >> SF >> EPP >> Stay is valid. But let us examine the case of sentence-final narrow focus to see if it needs any modification. In (34) the predicate is under focus.

(34) Narrow focus on predicate: Zhangsan bing le. ‘Zhangsan got sick.’

	*FinalStress	SF	EPP	Stay
a. Canonical structure with final stress x [S aux [t V <sub>f</sub> ]]	*!			*
b. Canonical structure with initial stress x [S aux [t V <sub>f</sub> ]]		*!*		*
c. Canonical structure with no stress [S aux [t V <sub>f</sub> ]]		*!		*
d. clause-final subject with initial stress x [aux [V <sub>f</sub> [S t]]]			*	*

Candidate a is ruled out by violation of the highest-ranked \*FinalStress. Candidate b and c both violate Stay and SF, but the former violates it twice as the stress falls on a non-focused element and the focused element does not receive stress. Candidate c is the best choice among the first three. However, candidate d, corresponding to ‘BING le Zhangsan’ with stress on the predicate, would become the winner because the two syntactic constraints it violates are ranked lower than SF violated by candidate c. Yet the sentence is absolutely unacceptable in Mandarin. This shows that EPP cannot be violable and must be ranked higher. I now move the two syntactic constraints altogether to a position higher than SF, which yields the desirable result.

(35) (modified) Narrow focus on predicate: Zhangsan bing le. ‘Zhangsan got sick.’

	*FinalStress	EPP	Stay	SF
a. Canonical structure with final stress x [S aux [t V <sub>f</sub> ]]	*!		*	
b. Canonical structure with initial stress x [S aux [t V <sub>f</sub> ]]			*	**!
c. Canonical structure with no stress [S aux [t V <sub>f</sub> ]]			*	*

d. Clause-final subject with initial stress			
x		*!	*
[aux [V <sub>f</sub> [S t]]]			

Note that I put \*FinalStress, EPP and Stay in the same slot due to their equal degree of inviolability. The three must outrank SF, otherwise candidates a, c and d would tie. Therefore, the final ranking of the constraints should be as follows.

(36) \*FinalStress, EPP, Stay >> SF

The previous two examples can be reanalyzed under the new ranking and it should yield the same results. Readers can work out the tableaux themselves.

#### 4. Conclusions

In this paper, I provided a formal analysis of the realization of informational focus in Mandarin Chinese in the OT model. I first gave a brief overview of the important concepts related to focus, reviewed the facts regarding the realization of informational focus in Mandarin, and then gave an OT account for the patterns mainly by following the approach in Samek-Lodovici (2005). I also compared Mandarin with Italian and English. Essentially how informational focus is manifested in a language is a result of the competition or compromising between various sorts of grammatical constraints in phonology, syntax and other components of grammar. As a common property of Italian, English and Mandarin Chinese, focus is in general realized by prosodic prominence. So a basic constraint Stress-Focus plays an important role in all three languages. When prosodic constraints and syntactic constraints conflict with each other, syntactic requirements give in in Italian while prosodic requirements give in in English. These facts are accounted for by ranking prosodic constraints higher than syntactic ones in Italian and the opposite in English. In both languages, SF ranks the highest. In Mandarin Chinese, the prosodic constraint \*FinalStress I proposed takes the form of a markedness constraint and is ranked equally high with syntactic constraints. What gives in in Mandarin is the constraint SF because it is relaxed in the sentence-final position or in broad focus. That is why it ranks lower than the other constraints in Mandarin. The OT analysis shows that Italian, English and Mandarin each represents a type in the language typology of how informational focus is realized through the interaction between syntax, prosody and pragmatics.

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