

# PHONETIC AND PHONOLOGICAL MARKERS OF CONTRASTIVE FOCUS IN KOREAN

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## ABSTRACT

Cross-linguistically, focus is often cued by suprasegmental features and changes in phrasing. In this paper, phonetic and phonological markers of contrastive focus in Korean are investigated. We find that, as a phonological marker, focus initiates an accentual phrase (AP), and tends to, but does not always, include the following words in the same AP. But regardless of whether the post-focus sequence is dephrased or not, there is a significant expansion of the focused peak compared to the peak on the following words, thus achieving the perceptual goal of focus: prominence of the focused word relative to the following items. As a phonetic marker, a focused AP has extra-strengthening on its left edge, and the sequence before and after focus tends to be shorter than that in a neutral sentence.

## 1. INTRODUCTION

It is very common cross-linguistically that contrastive or narrow focus is cued by suprasegmental features: a focused item has a longer duration, higher amplitude, and a larger pitch range than a neutral item. A focused phrase can also differ from a neutral phrase in prosodic structure. For example, a focused word begins a new prosodic unit and all words after the focused word are deaccented or dephrased (e.g., French [13], Japanese [2]). This suggests that the goal of focus is to make the focused word perceptually more salient and prominent relative to the neighboring words, both phonetically and phonologically.

Cooper et al. [3] and Eady & Cooper [4] found that a focused word in English is 30-40% longer than a neutral word, and that the f0 of words after focus (i.e. the post-focus sequence) is significantly lower than that in a neutral sentence. However, studies do not agree whether the duration of words *after* focus is influenced by focus or not; it is shorter in some studies [16, 5], but is not different from the neutral sentence in other studies [3, 4]. Eady and Cooper suggest that the difference might be related to the length of the sequence. They claim that the duration of a post-focus sequence is shorter than that in a neutral case when the sequence is short (6-7 syllables), but not when it is longer (10 or more sylls). Jun & Fougeron [13] found that a post-focus sequence in French is not different from the same sequence in a neutral utterance, regardless of the length of the sequence, suggesting that post-focus shortening may be language specific.

For Korean, it has been claimed in Jun [9, 10] that contrastive focus is marked phonetically (higher pitch, longer, louder) and phonologically (by becoming the left head of an Accentual Phrase (=AP), with the following words being dephrased). Recent studies based on quantitative data [8, 2, 15] confirmed

that a focused word in Korean has a longer duration and a larger pitch range than that of a neutral word. However, there seems to be a discrepancy among studies regarding the duration of the last syllable of a focused word; E. Jun [8] found that the final syllable is longer than that in a neutral word, but this was not always the case among the subjects in Chung & Kenstowicz [2]. In addition, both [2] and [15] found that words after focus are not always dephrased as claimed in Jun [9, 10]. One of the three subjects in [2] showed a phrase break after focus. But for all subjects, the peak of the post-focus words was significantly reduced compared to that in a neutral sentence. Oh [15] further found that the duration of a post-focus sequence or a pre-focus sequence is often shorter than that in a neutral sentence when the sequence is dephrased before or after focus.

In this paper, we investigate in more detail what the phonetic and phonological markers of contrastive focus in Korean are, and how consistent these features are across speakers and across sentences of different length and different location of focus. We will examine the durational patterns of each syllable in a focused word, and the duration of the post-focus sequence as well as the pre-focus sequence. We will also examine the degree of dephrasing after focus in both declaratives and interrogatives. Since interrogatives in Korean have the same tonal pattern as that of declaratives except for the phrase final boundary tone (high vs. low) [10], one might expect that there would be no difference in phrasing after focus. But it is possible that dephrasing is influenced by the type of a boundary tone as well as the length of the phrase.

## 2. EXPERIMENT

To examine the durational pattern and prosodic structure of a focused phrase, ten sentences were divided into three sets which differ in the location of focus, and the number of syllables in the focused word as well as in post-focus and pre-focus sequences. Table 1 shows the first set, in which the initial word is focused. A focused word is shown in bold. These five sentences have the same subject noun (4 sylls) but vary in the number of syllables (and words) in the verb phrase, from 3-16 sylls (1-5 words). For this set, the influence of focus on the post-focus sequence was examined. Table 2 shows the second set. These five sentences vary in the number of syllables (words) in the subject noun phrase, from 3-7 sylls (1-2 words), while keeping the verb phrase the same, 7 sylls. Table 3 shows the third set. Here each word in a sentence is focused in turn so that the number of syllables (words) in the pre-focus sequence can vary from 4 to 13 syllables. For all sentences, the location of peak in the focused word is labelled together with the boundary of the AP, based on f0 contour.

Each focus sentence is uttered in two sentence types, declarative and interrogative, to examine whether there is any influence of

the boundary tone. In addition, as control data, each sentence is read without focusing any word, i.e. a ‘neutral’ condition.

To trigger contrastive focus on a specific word, a sentence is given in parenthesis before the target sentence. This focus-cueing sentence is exactly the same as the target sentence except for the focused word and the verb final ending ‘but’. In both sentences, the word in contrast is marked in bold. For example: (miraneka **onil** tʃənjəke bananaril məknin̩e anira,) miraneka **neil** tʃənjəke bananaril məknin̩e “(It is not **this** evening that Mira’s family eats bananas, but) It is **tomorrow** evening that Mira’s family eats bananas”. Speakers were asked to produce the focus-cueing sentence either silently or overtly before producing the target sentence.

initial-focus sentences	post-focus #syll(wd)
<b>miraneka</b> məknin̩e ‘Mira’s family is eating’	3(1)
<b>miraneka</b> bananaril məknin̩e ‘Mira’s family is eating bananas’	7(2)
<b>miraneka</b> tʃənjəke bananaril məknin̩e ‘Mira’s family is eating bananas tonight’	10(3)
<b>miraneka</b> neil tʃənjəke bananaril məknin̩e ‘Mira’s family is eating bananas tomorrow night’	12(4)
<b>miraneka</b> neil tʃənjəke bananaril matən̩esə məknin̩e ‘Mira’s family is eating bananas in a yard tomorrow night’	16(5)

**Table 1:** Sentences which have an initial focused word and vary in the number of syllables (words) in the post-focus sequence.

initial-focus sentences	subject NP #syll(wd)
<b>miraka</b> məknin̩e	‘Mira is eating’ 3(1)
<b>miraneka</b> məknin̩e	‘Mira’s family is eating’ 4(1)
<b>mira imoka</b> məknin̩e	‘Mira’s aunt is eating’ 5(2)
<b>mira əmənika</b> məknin̩e	‘Mira’s mom is eating’ 6(2)
<b>inmunte tehaksegi</b> məknin̩e ‘Humanity college student is eating’	7(2)

**Table 2:** Sentences with varying number of focused syllables in the subject noun phrase.

medial-focus sentences	pre-focus #syll(wd)
miraneka <b>neil</b> tʃənjəke bananaril məknin̩e	4(1)
miraneka neil <b>tʃənjəke</b> bananaril məknin̩e	6(2)
miraneka neil tʃənjəke <b>bananaril</b> məknin̩e	9(3)
miraneka neil tʃənjəke bananaril <b>məknin̩e</b>	13(4)

**Table 3:** Sentences which have a medial focused word and vary in the number of syllables (words) in the pre-focus sequence.

A total of 40 sentences (35 target and 5 filler sentences) were repeated 8 times by five speakers (2 females, F1 and F2, and 3 males, M1, M2, and M3). Sentences were digitized and f0 tracks were analyzed using *xwaves*. Duration was measured by referring to a spectrogram and a waveform. AP boundaries and the location of the peak were labeled separately by each author,

based on f0 tracks and audio. The AP is a tonal unit lower than an Intonation Phrase (=IP) in Korean [10]. An AP has a LHLH pattern (or a HHLH when the phrase initial segment is aspirated or a tense obstruent) when it is in an IP-medial position. The initial two tones of an AP are associated with the phrase initial two syllables, and the final two tones with the phrase final two syllables. When an AP is in an IP-final position, the AP final H is preempted by an IP final tone. For example, in a declarative with a Low boundary tone (L%), the last AP is realized as LHLL, with the last L being an L%. Since a focused word starts a new AP and is claimed to include all following words within an IP, we expect that a focused AP will have a peak (i.e., the initial H in LHLL%) in the second syllable of the phrase.

## 3. RESULTS AND DISCUSSION

### 3.1. Phonological Markers

As found in [2, 15], not all speakers produced the focused word and all the following words as one AP. Speaker M2 showed a complete dephrasing while Speaker M3 showed almost no dephrasing (i.e. every word formed one AP). For the other three speakers, the degree of dephrasing varied: from more often to less often: M1 > F2 > F1. Table 4 shows the mean number of phrases starting from the focused word in sentences in Table 1. The number in each cell would maximally be the number of the words given in the top row since the smallest possible AP is one word, in a default case.

Speaker	Sent-type	2wds (3s)	3wds (7s)	4wds (10s)	5wds (12s)	6wds (16s)
F1 (SH)	Dec	2	3	4	3.66	5.5
	Int	1	1	1.66	1.5	1.83
F2 (HS)	Dec	1	1.66	2	1.83	2.83
	Int	1	1	1.33	1.33	2.83
M1 (DO)	Dec	1	1	1.33	1.33	1.66
	Int	1	1	1.16	1.16	1.16
M2 (TH)	Dec	1	1	1	1	1
	Int	1	1	1	1	1
M3 (WJ)	Dec	1.83	3	3	3.33	4
	Int	1.83	2.5	3.16	4	4.83

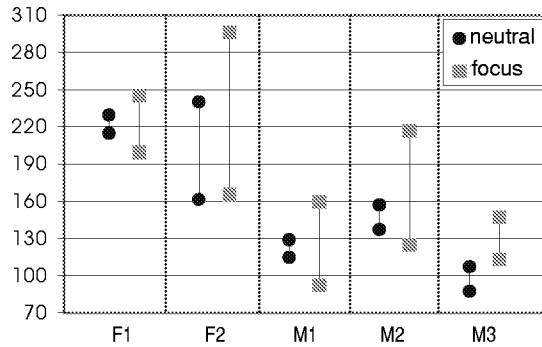
**Table 4:** Number of APs starting from a focused word.

For speakers who did not dephrase all the time, dephrasing occurred more frequently as the phrase became shorter, and more in interrogatives than in declaratives. This suggests that there is an interaction between focus and the length of the phrase, as well as focus and the type of boundary tone, in forming a big AP. Speakers seem to put more words in one phrase when they expect to raise f0 at the end.

When the focused word started one big AP including all following words, the tonal pattern of the AP was the same as that of the default AP in an IP final position, i.e. LHLL%. In this case, the initial H was realized mostly on the 2nd syllable or at the beginning of the 3rd syllable. It was sometimes realized in the middle of the third syllable (spkF2: 8.3%, M1: 40%, M2: 9.3%), but not later than that.

For all speakers, the pitch range of the words following the focused word was substantially reduced, regardless of whether they dephrase after focus or not. Figure 1 shows the peak f0 value of the sentence initial word, *miraneka*, shown as a top

value in a vertical line, and that of the following word, *tʃənjake*, shown as a bottom value, in the neutral and focus condition, for each speaker. For all speakers, the peak of the focused word was significantly higher than that of a neutral word, but peak of the post-focus word is either significantly lower (speakers F1, M1, M2), or higher (M3) than that of the post-neutral word, or similar (F2) to that after a neutral word. This suggests that what speakers manipulate to enhance prominence of a focused item is the pitch range difference between the focused word and the following word. The peak of the word following focus is not necessarily lower than that in a neutral sentence. It is interesting to note that Speaker F1, who rarely dephrases after focus, still lowers the peak of the post-focus AP significantly more than that in the post-neutral AP. To explain these APs with lowered peaks after focus, Chung & Kenstowicz [2] proposed a new prosodic unit, an intermediate phrase, as the domain of downstep in Korean. But this peak lowering phenomenon after focus is not true for every speaker, and is not triggered phonologically as in Japanese or English [1]. Rather, the pitch range difference itself can be a phonological property to cue or mark focus.



**Figure 1:** Peak f0 values of the sentence initial focused word, *miraneka*, (P1) and that of the following word, *tʃənjake*, in the neutral and focused condition.

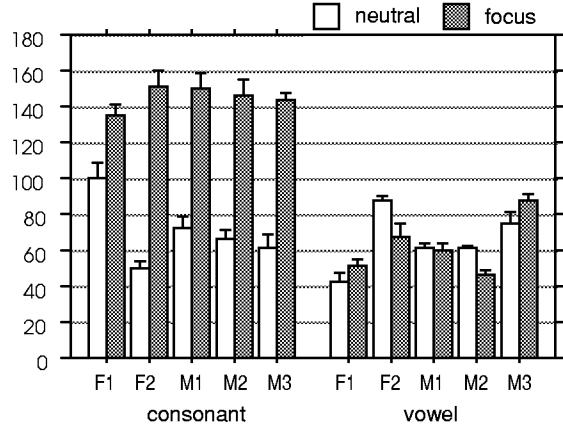
In sum, the results show that a phonological marking of focus in terms of phrasing is not always observed as claimed in Jun [10], but the expansion of pitch range between a focused word and the following words gives the effect of dephrasing as strongly as an actual dephrasing. This suggests that the goal of producing contrastive focus is to make the focused word the most prominent compared to the following words. This is further supported by the location of the phrase break after focus. When speakers failed to dephrase after focus, they tended to put a phrase break towards the end of the sequence, thus fulfilling the perceptual goal, i.e. give enough time for the focused word to be perceived as prominent.

### 3.2. Phonetic Markers

In addition to f0 prominence, previous studies [2, 8, 15] found that a focused word is longer than a neutral word. Our results show that the relationship varies depending on speakers and word types. For three speakers (F2, M2, M3), all focused words were significantly longer than corresponding neutral words, while for Speaker F1, the opposite was true. For Speaker M1, not every word showed a significant lengthening. When we pooled all words within each speaker, no significant

difference was found for all speakers. The duration of a focused word *final* syllable was even less consistent across speakers and word types. This explains controversial findings in previous studies: lengthening was found in [2], but not in [8].

However, examination of every syllable duration within the focused word shows that the focused word initial syllable, which is also an AP initial syllable, is always lengthened compared to that of the neutral word. We further found that the lengthening of the focused AP initial syllable is due to the lengthening of the initial consonant. Figure 2 shows the duration of the focused word (AP) initial consonant and vowel for each speaker, compared to those in the neutral condition. Consonant durations (neutral vs. focus) show significant differences for all speakers, but for the Vowel, no consistent pattern is found. This suggests that the AP initial strengthening, normally found in a neutral condition [7, 11, 14] is amplified in a focused AP initial position.



**Figure 2:** Duration of a focused word (i.e. focused AP) initial consonant (left) and vowel (right) for all speakers compared to that in the neutral condition.

Next, we found that the duration of post-focus sequence in declaratives is in general shorter than the corresponding sequence in a neutral condition, and even shorter in interrogatives than in declaratives. Table 5 shows the duration of the post-focus sequence as a percentage relative to the duration in the neutral condition. The number of syllables in the post-focus sequence is given in the top row. Asterisk (\*) refers to a significant difference ( $p < .05$ ) between the focus and neutral condition. For two speakers (F1, M3), the sequence is significantly shorter after focus than after the neutral word, regardless of the length of the sequence. It is interesting to see that these two speakers are those who dephrase the least after focus (see Table 4). This means that speakers decrease the duration of post-focus sequences, even though they do not reduce the number of phrases after focus. These data do not support Oh's [15] interpretation that shortening of the post-focus sequence is due to dephrasing.

For the other three speakers, the post-focus sequence was produced faster as the length increased, the opposite of the pattern found in English [3, 4]. The low f0 and reduced duration during the post-focus sequence in Korean clearly show that the informational load of this sequence is minimal, and at the same time, these two features boost the prominence of a

focused word. In addition, all speakers produced the post-focus sequence faster in interrogatives than in declaratives, parallel to the higher degree of dephrasing after focus. Speakers seem to rush more before a High boundary tone.

		3syl	7syl	10syl	12syl	16syl
F1(SH)	Dec	*92.2	*90.3	*88.0	*88.6	*89.9
	Int	*84.5	*81.3	*83.0	*82.7	*87.0
F2(HS)	Dec	101.4	98.5	102.5	*96.9	*94.2
	Int	*91.8	*93.8	*95.2	*94.0	*93.3
M1(DO)	Dec	101.6	*94.4	*93.5	*93.1	*93.7
	Int	*87.8	*81.2	*84.0	*77.2	*82.5
M2(TH)	Dec	100.7	99.4	*95.6	96.1	*94.1
	Int	*91.4	*97.3	*94.5	95.9	94.6
M3(WJ)	Dec	*89.1	*90.6	*87.9	*91.2	*88.5
	Int	*80.7	*85.9	*84.3	*88.3	*89.7

**Table 5:** Duration of a post-focus sequence (in percentage relative to Neutral) in declaratives and interrogatives, for five different number of syllables. \* = significant at <.05.

The duration of a pre-focus sequence in declaratives is not always shorter than that in the neutral condition, contrary to the findings in [15]. The ratio of the pre-focus sequence duration relative to that in the neutral condition (in percentage) is given in Table 6. Two speakers (F1, M1) showed a significant reduction for all lengths in declaratives. Other speakers tend to show either no difference from Neutral or even longer duration than Neutral except for a long sequence (i.e. 13 syllables). As in the post-focus sequence, however, speakers uttered the pre-focus sequence faster in interrogatives than in declaratives, except for one speaker (F1). It seems that the influence of the H boundary tone extends to the beginning of a sentence even before focus.

		4syl	6syl	9syl	13syl
F1(SH)	Dec	*91.9	*89.9	*90.6	*88.6
	Int	*91.5	*92.3	*91.4	*89.26
F2(HS)	Dec	101.1	101.6	106.8	99.3
	Int	*94.0	*92.2	98.6	*92.1
M1(DO)	Dec	*83.3	*89.6	*91.7	*90.1
	Int	*83.7	*84.3	*90.6	*88.6
M2(TH)	Dec	104.9	105.0	106.4	102.3
	Int	98.5	*90.4	96.2	*93.8
M3(WJ)	Dec	105.7	103.3	101.5	99.7
	Int	93.9	93.6	94.3	*94.9

**Table 6:** Duration of a pre-focus sequence (in percentage relative to Neutral) in declaratives and interrogatives, for four different number of syllables. \* = significant at <.05.

In sum, a focused word itself tends to be longer than a neutral word, though not true for every speaker. The focused word final syllable is also not consistently lengthened compared to that in a neutral condition, but the focused word initial syllable, especially the initial consonant, is consistently lengthened across speakers. Since a focused word comes at the beginning of an AP, we interpret this as an extra phonetic strengthening of the AP initial boundary. In addition, focus is generally marked by reduction in the duration of the sequence after and before focus, and the degree of reduction is higher in interrogatives than in declaratives. For some speakers, the reduction ratio increases as the number of syllables increases.

## 4. CONCLUSION

In this paper, we showed that contrastive focus in Korean is realized both phonologically and phonetically. As a phonological marker, focus initiates an AP, and tends to include the following words in the same AP. But, regardless of whether the post-focus sequence is dephrased or not, the f0 range after focused word is significantly reduced compared to that in a neutral sentence, thus achieving the perceptual goal of focus: prominence of the focused word relative to the following items. As a phonetic marker, a focused AP has an extra-strengthening on its left edge, and the sequence before and after focus tends to be shorter than that in a neutral sentence.

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