

An Experimental Study on the Effect of Argument Structure

On VP Focus*

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Abstract. It has been claimed that a focused word may project its focus to a syntactic constituent larger than the focused item, under what are known as Focus Projection principles (Selkirk 1995; Rochemont 1998). Engdahl and Vallduvi (1996) rejected this purely syntax-based approach and proposed considering the interactions between the grammatical function and the types of an argument. Chung, Kim, and Sells (to appear) applied Engdahl and Vallduvi's theory to Korean and claimed that in Korean only a theme argument, but not an oblique argument (I.O or Locative PP), can project its focus to the Verb Phrase. This paper examines how VP focus is realized in Korean and tests Chung et al.'s claim that the types and the order of arguments can affect the focus projection (especially 'VP focus'). The results show that there is no sensitivity to argument type, word order, or the length of VP in projecting the domain of focus to VP in Korean. Regardless of these factors, VP focus was prosodically marked by boosting the prominence of all words inside the VP, with the VP-initial word being the most prominent. Our data suggest that focus projection rules can be eliminated as proposed in Büring (2003).

Keywords: focus projection, argument type, word order, VP-focus, domain of focus, intonation phrase, neutral production, edge-based prominence, corrective/contrastive focus

1. INTRODUCTION

Syntactic analyses of focus projection have argued that a focused word may have as its focus domain a larger syntactic constituent projected from the focused word. According to Selkirk (1984, 1995) and Rochemont (1986, 1998), a focus on the internal argument can project to its head phrase recursively. For example, the focus on *box* in (1) can be the answer to either the PP focus question *Where did Mary put the book?* or the VP-focus question *What did Mary do with the book?* This is possible because *box* is an internal argument of a head phrase PP, and in turn the PP is an internal argument of a head phrase VP. Along the same line, the focus on *box* can license its focus projection up to the whole sentence.

- (1) [Mary [put the book [in [a new [**box**]_F]_F]_F]_{FOC}

* The same version appears in *Korean Linguistics, Volume 13, 89–112.*

¹ Here, *Focus* (FOC) refers to the constituent that is traditionally referred to as "the focus of the sentence," and *F* refers to the item or constituent in focus. In the surface structure of a sentence, a Focus constituent is F-marked (Jackendoff 1972, Rooth 1992).

In this approach, a special role is given to an internal argument in projecting the domain of focus. Non-arguments such as adjuncts and specifiers may not project focus to a larger constituent. However, researchers such as Vallduvi and Engdahl (1996) and Gussenhoven (1999) claim that this purely syntax-based analysis cannot explain the true nature of focus projection. Vallduvi and Engdahl (1996) and Engdahl and Vallduvi (1996) proposed a new level of focus interpretation, called Information Structure (IS), based on their Information Packaging Theory. IS is an independent level of linguistic representation interacting with the other grammatical components of the grammar such as ARG-ST whose elements follow the ordering of grammatical functions given in the following:

(2) *ARG-ST Hierarchy*

SUBJ < OBJ < OBJ2 < OBL (where, if A precedes B in the argument structure, A has a higher rank than—outranks—B)

In this framework, focus projection is accounted for by the interaction between argument types and grammatical functions rather than syntactic constituency.

Chung, Kim, and Sells (to appear) applied the Information Packaging Theory to the HPSG (Head-Driven Phrase Structure Grammar; *see* Sag and Wasow, 1999) feature structure. They showed that the important role of the argument hierarchy based on grammatical functions is also observed in a free-word-order language, Korean, and proposed that focus projections in Korean are closely related to the hierarchical structure of arguments in a sentence.

For example, the verb *poasse* ‘watched’ has the argument structure in (3) and, when the lowest ranking argument—the accusative object NP *yenghwa-lul* ‘movie’ in (4)—is focused, the focus value on the object NP can then extend its FOC value to the mother VP, making it a felicitous reply to a question like *What did John do yesterday?*

(3) ARG-ST < NP[agent], NP[theme]>

(4) John-un [F ecey [F **yenghwa-lul**] poasse]
 John-TOP yesterday movie-ACC watched
 ‘John watched a **movie** yesterday.’

The FOC value on the noun phrase can also be accounted for as illustrated in (5). Chung et al. claimed that the “A-accent”² on the NP head *chayk-ul* ‘book’ in (5) can be projected to its mother phrase NP, serving as an answer to *What did John read yesterday?* The FOC value of the verb itself, as in (6), however, does not project focus to a larger domain; (6) is felicitous only when the verb receives a narrow focus.

(5) John-un ecey yenge-eykwanhan [**chayk-ul**]_F]_{FOC}
 John-TOP yesterday English-about book-ACC
 ilkesse.
 read
 ‘John read a **book** about English yesterday.’

² The term *A-accent* has been used in the literature to refer to the focus pitch accent in English. Chung et al. did not provide a definition for *A-accent* in Korean. We interpret it as a cover term representing the prominence given to the focused word in Korean.

- (6) John-un ecey [yenge-eykwanhan chayk-ul
 John-TOP yesterday English-about book-ACC
 [ilkesse]_F]_{FOC}.
 read
 ‘John **read** a book about English yesterday.’

When a verb takes two internal arguments such as ‘to give’, Chung et al. (to appear) claim that—unlike English where any internal argument can project its focus to the VP if the focused item is the peripheral one—Korean allows focus projection only from a non-oblique, theme argument. As shown in (7), (a) can be a felicitous answer to a VP-focus question, *What did you do?*, but (b) cannot. They claim that this condition holds even in locally scrambled examples: As shown in (8), it is only when the theme argument *senmul* ‘a present’ is focused that the VP can receive a wide-focus reading.

- (7) a. [Mary-eykey [senmul-ul]_F cwuesse]_{FOC}
 Mary-DAT present-ACC gave
 ‘(I) gave Mary a **present**.’
 b. *[[Mary-eykey]_F senmul-ul cwuesse]_{FOC}
 Mary-DAT present-ACC gave
 ‘(I) gave **Mary** a present.’
- (8) a. *[senmul-ul [Mary-eykey]_F cwuesse]_F
 b. [[senmul-ul]_F Mary-eykey cwuesse]_F

To capture such differences from English, Chung et al. (to appear) proposed that the non-agentive highest ranking argument allows wide focus projection in Korean. In other words, in the ARG-ST of the verb *cwuesse* ‘gave’ shown in (9), the theme NP, which is the non-agentive highest ranking argument, allows wide focus and the highest ranking argument, the agent NP, does not allow wide focus projection. The goal PP cannot induce wide focus either, since it is the lowest ranking argument regardless of its syntactic position.

- (9) ARG-ST < NP[agent], NP[theme], PP[goal]>

Chung et al. provided further support for this approach using sentences with a locative complement. As shown in (10), the focus value on the locative PP, which is the lowest argument in the ARG-ST of the verb ‘to put’ (<NP[agent], NP[theme], PP[locative]>), does not project focus to the VP; only when the NP[theme] is focused does the VP obtain a wide focus.

- (10) a. *[[sangca-ey]_F chayk-ul nehesse]_F
 box-LOC book-ACC put
 ‘(I) put books in the **box**.’
 b. [sangca-ey [chayk-ul]_F nehesse]_F
 box-LOC book-ACC put
 ‘(I) put **books** in the box.’

It appears that the focus-projection principles apply similarly in English and Korean except when there is more than one internal argument. The focus projection principles are claimed to apply only to the thematic argument in Korean whether the focused thematic argument is positioned VP-initially or not (e.g., whether the order is S + D.O + I.O + V or S + I.O + D.O + V). However, it seems that their judgment on the Korean focus data is biased by equating Korean prosody with English prosody. Though there are common phonetic features of focus realization in both languages (i.e., a focused word is realized with expanded pitch range, higher amplitude, and longer duration, while post-focused words are realized with reduced pitch range, weaker amplitude, and often shorter duration), there are categorical differences in focus prosody in these two languages.

In English, a pitch-accent language, focus is realized as nuclear pitch accent, i.e., the rightmost pitch accent in a phrase (Pierrehumbert 1980, Beckman and Pierrehumbert 1986, Selkirk 1995). This means the focused word becomes the most prominent word in the phrase by deaccenting all post-focus words. Pre-focus words can either be pitch accented or not depending on whether they convey new or given information and on prosodic factors such as rhythm and the length of the phrase.

Korean, on the other hand, is not a pitch-accent language, but an edge-prominence language (Jun 2005a, 2005b). In Korean, prominence is marked by phrasing (Jun 1993, Jun and Lee 1998, Oh 2001, Oh, Kang, and Kim 2004). That is, a prominent word is located at the beginning of a phrase. In other words, the first word in a phrase is the most prominent. A focused word cannot appear in the middle of a phrase. Jun and Lee (1998) examined the realization of contrastive focus³ in Korean and found that the focused word always initiated an Accentual Phrase (AP), a prosodic unit smaller than an Intonation Phrase (IP) and larger than a Prosodic word (Jun 1993, 1998, 2000). Any AP boundaries that existed after the focused word in the neutral rendition were usually deleted, i.e., post-focus material was dephrased. Dephrasing was more common when the post-focus string was short. The phrasing before the focused word (= phrasing of pre-focus string) remained the same as in the neutral condition though the duration of the pre-focus string was also slightly shortened. Therefore, the pre-focus word is always more prominent than post-focus words in Korean; in English, this is not necessarily true. A certain pre-focus word in English can have no pitch accent at all (e.g., it is well known that predicates tend not to receive pitch accent in English).

When producing (7a), the focused word initiates a phrase boundary (AP or IP), and this causes the preceding word, Mary-eykey ‘to Mary’, to form its own phrase, thus bearing some degree of prominence. On the other hand, the focused word in (7b) is the first word of an IP and all the following words are dephrased or produced in a very reduced pitch range while preserving the (accentual) phrase boundaries. This is what happens if the first word is narrowly focused (i.e., meaning ‘I gave a present to Mary, not to someone else’), thus not felicitous as an answer to a VP question, *What did you do?*. For the same reason, we would expect (8b) to be an answer to a narrow focus question (*What did you give to Mary?*), but not a felicitous answer to a VP question, thus the

³ In Jun and Lee’s study, the focus was triggered by the ‘not A but B’ structure. Thus, ‘corrective focus’ would be the correct term. But this would not matter much here because the realization of focus is similar in corrective focus and contrastive focus. Focus was triggered on a specific word by providing a context phrase before the target sentence. The context phrase included a word correcting a certain word in the target sentence. For example, [미라네가 **오늘** 저녁에 바나나를 먹는게 아니라,] 미라네가 **내일** 저녁에 바나나를 먹는데 [‘(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 read both the context and the target sentence. The word in contrast was written in bold, visually cueing the focus.

opposite of Chung et al’s judgment. It is an empirical question whether native speakers of Korean would produce an (8b)-like sentence as an appropriate answer to a VP-focus question or not.

In this paper, we report on a production experiment in which we investigated how native speakers of Korean produce an answer to a VP-focus question and whether their production changes depending on the argument type or the order of the arguments within a VP. To our knowledge, no data on VP focus have been examined instrumentally in order to verify its domain.

2. EXPERIMENT

To investigate the relationship between the argument structure and the focus projection, we selected two types of syntactic constructions: (i) Subj+I.O+D.O+Verb, sentences containing a goal argument (I.O) and a theme argument (D.O), and (ii) Subj+LOC+D.O+Verb, sentences containing a locative PP argument (LOC) and a theme argument (D.O). Then, the two types were further divided into two subsets differing in word order, as shown in (11).

- (11) *Set 1:*
 a. Subj+I.O+D.O+Verb vs. b. Subj+D.O+I.O+Verb
Set 2:
 c. Subj+LOC+D.O+Verb vs. d. Subj+D.O+LOC+Verb

The base stimuli consisted of eight sentences in each construction; the eight vary in two versions according to the number of syllables in each constituent: short (3-syllable subject — 3-syllable first argument — 3-syllable second argument — 3-syllable verb, i.e., 9-syllable VP) and long (3-syllable subject – 4-syllable first argument – 4 syllable second argument — 5-syllable verb, i.e., 13-syllable VP). Example sentences of short vs. long versions from each set are shown in Table 1. As mentioned above, Jun and Lee (1998) showed that contrastive focus tended to trigger dephrasing after the focused item and this was more common in shorter phrases. It would be interesting to see whether dephrasing occurs in VP-focus sentences and, if so, if it is more common in the short than in the long version.

Table 1. Sentence examples of short and long versions of each construction (Subj+I.O+D.O+Verb and Subj+LOC+D.O+Verb). In short versions, each word (subject, argument 1, argument 2, verb) is 3 syllables long (i.e., 3-3-3-3). In long versions, the subject is 3 syllables long, but the two arguments are 4 syllables long, and the verb is 5 syllables long (i.e., 3-4-4-5).

Set 1: Subj+I.O+D.O+Verb			
Short: 3-3-3-3			
yengho-ka	mal-eykey	tangkun-ul	mekyesse.
Yengho-SUBJ	horse-DAT	carrot-OBJ	fed
‘Yengho fed a carrot to the horse.’			

Long: 3-4-4-5			
yengwu-ka	Mina-eykey	ciwukay-lul	kenneycuesse.
Yengwu-SUBJ	Mina-DAT	eraser-OBJ	passed
‘Yengwoo passed the eraser to Mina.’			
Set 2: Subj+LOC+D.O+Verb			
Short: 3-3-3-3			
minci-ka	patak-ey	kapang-ul	nohasse.
Minci-SUBJ	floor-LOC	bag-OBJ	put
‘Minci put the bag on the floor.’			
Long: 3-4-4-5			
kemsa-ka	kyotoso-ey	totwuknom-ul	ponayperyesse.
Prosecutor-SUBJ	jail-LOC	thief-OBJ	sent
‘The prosecutor sent the thief to jail.’			

In addition to the number of syllables in each word, the initial segment of each word was controlled so that each word begins with either a sonorant segment or a lenis obstruent, segment types that are known to trigger the same tonal pattern in the intonation of Korean. According to the model of Korean Intonational Phonology developed by Jun (1993, 2000, 2005a), a word beginning with these segment types is produced with low pitch on the first syllable and high pitch on the second syllable when the word is located at the beginning of an Accentual Phrase (AP), a prosodic unit smaller than an Intonation Phrase and larger than a Word. When an AP-initial word begins with a segment not belonging to these segment types (i.e., aspirated or tense stops, or /s, h/), it is produced with high pitch on the first two syllables. Controlling the word-initial segment types allowed easier definition of the prosodic phrasing in general and was especially useful for observing the influence of focus (but not the segment) on pitch range (see Jun (to appear) for the effect of pitch range on prosodic phrasing).

The sixteen sentences [8 sentences (4 short and 4 long) × 2 constructions] were further divided into two different word-order sets as shown in (11). Each set of sixteen sentences was shuffled with 16 filler sentences with two different syntactic constructions, Subj + V and Subj + Mod + D.O + V.

The procedures used in this experiment involved the oral reading of isolated sentences visually presented on the computer monitor. Subjects read each sentence twice for the purpose of elicitation of neutral focus, and the sentence disappeared from the monitor. Then, they heard a question prompting the VP wide focus, *What did X do?*. Subjects responded to the question by supplying the sentence they had read with focus on the VP constituent. Next, subjects heard another question prompting a narrow focus (e.g., *What did X pass to Mina?*) and they responded with the same sentence, this time narrowly focusing on the corresponding constituent (e.g., *X passed the eraser to Mina*). The filler sentences were followed by a broad question, *What did you say?*, to mask the predictability of the VP- or narrow-focus questions for target sentences. The production data on narrow focus are not presented here. The first production, read twice with neutral focus, was used as control data. All readings and responses were recorded to a computer.

The experiment was conducted in two separate sessions, with an interval of at least two weeks. Each session contained one of the two experimental sets shown in (11).

Before the main experiment session, there was a practice session with six sentences which were not used in the main session.

A total of 32 sentences (16 sentences × 2 word order) were produced by four native Seoul Korean speakers (two males and two females). Pitch (f0) tracks of neutral and VP-focus productions were analyzed using *PitchWorks* (Scicon R&D). The prosodic phrasing and intonational pattern were transcribed by two of the authors adopting the Korean-ToBI (K-ToBI) conventions developed in Jun (2000). To quantify the realization of focus, *_peak* f0 value and duration were measured for each word by referring to pitch track, spectrogram, and waveform. In other words, the analysis was done phonologically (i.e., via transcription of prosodic phrasing, AP or IP) and phonetically (i.e., via measurements of pitch peaks and duration). All sentences used for the experiment are presented in an Appendix.

3. RESULTS AND DISCUSSION

Unlike (correction) contrastive focus (Jun and Lee 1998), VP focus was cued by inserting an Intonation Phrase boundary before VP and not by dephrasing after the VP-initial word. That is, the first argument in a VP often started an Intonation Phrase and the following word (the second argument in a VP) always started an Accentual Phrase and sometimes even an IP. Quantitative data from pitch peak and duration measurements confirmed the phrasing data.

3.1. Prosodic Phrasings

In the neutral condition, all speakers produced each word in an AP, [AP-AP-AP-AP]_{IP}, except for two sentences (out of 128 sentences). In those two cases, an IP boundary was produced after the first or second word. In the VP-focus condition, however, speakers showed a strong tendency to initiate a new Intonation Phrase at the left edge of VP, i.e., [AP]_{IP}-[AP-AP-AP]_{IP}. Note that the left edge of VP is the end of a subject NP. This means the subject NP was followed by an IP boundary, which is realized with significant phrase-final lengthening and an IP boundary tone. In most cases, a HL% boundary tone was used to mark the IP boundary at the end of the subject NP. Example pitch tracks and K-ToBI analysis of a sentence (12) produced in neutral and VP-focus contexts are shown in Figure 1. “Ha” in the tones tier marks the end of an AP and a % tone (“L%” or “HL%”) marks the end of an IP.

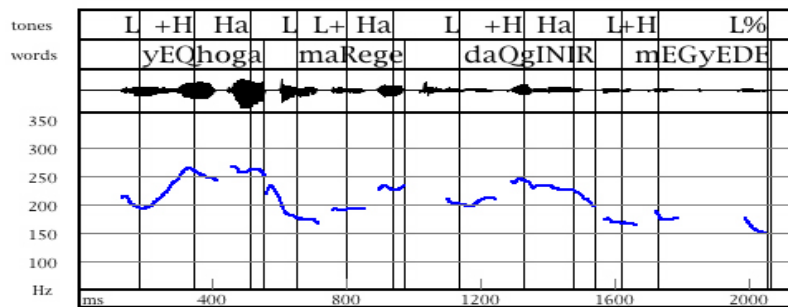
- (12) Yengho-ka mal-eykey tangkun-ul mekyesse
 YEQhoga maRege daQgINIR mEGyEDE
 Yengho-SUBJ horse-DAT carrot-OBJ fed
 ‘Yengho fed a carrot to the horse.’

As shown in Figure 1, the main difference in phrasing between the neutral condition and the VP-focus condition is the IP boundary located between the subject NP and the VP. In addition, each AP in the VP-focus condition shows a higher pitch range compared to the APs in the neutral condition (see Section 3.2 for pitch-range data).

The percentage of IP boundaries found at the left edge of each argument in the VP-focus condition for each speaker is summarized in Table 2. Data from each set are given separately. In each set, the word-order variation is shown separately.

Overall, VP-initial arguments were marked by an IP boundary more often (66% on average) than VP-medial arguments (18% on average), regardless of argument type. This pattern was true for all speakers except for Speaker M2's DO+IO order, where he produced the same percentage of IP boundaries (13%) whether the argument was VP-initial or medial. Speaker M2 also differed from others in that his phrasing was sensitive to argument type. He often employed an IP boundary at the left edge of VP when the VP-initial argument was oblique, i.e., in the (a) and (c) constructions (in 50% and 100% of cases, respectively), but much less often when the VP-initial argument was thematic, i.e., in the (b) and (d) constructions (13% and 25%, respectively).

(a) Neutral condition



(b) VP-focus condition

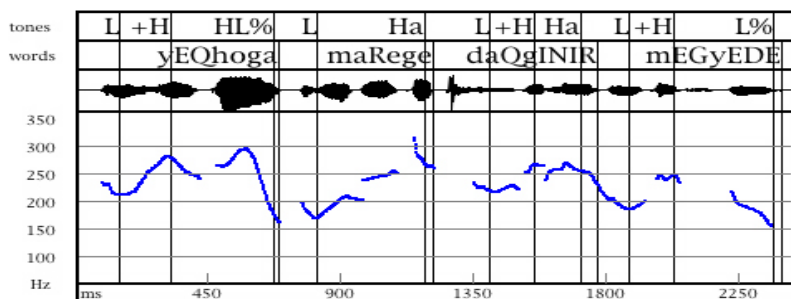


Figure 1. Pitch tracks of the sentence (12) for one female speaker (F1) in (a) neutral and (b) VP-focus conditions.

We found no clear evidence that the argument ranked higher in the ARG-ST (D.O) gets the focus over the lower ranked argument (I.O or LOC) in the VP-focus condition. As can be seen in Table 2, D.O.—the highest argument in the VP—was more likely to start a new IP only when located VP initially, as in the (b) and (d) constructions. In (a) and (c), D.O, which is not VP-initial, rarely started a new IP. On the other hand, the argument ranked lower (I.O or LOC) still started a new IP in some cases (I.O: 25–38%, LOC: 38–63%) when it was not VP-initial. This tendency was consistent across speakers except for M2. M2 rarely started a new IP when the oblique argument is VP-medial (0–13%). Instead, he maintained the AP phrasing as in the neutral condition.

Table 2. Percentage of IP boundaries at the left edge of each argument in the VP-focus condition.

Set 1:

ARG Spk\	a. S+[I.O+D.O+V]		b. S+[D.O+I.O+V]	
	I.O	D.O	D.O	I.O
M1	88%	0%	88%	38%
M2	50%	13%	13%	13%
F1	38%	0%	50%	25%
F2	50%	13%	75%	25%
Average	56.3%	6.3%	56.3%	25%

Set 2:

ARG Spk\	c. S+[LOC+D.O+V]		d. S+[D.O+LOC+V]	
	LOC	D.O	D.O	LOC
M1	75%	13%	88%	38%
M2	100%	13%	25%	0%
F1	63%	0%	100%	38%
F2	88%	0%	75%	63%
Average	81.3%	6.3%	71.9%	34.4%

Overall, speakers tended to signal the VP focus by starting a large Intonation Phrase boundary at the left edge of VP regardless of the ranking relationship between arguments. Therefore, our data do not support Chung et al.'s claim that focus projection in Korean is sensitive to the thematic rankings or syntactic relations between arguments.

In addition, no clear tendency of dephrasing after the focused items was found in the domain of VP. Only eight out of 128 sentences showed dephrasing within VP, and dephrasing occurred only in short sentences — Word 4 (the verb) was dephrased after Word 3, together forming one prosodic unit, IP or AP, separated from the VP-initial word, Word 2. We did not observe any case where the whole VP was dephrased into one IP or AP. This indicates that dephrasing is closely related to the length of the phrase as expected, and that the phrasing cues signaling VP focus are different from those signaling (corrective) contrastive focus as found in Jun and Lee (1998).

3.2 Pitch Peaks

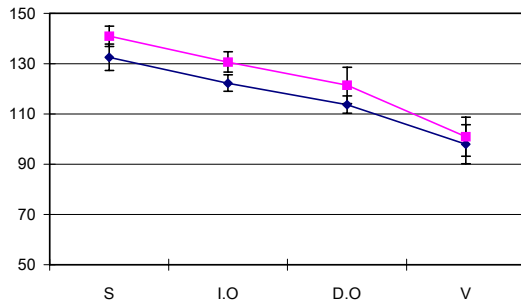
Next, we examined how speakers used pitch range cues to represent VP focus in Korean. The peak f0 value of each word (the highest f0 in each word) was measured in the neutral and the VP-focus conditions. Figure 2 shows that the first word (the Subj) has similar values in both neutral and VP-focus conditions. In the domain of VP, the f0 of each word was higher than its neutral counterpart throughout the domain or locally (i.e., for one or two words at the VP initial position).

Figure 2 shows that, for both male and female speakers, the average f0 value of the VP-initial argument (the second word in each sentence) was always higher than that of the VP-medial argument (third) regardless of argument type. These findings were consistent regardless of the order of thematic and oblique arguments.

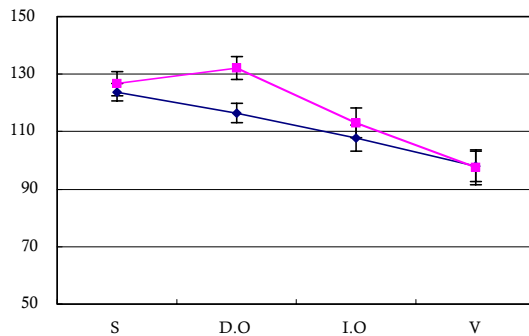
Follow-up statistical analyses obtained mixed results in showing the interaction between the focus condition and word position. In the VP-focus condition, shown in Figure 2 (i b) and (i d), male speakers produced f0 of thematic arguments (D.O) significantly higher than that of oblique arguments. However, such an effect was found only when the thematic argument was the initial constituent of the focused VP. The f0 peak of the thematic argument was lower than that of the oblique argument when the thematic argument was VP-medial, as in Figure 2 (i a) and (i c). In the female subjects' speech, f0 of thematic arguments was higher than that of oblique arguments when the thematic arguments were VP-initial, as shown in Figure 2 (ii b) and (ii d), but was not when they were VP-medial. Unlike the male speakers' data, the female speakers' thematic argument (D.O) in the VP-medial condition was similar to that of LOC (Figure 2, ii c), but this pattern is not unique to the focus condition. A similar f0 relation is shown in the neutral condition. It is possible that D.O is realized with an inherently higher pitch than LOC (it is possible that D.O might begin an intermediate phrase; see Jun, to appear) and the relation of pitch range between the arguments in the neutral condition is preserved in the VP-focus condition. However, given that the IP boundary is not more common before D.O than before LOC when D.O is VP-medial and that there is large variation in the f0 peak data, we conclude that the thematic argument is not always more prominent than the oblique argument in the VP-focus condition.

Figure 2. Average f0 peak values (in Hz) of each word in the neutral (diamond) and VP-focus (square) conditions for (i) male and (ii) female speakers. Error bars show standard error. (Figure continues overleaf.)

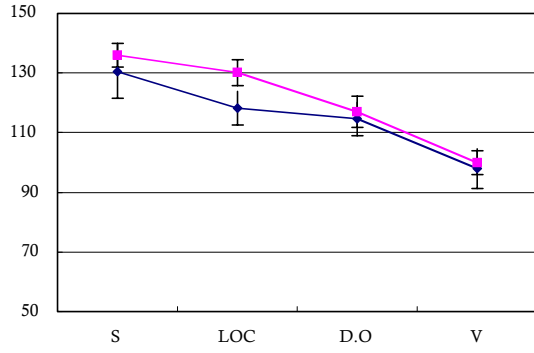
(i) Male



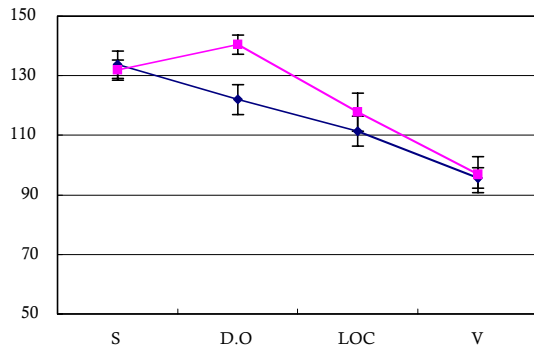
(a) S+I.O+D.O+V



(b) S+D.O+I.O+V

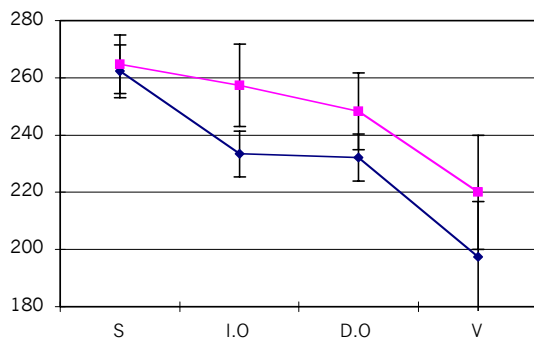


(c) S+LOC+D.O+V

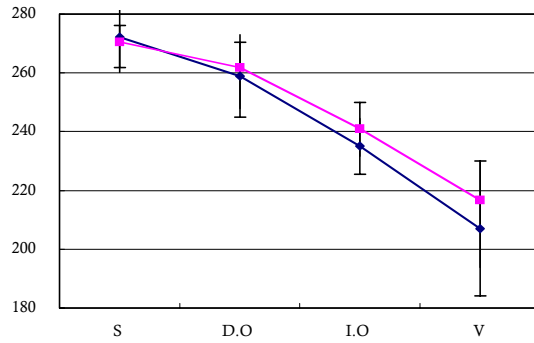


(d) S+D.O+LOC+V

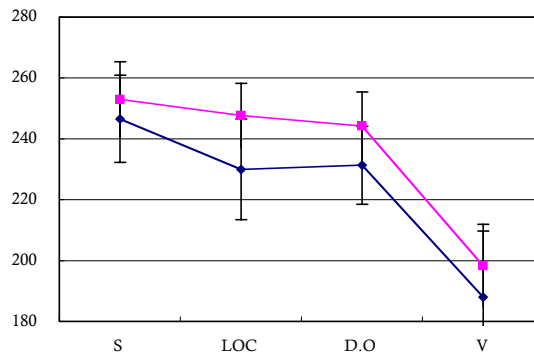
(ii) Female



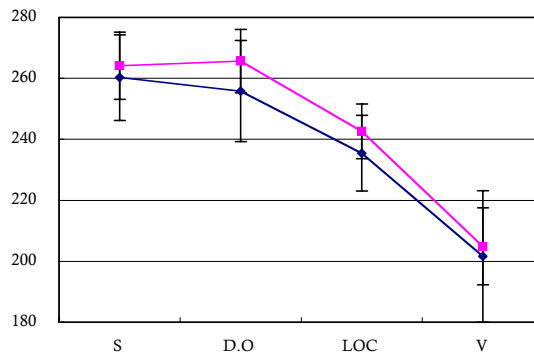
(a) S+I.O+D.O+V



(b) S+D.O+I.O+V



(c) S+LOC+D.O+V



(d) S+D.O+LOC+V

In sum, we did not find any supporting evidence that, when focused, the argument ranked higher (D.O) behaves differently from the argument ranked lower (I.O and LOC) in terms of pitch range. If there were significant influence of the thematic argument (as highest ranked non-agentive argument), its effect should have appeared even when it was located in the middle of VP, as expected from Chung et al's proposal. Our data show that, in the VP-focus condition, the pitch range of each argument (and the verb) is expanded from its neutral condition, and in general the pitch range of the VP-initial argument is expanded more than that of the second argument.

3.3 Duration

Previous studies on Korean focus found that a focused word is longer than a neutral word. In particular, Jun and Lee (1998) reported that contrastive focus is marked by the increase in duration of the initial syllable of the focused word and the decrease in duration of the post-focus words.

Table 3. Mean duration (msec) of each word in the neutral and VP-focus conditions and the difference (VP focus minus Neutral). The percentage of the duration difference relative to the neutral duration is given in parentheses.

Sentence type	Focus	Word 1	Word 2	Word 3	Word 4
(a) S+IO+DO+V	Neutral	435.4	469.4	469.9	681.2
	VP focus	494.8	521.9	480	693.8
	Difference (percentage)	59.4 ^a 13.6%	52.5 ^a 11.2%	10.1 2.1%	12.6 1.8%
(b) S+D.O+I.O+V	Neutral	420.5	505.4	431	704.9
	VP focus	505.5	576.5	451.7	727.2
	Difference (percentage)	85 ^a 20.2%	71.1 ^a 14%	20.7 4.8%	23.7 3.3%
(c) S+LOC+D.O+V	Neutral	427.3	483.2	458.2	650.5
	VP focus	546.6	517.0	472.4	708.3
	Difference (percentage)	119.3 ^a 27.9%	33.8 ^a 6.9%	14.2 3.1%	57.8 8.9%
(d) S+D.O+LOC+V	Neutral	432.5	488.2	475.5	686.1
	VP focus	514.4	564.9	468.5	709.2
	Difference (percentage)	81.9 ^a 18.9%	76.7 ^a 15.7%	-7 -1.5% ^b	23.1 3.4%

^a Significant lengthening at $p < 0.05$.

^b This negative duration is due to one subject (speaker F2) who showed very short duration of Word 3 in the focus condition probably due to dephrasing (neutral: 526.5 ms; VP focus: 411.1 ms). She was the only person who showed dephrasing in the VP focus condition. All other speakers showed lengthening in the VP-focus condition.

shows the average duration of each word in the neutral and VP-focus conditions. In general, the sentences in the VP-focus condition have greater mean durations across words. Notable differences were found in the duration of the first (Subject NP) and second (VP-initial argument) words: the first and second words in the VP-focus condition were significantly longer than those in the neutral condition (all $ps < 0.05$).

It seems that lengthening of Word 1 in the VP-focus condition is due to speakers' tendency to put an Intonation Phrase boundary at the beginning of a Verb Phrase (see Section 3.1)—that is, at the end of Word 1 (Subject NP). Recall that an IP-final syllable is substantially lengthened in Korean. The lengthening of Word 2 can be explained in the same way, i.e., the insertion of an IP boundary before Word 3 (though an IP boundary before Word 3 was less common than that before Word 2). But, it is also possible that the lengthening of Word 2 is related to the fact that this word is the first word of a focused phrase. As mentioned earlier, Jun and Lee (1998) found a substantial lengthening of the initial syllable of a focused word. They claimed that the degree of lengthening was larger than that found in the phenomenon of initial strengthening (measured in the neutral condition) described in the literature (Fougeron and Keating, 1997; Jun and Lee, 1998; Cho and Keating, 2001; Keating, Cho, Fougeron and Hsu, 2003).

Figure 3 shows the duration of the initial syllable of the second word (Word 2, the VP-initial argument) and the third word (Word 3, the second argument in VP) of the sentence in the neutral condition and the VP-focus condition. As shown in Figure 3, substantial initial lengthening was found in Word 2 in the VP-focus condition whether its argument type was oblique (I.O or LOC) or thematic (D.O). That is, the initial lengthening occurred only in the VP-initial position. This suggests that, within VP, the first argument is more prominent than the second argument in the VP-focus condition. The initial syllable of the Word 3 (the second argument in VP) also showed some tendency to lengthen when the argument type was D.O, [i.e., (a) and (c)]. However, statistical analyses showed that there was significant initial syllable lengthening in Word 2 but not in Word 3 compared to those in the neutral condition (all $ps < 0.05$ for Word 2 vs. all $ps > 0.05$ for Word 3). This suggests that in terms of duration data the VP focus is realized by focusing only the first word of a Verb Phrase in Korean.

3.4. No Focus Projection in Korean

The results of the current study suggest that the type of argument, theme or oblique, does not play a role in realizing VP focus as suggested in Engdahl and Valduvi's work or Chung et al.'s work. Our data also suggest that the most prominent word in a focused VP in Korean is the VP-initial word, instead of the VP-final word as in English (Bresnan 1971: a pitch-accented peripheral argument can project its focus to the VP). In other words, the rightmost pitch accent or the nuclear pitch-accented argument in a VP can license VP focus in English. However, the relation between the directionality of a prominent item and the domain of VP focus is not the same in

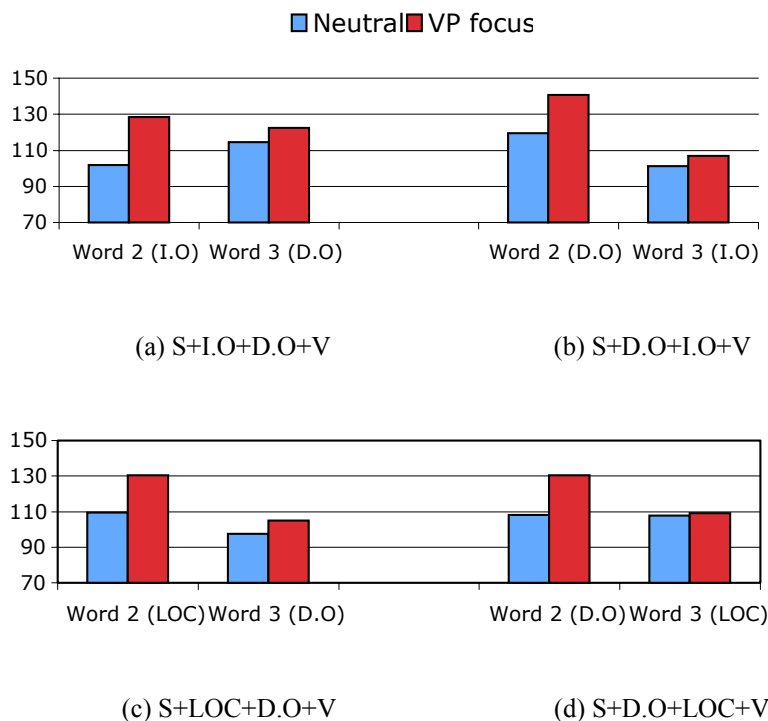


Figure 3. Duration of the initial syllable of Wd 2 (VP-init) and Wd 3 (VP-med) in the neutral & VP-focus conditions.

Korean. Though the leftmost argument in a focused VP is the most prominent in the VP, if the leftmost argument is not the only prominent word in the whole phrase—and, if it is, it is interpreted with a narrow focus on the VP-initial word [e.g., (**senmul-ul** Mary-eykey cwuesse) ‘I gave the **present** to Mary, but not other things’]. This is how we interpreted the sentence in (8b), i.e., not as a felicitous answer to a VP-focus question, and this is why we accepted the judgment of (7b) as infelicitous. To be interpreted as VP focus, each argument in the VP seems to receive prominence by starting an Intonation Phrase or an Accentual Phrase, showing expanded pitch range and increased duration, though to a lesser degree for the second argument than for the first.

This phenomenon of prominence boosting within a focused VP does not seem to be confined to an argument. As shown in (13), an adjunct becomes the most prominent (by inserting an IP break before the adjunct and by raising the pitch of the adjunct and lengthening it) if it is the first item within a focused VP. If the adjunct is the only prominent word in the whole VP, i.e., if the three words form one Accentual Phrase as in (13c), the sentence is interpreted as having a narrow focus on the adjunct. In (13), () enclose an Accentual Phrasing and { } enclose an Intonation Phrasing.

- (13) a. *Neutral, all new information:*
 {(Yengho-ka) (wusan-ulo) (Yengswu-lul)
 Yengho-SUBJ an umbrella-with Youngswu-ACC
 (millesse)}
 pushed
 ‘Yengho pushed Yengswu with an umbrella.’
- b. Q: What did Yengho do?
 A: {(Yenghoka)} {(wusanulo)(Yengswu-lul)(millesse)}
- c. {(Yenghoka)} {(wusanulo yengswulul millesse)}
 ‘Yengho pushed Yengswu **with an umbrella.**’

Therefore, the prominence relation among the items in a VP would look like (14) in the metrical grid representation. That main difference between these two types of focus is whether YP, the second item in a VP, is prominent or not. The verb (V) in a VP-focus condition may not form its own phrase, i.e., (x), if the verb forms one Accentual phrase with the preceding word in the neutral or default condition (cf. *intergrated* as in Gussenhoven 1983, Truckenbrodt 1995, Büring 2003, and references therein). This happens when the verb and the preceding word are semantically related or predictable and the phrase as a whole is not longer than seven syllables (Jun 1993, 2003). In the VP-focus condition, the prominence relations among the items in the neutral condition are preserved.

- (14)
- | | |
|--------------------|--|
| a. <i>VP focus</i> | b. <i>corrective/contrastive focus on [XP]</i> |
| x x | x x |
| x x x (x) | x x |
| x x x (x) | x x (x) (x) |
| SUBJ [XP] YP V] | SUBJ [XP] YP V |

Though the directionality or headedness of the prominent peak is different between English and Korean, what is common in these two languages is that the focused

word/phrase is the most prominent in a phrase/sentence. That is, no items following focus are more prominent than the focused item (see Truckenbrodt 1995 and Büring 2003 for the formalization of focus prominence). As proposed in Büring (2003), focus projection rules can be replaced by the combination of focus prominence and default prosody (i.e., default accent patterns in English or default phrasing in Korean). We expect that languages behave differently depending on whether they are head-prominence languages (e.g., English, German) or edge-prominence languages (e.g., Japanese, Bengali) (Pierrehumbert and Beckman 1988, Hayes and Lahiri 1990, see Jun 2005b for the typology of prominence system). It seems that, in the default prosody, head-prominence languages tend to show right-headedness and edge-prominence languages tend to show left-headedness. Further research is needed to find out how focus prominence interacts with language-specific default prosody and prominence systems.

4. CONCLUSION

Taken together, the results found in the current study do not support the claim that argument types play an important role in focus projection in Korean. We found that VP focus was in general marked by emphasizing both arguments within the VP, with more emphasis on the VP-initial words. More specifically, VP focus was marked by initiating a large Intonation Phrase boundary at the beginning of the VP, raising the pitch range of the VP-initial word, and by extra-strengthening of VP-initial syllables. We observed that these phonetic (f_0 peak, word duration) and phonological (prosodic phrasing) markers of focus were found the same regardless of the argument type or the order of arguments. That is, both thematic and oblique arguments behaved the same way under VP focus. Therefore, we conclude that the effect of argument ranking on the domain of focus projection proposed in Chung et al. does not have any phonetic correlates. The validity of Vallduvi and Engdahl's Information Packaging theory should be evaluated further by examining experimental data from more languages. It is suggested that the focus projection principles proposed by Selkirk and other researchers to explain data in English and other Germanic languages may not apply similarly to languages whose prosodic system is not built on the stress-based pitch accent. The current data support Büring's (2003) proposal that focus projection rules can be dispensed with. Further studies are needed to examine experimental data on how the domain of focus interacts with the prosodic system of a language and the informational status (new or given) of a word.

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APPENDIX

Set 1: NP[Agent], NP[Theme], NP[Goal]: 8 Sentences × 2 Word Orders

3-3-3-3

직원이 곰에게 먹이를 주었어.

cikwen-i kom-eykey meki-lul cuesse
staff+SUBJ bear+DAT meal+ACC give+PAST
'The staff fed a meal to a bear.'

간첩이 적에게 지도를 넘겼어.

kanchep-i cek-eykey cito-lul nemkyesse
spy+SUBJ enemy+DAT map+ACC hand over+PAST
'The spy handed over the map to the enemy.'

영호가 말에게 당근을 먹였어.

yengho-ka mal-eykey tangkun-ul mekyesse
Yengho+SUB horse+DAT a carrot+ACC feed+PAST
'Yengho fed a carrot to the horse.'

언니가 뱀에게 다리를 물렸어.

enni-ka paym-eykey tali-lul mullyesse
older sister+SUBJ snake+DAT leg+ACC be bitten+PAST
'My older sister was bitten on her leg by a snake.'

3-4-4-5

민우가 누나에게 인절미를 나눠주었어.

Minwu-ka nwuna-eykey incelmi-lul nanwecwuesse
Minwu+SUBJ older sister+DAT rice cake+ACC share+PAST
'Minwu shared Inzelmi (a Korean rice cake) with his older sister.'

영우가 미나에게 지우개를 건네주었어.

yengwu-ka mina-eykey ciwukay-lul kenneycwuesse
Yengwu+SUBJ Mina+DAT eraser+ACC pass+PAST
'Youngwu passed the eraser to Mina.'

엄마가 아들에게 반바지를 입혀주었어.

emma-ka atul-eykey panpaci-lul iphyecwuesse
Mom+SUBJ son+DAT short pants+ACC dress+PAST
'The mother helped her son to put on his shorts.'

동생이 언니에게 자전거를 빌려주었어.

tongsayng-i enni-eykey cacenke-lul pillyecwuesse
younger sibling+SUBJ older sister+DAT bike+ACC lend+PAST
'The younger sister lent a bike to her older sister.'

Set 2: NP[Agent], NP[Theme], NP[Loc]: 8 Sentences × 2 Word Orders

3-3-3-3

영미가 지갑에 동전을 넣었어.

yengmi-ka cikap-ey tongcen-lul nehesse
 Yengmi+SUBJ purse+LOC coin+ACC put+PAST
 ‘Yengmi put coins in her purse.’

엄마가 마당에 고추를 널었어.

emma-ka matang-ey kochwu-lul nelesse
 Mom+SUBJ ground+LOC red peppers+ACC spread+PAST
 ‘The mother spread red peppers out in the yard to dry.’

아빠가 군대에 아들을 보냈어.

appa-ka kuntay-ey atul-ul ponaysse
 Dad+SUBJ army+LOC son+ACC send+PAST
 ‘The father sent his son to the army.’

민지가 바닥에 가방을 놓았어.

minci-ka patak-ey kapang-ul nohasse
 Minci+SUBJ floor+LOC bag+ACC put+PAST
 ‘Minci put the bag on the floor.’

3-4-4-5

엄마가 냉장고에 고등어를 넣어두었어.

emma-ka nayngcangko-ey kotunge-lul nehetwuesse
 Mom+SUBJ refrigerator+LOC mackerel+ACC put+PAST
 ‘The mother put the mackerel in the refrigerator.’

미리가 바구니에 고구마를 집어넣었어.

mili-ka pakwuni-ey kokwuma-lul cipenehesse
 Mili+SUBJ basket+LOC sweet potato+ACC put+PAST
 ‘Mili put sweet potatoes in the basket.’

예나가 의자위에 도시락을 올려놓았어.

yena-ka uycawi-ey tosilak-ul ollyenohasse
 Yena+SUBJ chair+DAT lunch box+ACC put+PAST
 ‘Yena put her lunch box on the chair.’

검사가 교도소에 도둑놈을 보내버렸어.

kemsa-ka kyotoso-ey totwuknom-ul ponaypyesse
 Prosecutor+SUBJ jail+DAT thief+ACC send+PAST
 ‘The prosecutor sent the thief to jail.’