

# DISTINCT TYPES OF FOCUS AND WH-QUESTION INTONATION

Hyun Kyung Hwang

National Institute for Japanese Language and Linguistics, Japan

hwang@g.ninjal.ac.jp

## ABSTRACT

The prosodic properties of distinct types of focus and wh-interrogatives are compared in Tokyo Japanese (TJ) and South Kyeongsang Korean (SKK). The results of a production study demonstrate that there are limited prosodic differences between the intonation patterns of Informational Focus (IF) and Contrastive Focus (CF) in both languages. Also, it is revealed that the intonational realization of wh-interrogatives differs from that of both types of focus as the former lacks pre-focus pitch compression in TJ, and involves a high flat pitch pattern in SKK. This supports the claim that the prosodic marking of focus and WH are distinct in TJ and SKK.

**Keywords:** intonation, informational focus, contrastive focus, wh-interrogatives

## 1. INTRODUCTION

Focus highlights the part of an answer that corresponds to the wh-part of a wh-interrogative [12]. This use of focus is often called *informational focus* (IF). Another use of focus is *contrastive focus* (CF), which has a limited set of alternatives [2]. Yet, some semantic accounts on the syntax-phonology interface do not assume different subtypes of focus, with a single category of focus [15] or givenness [16].

In Japanese and Korean, most previous studies on prosody of focus deal with the characteristics of CF [9, 13, 14]. Despite methodological differences, there is a general agreement that focus expands the pitch range of focused items, followed by post-focal pitch compression. Although the prosodic realizations of focus have attracted intensive interest, it has not yet been explicitly discussed whether to differentiate distinct types of focus. Recently, Breen et al. [1] provide prosodic properties of the two focus types in English. In [1], CF in an object position is produced with a higher maximum F0. However, no acoustic difference is found between CF and IF in subject and verb positions.

Also, there is a crucial theoretical issue whether WH itself receives focus. The intonation pattern of wh-interrogatives in TJ has often been equated with focus intonation in that both patterns exhibit F0 expansion of a wh-phrase/focused item and following F0 compression [3, 6, 8]. However, neither of the previous studies on wh-prosody in TJ provided quantitative data to support that the intonation pattern of wh-interrogatives is identical to that of focus. Further, it is observed that wh-interrogatives in Fukuoka Japanese and SKK yield a different prosodic pattern, involving a high plateau contour [5, 7, 10]. In particular, [7] explicitly argues that the specific prosodic pattern of wh-interrogatives in these languages is to accomplish wh-scope marking, and distinct from focus.

Further, it remains unresolved whether the F0 of post-focus is compressed simply due to the givenness of post-focus material. In general, non-focused part of a sentence is given, and discourse-given material is predicted to be prosodically nonprominent [4, 17]. However, it is not clear whether focus yields further F0 compression of post-focus given material. This question necessitates the importance of controlling information status of test material.

Thus, this research aims to provide experimental verification of the following questions; 1) Should we distinguish distinct subtypes of focus in terms of intonation in TJ and SKK? 2) Is the prosodic manifestation of WH in TJ identical to that of focus? If so, which type of focus? 3) Is post-focal compression the prosodic realization of givenness? Or is there further post-focal effect? The answers to these questions allow us to advance our understanding of focus.

## 2. METHODS

### 2.1. Materials

Two sets of sentences were tested, and each test sentence consists of 4 phrases: Topic – Obj1 – Obj2 – Verb (V). A topic phrase is to test pre-focal effects. The preceding (Obj1) and following objects (Obj2) are the targets of F0 expansion and

of F0 compression, respectively. As the word order in Japanese and Korean is relatively free, different orders between direct objects (D.O.) and indirect objects (I.O.) were also recorded.

To explore the intonation pattern of wh-interrogatives and distinct types of focus, each target sentence was uttered as answers/additional questions to a prompt question/statement as shown in the sample set of Japanese sentences in Table 1.

**Table 1:** An example set of test sentences in TJ (D.O.-I.O order): a-Given, b-WH, c-IF, d-CF.

	Prompt	Target
a	Yúu-wa mémo-o Náo-ni m íse-ta? 'Did Yuu show Nao the memo?'	un, Yúu-wa mémo-o Náo-ni m íse-ta-yo. 'Yes, Yuu showed Nao the memo.'
b	Yúu-wa Náo-ni m íseta-tte. 'I heard Yuu showed Nao.'	Huh? Yúu-wa náni-o Náo-ni m íse-ta? 'huh? What did Yuu show Nao?'
c	Yúu-wa náni-o Náo-ni m íse-ta? 'What did Yuu show Nao?'	Yúu-wa mémo-o Náo-ni m íse-ta-yo. 'Yuu showed Nao the memo.'
d	Yúu-wa ronbun-o Náo-ni m íse-ta? 'Did Yuu show Nao the paper?'	uun, Yúu-wa mémo-o Náo-ni m íse-ta-yo. 'No, Yuu showed Nao the memo.'

In order to circumvent any effect of *un* 'yes'/'*uun* 'no' in the Given and CF case, participants were asked to make a pause after those words. In constructing test material, only accented items were used since the accentedness of a preceding word influences the F0 of following material [11, 13]. Also, the length and accent location of each phrase is consistent across test sets and information status. Further, all other elements except the target of focus are discourse-given.

Target sentences were divided into 4 blocks by their information status, and each block was recorded with at least a day interval. The test list in each block, containing 4 target and 4 filler sentences in a random order, was repeated ten times by each subject. In total, 640 utterances were obtained (2 sets x 2 object order x 4 information status x 4 speakers x 10 repetitions).

## 2.2. Participants

Two female and two male speakers of each language, aged 24-39 participated in the recording. All were born and grew up in the respective

linguistic target areas and had no history of speech or hearing impairment.

## 2.3. Procedure and analyses

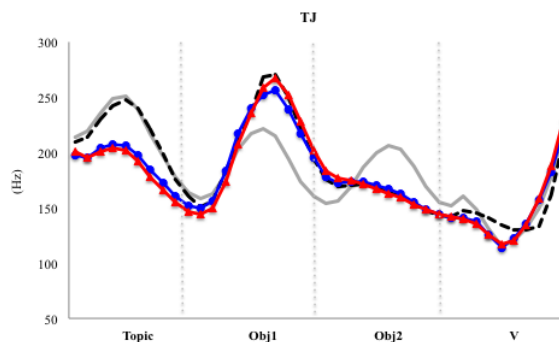
The recordings were conducted in a sound-attenuated booth at the National Institute for Japanese Language and Linguistics for Japanese, and in a quiet office for Korean. A Marantz digital recorder (PMD 661) and a SHURE microphone (Beta 58A) were used for the recordings. Participants were instructed to give natural renditions at a comfortable speed.

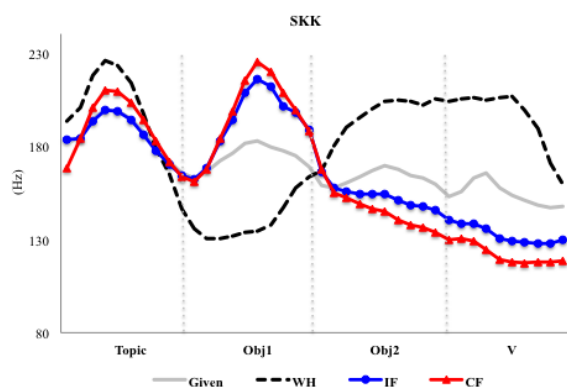
Phrase boundaries were manually marked on each utterance. In measuring fundamental frequencies, maximum F0 (MaxF0) and Minimum F0 (MinF0) values of each phrase were extracted using a Praat script [18]. The pitch fall from Obj1 to Obj2 (Max/MinF0 of Obj1-Max/MinF0 of Obj2) is also calculated.

## 3. RESULTS

Figure 1 shows time-normalized F0 curves in Hz, averaged all renditions by 4 speakers. In TJ, IF and CF exhibit extremely similar curves, involving the F0 expansion of Obj2 and post-focal F0 compression compared to the Given case. WH seems to pattern together with IF and CF in this regard. Surprisingly, however, WH and IF/CF seem to be distinct as F0 peaks of the pre-focus phrase (Topic) is considerably lower in WH and Given than in the IF and CF cases. For the F0 compression of Obj 2, there seems to be further F0 compression yielded by the preceding focus/WH besides the absence of prosodic prominence by discourse-giveness.

**Figure 1:** Time-normalized mean F0 contours in TJ (top) and in SKK (bottom): Vertical lines indicate phrase boundaries – Topic, Obj1, Obj2, and V.





In SKK, the similar focus effect by IF and CF is observed. Yet, CF seems to yield slightly higher F0 peaks of Obj1 and more F0 compression in the following material compared to the IF case. Contrary to TJ, WH exhibit a completely distinct tonal shape—F0 rise of Obj1 (wh-phrase), following high plateau and F0 fall at the end. Also, the F0 peak of Topic in WH appears to be somewhat higher than that in other cases. Similarly to TJ, both types of focus seem to compress pitch range of the post-focal material, which is discourse-given.

Statistical analyses using JMP were conducted to confirm the observations. The results of one-way ANOVAs in TJ are summarized in Table 2.

**Table 2:** Results of statistical analyses in TJ.

df (3, 633)	MaxF0	MinF0
Topic	<b>F=26.4432</b> <b>P&lt;0.001*</b>	F=1.8816 P=0.1314
Obj1	<b>F=21.3206</b> <b>P&lt;0.001*</b>	F=0.0064 P=0.5754
Obj2	<b>F=15.7884</b> <b>P&lt;0.001*</b>	<b>F=4.1976</b> <b>P=.0059*</b>
V	<b>F=10.0068</b> <b>P&lt;0.001*</b>	<b>F=3.4817</b> <b>P=.0157*</b>
Obj1-Obj2	<b>F=244.6117</b> <b>P&lt;0.001*</b>	<b>F=12.7091</b> <b>P&lt;0.001*</b>

For MaxF0s, there is a significant main effect of information status for all phrases. Post-hoc comparisons revealed that the MaxF0 of Topic in Given and WH is significantly higher than that in IF and CF (Given=WH>IF=CF). For Obj1, focus and WH yielded significantly higher MaxF0s compared to the Given case (WH=CF=IF>Given). The same tendency that WH patterns together with focus is also found in the comparison of the Max F0 of Obj2 and V; WH, IF and CF exhibit more F0 compression of Obj2 and V compared to the Given case (Given>WH, IF, CF). On the contrary, the F0

fall from Obj1 to Obj2 differentiated all four information conditions (WH>CF>IF>Given).

For MinF0s, the distinct information condition plays a significant role only for Obj2, V and Obj1-Obj2. The MinF0 of V is significantly higher in WH than in the other cases (WH>CF=IF=Given), presumably because WH is the only interrogative case whereas the others are declaratives. For MinF0s of Obj2 and Obj1-Obj2, on the other hand, it was indicated that WH patterns together with focus (Given>IF=CF=WH for Obj2, and WH=CF=IF>Give for Obj1-Obj2).

Table 3 shows the results of one-way ANOVAs in SKK.

**Table 3:** Results of statistical analyses in SKK.

df (3, 633)	MaxF0	MinF0
Topic	<b>F=5.5101</b> <b>P&lt;0.001*</b>	F=1.8446 P=.1378
Obj1	<b>F=25.1528</b> <b>P&lt;0.001*</b>	<b>F=4.0436</b> <b>P=.0073*</b>
Obj2	<b>F=10.3043</b> <b>P&lt;0.001*</b>	<b>F=20.1437</b> <b>P&lt;0.001*</b>
V	<b>F=223.3554</b> <b>P&lt;0.001*</b>	<b>F=550.0667</b> <b>P&lt;0.001*</b>
Obj1-Obj2	<b>F=38.2009</b> <b>P&lt;0.001*</b>	<b>F=9.4335</b> <b>P&lt;0.001*</b>

Like TJ, a significant effect of information status was found for MaxF0s in all phrases. Post-hoc comparisons indicated that WH yields significantly higher MaxF0s of Topic, but there is no focus effect (WH>IF=CF=Given). For Obj1, there is a significant effect of focus, and CF exhibits stronger effect compared to IF (CF>IF>Given=WH). The Max F0 of V is the highest in WH, low in Given, and even lower in IF and CF (WH>Given>IF=CF). Also, it was revealed that the F0 fall between the objects differentiates all four information conditions in SKK (CF>IF>Given>WH).

For MinF0s, there are significant differences among the information conditions for Obj1, Obj2, V and Obj1-Obj2. First, WH yields significantly lower MinF0s of Obj1 (CF=Given=IF>WH). It is not surprising as Obj1 in the WH case, *i.e.* wh-phrase, in SKK bears a rising lexical accent while that in other cases has a falling accent. Second, MinF0s of Obj2 and Obj1-Obj2, differentiate all four information conditions (WH>Given>IF>CF for Obj2, CF>IF>Given>WH for Obj1-Obj2). The MinF0 of V is significantly lower in IF and CF than in the other cases (WH, Given>IF, CF).

#### 4. DISCUSSION AND CONCLUSIONS

Results of the present study demonstrate that both IF and CF consistently yield considerable F0 expansion of focused items and F0 compression of post-focus material in TJ and SKK. However, the prosodic effect of distinct types of focus is quite limited in both languages. Similar results on the prosodic differences between IF and CF were reported in English [1]. Yet, the debate over distinct types of focus marking is still open as certain parameters exhibited significant F0 differences between two types of focus in this study. It is necessary to test whether the distinct F0s between IF and CF play a crucial role in perception of prominence in TJ and SKK.

Also, it was revealed that focus involves F0 compression not only of post-focus items, but also of pre-focus items in TJ. On the other hand, wh-interrogatives in this variety only affect the F0 of following material. Thus, despite the similar intonational realizations of WH and focus in TJ, WH prosodically differs from focus. SKK provides more robust differences between WH and focus as the two exhibit completely distinct prosodic patterns. This result corroborates the claim in [7] that the prosodic marking of WH and focus is distinct.

Furthermore, in comparing the degree of F0 compression between the Given and focus cases, it is clearly observed that there is a significant additional focal effect on post-focus material, which is discourse-given and already non-prominent. This suggests that post-focus F0 compression is not simply the prosodic realization of discourse-giveness of non-focused material.

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