

Contrastive Focus Facilitates Scrambling in Korean Sentence Processing

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1. Introduction

Much research has demonstrated a parsing preference for simpler syntactic structures over more complex ones. This predicts that parsers choose *in situ* analyses over scrambling analyses, and prefer short-distance to long-distance scrambling when both analyses are available (e.g., Clifton & Frazier 1989). However, in this study, we report two experiments on Korean showing that contrastive focus can lead parsers to prefer a more complex scrambling analysis to a syntactically simpler *in situ* analysis.

Scrambling has often been discussed in syntactic and processing literature. In syntactic research, it has been suggested that contrastive focus is associated with a scrambled phrase (Moltmann 1990, among others). Contrastive focus is typically distinguished from information focus. For an instance, Kiss (1998) claimed that INFORMATION FOCUS merely conveys non-presupposed (new) information whereas CONTRASTIVE FOCUS expresses an operation similar to quantification. The Korean focus particle *-man* is 'contrastive' in the sense of Kiss (1998) since the particle presupposes a refer-

ence set and contrasts one entity with the rest of the set. This is shown in sentence (1).

- (1) Swu-man ku seymina swuep-ey tuleka-ss-e.
Swu-ONLY that seminar class-LOC enter-PST-DC
'Only Swu entered that seminar class (among, e.g., the students who registered for the class).'

This sentence literally means 'Only Swu entered that seminar class', but it implies a reference set, such as a set of students who registered for the class, and 'Swu' is contrasted with the rest of the reference set.

Now let us consider an ambiguity involving the Korean dative marker *-eykey* 'to_{DAT}'. This is exemplified in (2).

- (2) Swu-nun Chaymin-eykey Minhok-chayk-ul cwu-ess-ta-ko
Swu-TOP Chaymin-TO Minhok-NOM book-ACC give-PST-QUOT
malhay-ss-ta.
say-PST-DC.
a. 'Swu told Chaymin that Minhok gave (someone) a book.'
b. 'Swu said that Minhok gave a book to Chaymin.'

The *-eykey* phrase in (2) is ambiguous between matrix association and embedded association, as with Japanese *-ni* (e.g., Aoshima et al. 2004). In interpretations like (2a), the *-eykey* phrase is interpreted in the matrix clause as an addressee and an argument of the matrix verb *malha-* 'to say', and is accordingly assumed to be in its canonical position. In contrast, in (2b), the *-eykey* phrase is interpreted as the goal argument of the embedded verb *cwu-* 'to give,' and thus is assumed to have scrambled out of the embedded clause.

In (3), the contrastive focus particle *-man* is attached to the *-eykey* phrase. Sentence (3) is also ambiguous in that it could be interpreted as either (3a) or (3b), in parallel to (2a) and (2b).

- (3) Swu-nun Chaymin-eykey-man Minhok-chayk-ul
Swu-NOM Chaymin-TO-ONLY Minhok-NOM book-ACC
cwu-ess-ta-ko malhay-ss-ta.
give-PST-QUOT say-PST-DC.
a. 'Swu told only Chaymin that Minhok gave a book.'
b. 'Swu said that Minhok gave a book only to Chaymin.'

Although (2) and (3) are structurally ambiguous in the same way, we predicted that comprehenders would have different preferences when they interpreted the two sentences. Specifically, if contrastive focus is associated with scrambling, parsers will have a stronger preference for interpreting the

-*eykeyman* phrase in (3) as scrambled than *in situ*, compared with the -*eykey* phrase in (2).

One way of testing whether there are different preferences for interpreting the -*eykey* (*man*) phrases is to look for a *Filled-Gap Effect* (e.g., Aoshima et al. 2004). Filled-Gap Effects occur when a moved phrase (a filler) cannot be associated with its canonical position (the gap) because another phrase fills that position. A filled gap usually results in comprehension difficulty, which can be observed through effects such as longer reading times in the filled gap region. Let us first compare (4a) and (4b).

- (4) a. Swu-nun *Chaymin-eykey* Minhø-ka *Swuni-eykey* chayk-ul
Swu-TOP *Chaymin*-TO Minhø-NOM *Swuni*-DAT book-ACC
cwu-ess- ta-ko malhay-ss-ta.
give-PST-QUOT say-PST-DC.
'Swu told Chaymin that Minhø gave a book to Swuni.'
- b. Swu-nun *Chaymin-eykey-man* Minhø-ka *Swuni-eykey* chayk-ul
Swu-TOP *Chaymin*-TO-MAN Minhø-NOM *Swuni*-DAT book-ACC
cwu-ess-ta-ko malhay-ss-ta.
give-PST-QUOT say-PST-DC.
'Swu told only Chaymin that Minhø gave a book to Swuni.'

If a parser initially interprets the first dative-marked phrase *Chaymin-eykey* (*man*) '(only) to Chaymin' in (4a) or (4b) as being scrambled out of the embedded clause, the parser will try to find the gap in which the dative-marked phrase was base-generated or licensed thematically and will postulate one within the embedded clause. Previous research has demonstrated that such calculations happen quite rapidly, likely beginning during the processing of the nominative-marked phrase (*Minhø-ka*) that provides evidence for an embedded clause. Therefore, the parser is predicted to show a filled-gap effect by slowing down at the second dative-marked phrase *Swuni-eykey* 'to Swuni', since this phrase fills the postulated gap and blocks the association of the first dative-marked phrase to the embedded clause.

While both (4a) and (4b) may involve a filled-gap effect, they are different in that parsers may have a stronger preference for interpreting the first dative-marked NP as being scrambled out of the embedded clause in (4b) than in (4a) because of the addition of the contrastive focus marker. Therefore, we predicted more processing difficulty at the second dative phrase in (4b) than in (4a). This prediction was tested in Experiment 1.

2. Experiment 1: Self-Paced Reading

Target sentences such as (5) were developed and reading times were measured at the second dative NP (region 5) (each region is marked with

slashes). Two factors were manipulated: the position of the dative *-eykey* phrase (dative-first vs. dative-second) and contrastive focus (focused vs. nonfocused). The dative phrase was the first phrase of the sentence in the dative-first condition whereas it was the second phrase of the sentence in the dative-second condition. The dative phrase had the focus marker *-man* in the focused condition, but the focus marker did not appear in the nonfocused condition.

- (5) a. Focused, Dative-Second
 [NP-top/**NP-dat-MAN**/NP-nom/adverb/NP-dat...]
 yepcip halmeni-nun/yecaai-eykey-man/emeni-ka/onul achim/
 neighbor grandmother-TOP/girl-TO-ONLY/mother-NOM/this morning/
 apeci-eykey/tosilak-ul/kenneycwu-ess-ta-ko/malhay-ss-ta.
 father-TO/lunch.box-ACC/pass-PST-DEC-QUOT/say-PST-DEC
 ‘The elderly neighbor told only the girl that (her) mother gave a
 lunchbox to (her) father this morning.’
- b. Focused, Dative-First
 [**NP-dat-MAN**/NP-top/NP-nom/adverb/NP-dat...]
 yecaai-eykey-man/yepcip halmeni-nun/ emeni-ka/onul achim/
 girl-TO-ONLY/neighbor grandmother-TOP/mother-NOM/this morning/
 apeci-eykey/tosilak-ul/kenneycwu-ess-ta-ko/malhay-ss-ta.
 father-TO/lunch.box-ACC/pass-PST-RC-NML-ACC/see-PST-DEC
 ‘Same as (5a).’
- c. Nonfocused, Dative-Second
 [NP-top/**NP-dat**/NP-nom/adverb/NP-dat...]
 yepcip halmeni-nun/yecaai-eykey/emeni-ka/onul achim/
 neighbor grandmother-TOP/girl-TO/mother-NOM/this morning/
 apeci-eykey/tosilak-ul/kenneycwu-ess-ta-ko/malhay-ss-ta.
 father-TO/lunch box-ACC/pass-PST-DEC-QUOT/say-PST-DEC
 ‘The elderly neighbor told the girl that (her) mother gave a
 lunchbox to (her) father.’
- d. Nonfocused, Dative-First
 [**NP-dat**/NP-top/NP-nom/adverb/NP-dat...]
 yecaai-eykey/yepcip halmeni-nun/emeni-ka/onul achim/
 girl-TO/neighbor grandmother-TOP/mother-NOM/this morning/
 apeci-eykey/tosilak-ul/kenneycwu-ess-ta-ko/malhay-ss-ta.
 father-TO/lunch box-ACC/pass-PST-DEC-QUOT/say-PST-DEC
 ‘Same as (5c).’

When readers encountered the first dative-marked NP at region 2 in the nonfocused dative-second condition such as (5c), they were predicted to associate it with the matrix clause because that is the canonical position for

the dative-marked noun phrase in a mono-clausal analysis (Miyamoto & Takahashi 2002) and there is no reason to build up a bi-clausal analysis at this moment (e.g., Frazier 1978). However, at region 3, parsers should find that the sentences are bi-clausal and at this moment, they may (or may not) choose to revise the structure to associate the first dative NP with the embedded clause. At region 5, they encounter the second dative-marked NP. If they had chosen to reanalyze the structure to associate the first dative NP with the embedded clause at region 3, they will encounter difficulty in integrating the second dative NP into the embedded clause. If they had not revised the structure and kept the initial analysis in which the first dative NP is associated with the matrix clause, they will not run into any difficulty in interpreting the second dative NP, because it can be quickly associated with the embedded clause. We predicted that there would not be a strong tendency for embedded associations in the nonfocused dative-second condition, but that the presence of contrastive focus would increase such interpretations in the focused dative-second condition.

In the dative-first conditions, there should be a strong preference for matrix association given that parsers prefer short-distance scrambling to long-distance scrambling. Therefore, we predicted short reading times in both dative-first conditions.

To sum up, we predicted that a stronger filled-gap effect (slower reading times) would appear at region 5 for the focused dative-second condition than for the nonfocused dative-second, the focused dative-first, and the non-focused dative-first conditions.

2.1 Participants

Forty Korean native speakers from University of Hawai'i at Mānoa community participated in the experiment. They were recruited by posters and solicitation and paid five dollars for participating. All gave informed consent.

2.2 Materials

As described above, the critical materials manipulated the position of the dative NP (dative-first or dative-second) and the presence of the focus marker *man* 'only', resulting in four conditions. Twenty-eight sets of target sentences like those shown in (5) were used in the experiment.

Four presentation lists were constructed to distribute these twenty-eight sets of stimuli. Within a presentation list, fourteen of the target trials had the dative phrase as the second phrase in the sentence and fourteen had the dative phrase as the first phrase in the sentence. For each of these word orders, seven appeared with the focus marker *man* 'only' and seven appeared without the focus marker. Each target item was then rotated through the four

conditions, so that each item appeared in only one condition in each list but in all four conditions across lists.

Forty-eight filler sentences composed of two types of constructions were used to divert subjects' attention from the goal of the experiment. Filler sentences were similar in length and complexity to the critical items. The twenty-eight target sentences were randomly ordered with the forty-eight filler sentences for presentation to the participants.

2.3 Procedure

The experiment began by introducing participants to the format of the experiment through a screen of instructions. This was followed by six practice trials. For the experiment, each subject read sentences that were presented on a Macintosh computer screen, in a self-paced reading task. The experiment was programmed and run by PsyScope and the reading times were recorded through a button box. Subjects initiated a trial by pressing a yellow button on the button box. Participants were instructed to read through each sentence, phrase by phrase, by pressing the yellow button each time they were ready for the next phrase-sized portion of the sentence. The sentences were presented in a non-cumulative way: when a participant pressed the button, the phrase that was just displayed disappeared, and the following phrase appeared to the immediate right of the previous phrase on the monitor. Each sentence was composed of eight regions. Participants were encouraged to read sentences at a natural pace. At the end of each sentence, participants responded to a comprehension question by pressing buttons marked "yes" or "no" on the button box. The experiment lasted approximately twenty-five minutes.

2.4 Data Analysis

The primary dependent measure was reading time. The raw reading times (per region) were trimmed in the following way. For each region (combining all the conditions), the mean reading time and the SD (Standard Deviation) were computed for each subject. Reading times that were more than two and a half (2.5) SDs away from the mean were replaced with the mean plus or minus two and a half (2.5) SDs. This resulted in the replacement of less than 3% of the data.

2.5 Results

Table 1 and Figure 1 show the reading times for each region and condition. Figure 2 shows the reading times for region 5, the critical region.

TABLE 1. Reading times for Experiment 1

Condition	1	2	3	4	5	6	7	8
focused-dative 2 nd	1357	1441	1363	1365	876	723	781	818
focused-dative 1 st	1381	1912	1417	1372	800	687	756	794
nonfocused-dative 2 nd	1355	1477	1345	1315	840	662	766	733
nonfocused-dative 1 st	1410	1894	1375	1310	819	696	718	706

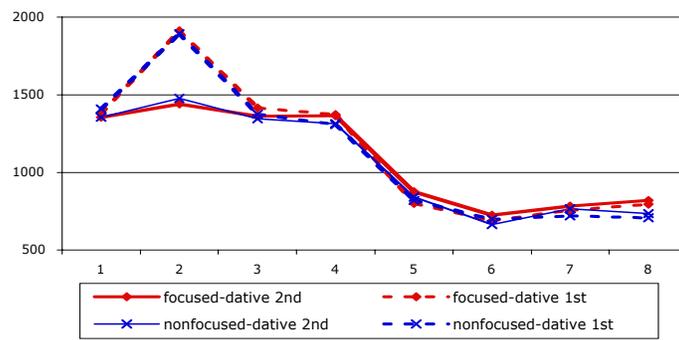


FIGURE 1. Reading times for Experiment 1

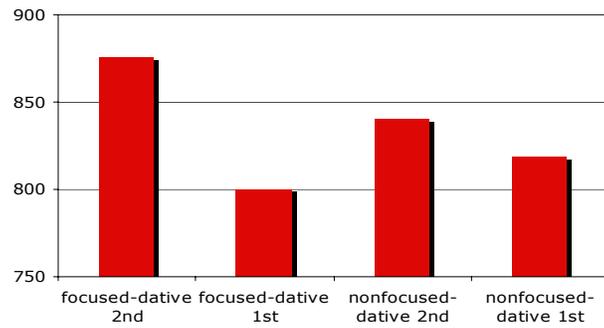


FIGURE 2. Reading times at region 5 for Experiment 1

There were no effects at region 1. At region 2, there was a main effect of word order: dative-second sentences were read significantly faster than

dative-first sentences, which at this point could be identified as having scrambling ($F_1(1, 39) = 11.01, p < .01$; $F_2(1, 27) = 22.62, p < .01$). There were no other significant effects for region 2. There were also no effects at regions 3 and 4. Recall that region 5 was the critical region where participants encountered the second dative-marked phrase. There was a significant main effect of the position of the dative NP in the participant analysis ($F_1(1, 39) = 5.88, p < .02$), but not in the item analysis ($F_2(1, 39) = 1.72, p < .20$). The dative-first conditions were read significantly faster than the dative-second conditions in the participant analysis. Pairwise comparisons showed that within the focused conditions, the dative-first condition was read significantly faster than the dative-second condition ($F_1(1, 39) = 5.75, p < .02$; $F_2(1, 27) = 3.55, p < .07$). There were no other significant effects.

There were no significant effects at region 6, although the pattern of means was similar to that of region 5, suggesting possible "spillover" of processing difficulty. When region 6 was collapsed with region 5, there was again a significant effect of the position of the dative NP in the participant analysis ($F_1(1, 39) = 5.03, p < .04$), but not in the item analysis ($F_2(1, 27) = 1.15, p < .3$). The dative-first conditions were read significantly faster than the dative-second conditions in the participant analysis. Pairwise comparison showed that within the focused conditions, the dative-first condition was again read significantly faster than the dative-second condition ($F_1(1, 39) = 5.01, p < .03$; $F_2(1, 27) = 3.12, p < .09$). More crucially, within the dative-second conditions, the nonfocused condition was read marginally faster than the focused condition in the participant analysis ($F_1(1, 39) = 3.31, p < .08$), but not in the item analysis ($F_2 < 1$).

At region 7, there was an almost significant main effect of the position of the dative NP in the participant analysis ($F_1(1, 39) = 3.36, p < .08$), but not in the item analysis ($F_2 < 1$). Finally, there was a main effect of focus at region 8 in the participant analysis ($F_1(1, 39) = 7.91, p < .01$), but not in the item analysis ($F_2 < 1$).

2.6 Discussion

Overall, the pattern of the results was partially consistent with the predictions. Regarding short- versus long-distance scrambling, there was a main effect of the position of the dative phrase: the dative-first conditions were read faster than the dative-second conditions at region 5. This suggests that the parser associated the first *-eykey* phrase with the matrix clause more frequently in the dative-first conditions than in the dative-second conditions and that short-distance scrambling was preferred to long-distance scrambling in the dative-first conditions.

As for the effect of contrastive focus on scrambling, the focused dative-second condition had only numerically longer reading times than the nonfo-

cused dative-second condition at region 5, although the effect approached significance in the participant analysis when region 5 was collapsed with region 6. However, reading times provide only an indirect measure of interpretation. Further, the design of Experiment 1 forced a complex processing pattern in which a filled-gap effect would only occur if reanalysis happened twice: first when the embedded clause was discovered, and again at the position of the embedded dative phrase. Since all of the critical sentences resolved to matrix association of the first dative phrase, the experimental situation may have biased readers against performing the first reanalysis that allows embedded clause association. These limitations in Experiment 1 motivated Experiment 2. A sentence completion task was chosen for Experiment 2 to see how participants interpret focused versus nonfocused dative phrases when they were free to construct continuations of the sentences.

3. Experiment 2: Sentence Completion

Experiment 2 investigates whether participants associate the dative NP with the matrix or the embedded clause as evidenced by their unconstrained sentence completions. Participants were provided with the first four phrases of the sentences used for Experiment 1, and asked to complete sentence fragments to make a sentence. A set of example stimuli is shown in (6). As in Experiment 1, dative-second versus dative-first word order was crossed with the presence or absence of the focus marker.

- (6) a. Focused, Dative-Second
 [NP-top **NP-dat-MAN** NP-nom adverb]
 halmeni-nun yeca ai-eykey-man emeni-ka onul achim...
 grandmother-TOP girl-TO-ONLYmother-NOM this morning
- b. Focused, Dative-First
 [**NP-dat-MAN** NP-top NP-nom adverb]
 yeca ai-eykey-man halmeni-nun emeni-ka onul achim...
 girl-TO-ONLY grandmother-TOP mother-NOM this morning
- c. Nonfocused, Dative-Second
 [NP-top **NP-dat** NP-nom adverb]
 halmeni-nun yeca ai-eykey emeni-ka onul achim ...
 neighbor grandmother-TOP girl-TO mother-NOM this morning
- d. Nonfocused, Dative-First
 [**NP-dat** NP-top NP-nom adverb]
 yeca ai-eykey halmeni-nun emeni-ka onul achim ...
 girl-TO neighbor grandmother-TOPmother-NOM this morning

Within the dative-first conditions, it was predicted for both focus conditions that the first dative NP would be matrix-associated and thus interpreted as being scrambled out of the matrix clause rather than out of the embedded clause because parsers prefer short-distance scrambling to long-distance scrambling. If scrambling is understood as movement, scrambling creates a filler-gap dependency. Thus, parsers will try to resolve the filler-gap dependency as quickly as possible (Clifton & Frazier 1989), creating a preference for short-distance scrambling.

Within the dative-second conditions, it was predicted that the focused dative NP in (6a) would be more frequently assigned an embedded association – scrambled out of the embedded clause – than the nonfocused dative NP in (6c), given that contrastive focus is associated with scrambling. Therefore, we predicted that there should be more embedded clause associations for the focused dative-second condition than the other three conditions.

3.1 Participants

Twenty Korean native speakers were recruited by posters and solicitation for the experiment. All of the participants were students of the University of Hawai'i at Mānoa. Subjects were paid ten dollars to do this and two other experiments.

3.2 Materials and Design

Sixteen sets of sentences were chosen from the critical items in Experiment 1. As mentioned above, these materials manipulated the presence of the (contrastive) focus marker *man* 'only' and the position of dative NP (dative-second or dative-first) in the same way as Experiment 1, resulting again in four conditions. In Experiment 2 we provided participants with only four regions, consisting of region 1 through region 4 of Experiment 1, as shown above in (6). These fragments were randomly interspersed with thirty-two filler fragments (from the fillers used in Experiment 1) to prevent participants from noticing the goal of the experiment and to avoid effects of syntactic priming, which might lead participants to repeat a syntactic structure across trials.

Four presentation lists were constructed by randomly combining the sixteen target sentences with thirty-two filler sentences. Within a presentation list, eight of the target trials contained the dative phrase as the second phrase of the sentence and eight contained the dative phrase as the first phrase of the sentence. For each of these word order patterns, four appeared with the focus marker *man* 'only' and four appeared without it. Each target item was then rotated through these four conditions, generating four different presentation lists.

3.3 Procedure

Participants in Experiment 2 were given a four-page set of test sentence fragments and asked to complete the sentence fragments as quickly as possible. Participants were tested individually. The experiment took approximately twenty-five minutes.

3.4 Data Analysis

This study yielded a total of 320 codable sentence fragment completions, which were classified by the first author and a second coder into six (6) categories according to the association of the first dative NP: unambiguously matrix clause association (UM), unambiguously embedded clause association (UE), matrix-biased association (BM), embedded-biased association (BE), ambiguous between matrix and embedded association (AA), and others (OT). Completions were classified as unambiguously matrix (UM) if the embedded clause had a second dative NP, or if the construction was mono-clausal. Completions were classified as unambiguously embedded (UE), if the matrix verb could not take a dative NP as its argument whereas the embedded verb could. Completions were classified as matrix-biased (BM) if the dative NP was more naturally associated with the matrix verb rather than with the embedded verb. Completions were classified as embedded-biased (BE) if the dative NP was more naturally associated with the embedded verb than with the matrix verb. If the dative NP was naturally associated to an equal degree with both the matrix verb and the embedded verb, the completions were classified as ambiguous (AA). Finally, if completions were ungrammatical or not complete, they were classified as other (OT).

3.5 Results

The results are shown in Table 2 and 3 and Figure 3. Table 2 shows the percentages of completions for each of the six categories. Table 3 shows collapsed percentages of matrix/embedded clause association, ambiguity, and other. Figure 3 shows the collapsed percentages of matrix/embedded clause association.

Overall the numbers of completions for matrix clause association were higher than for embedded clause association, showing participants' preference for simpler completions. However, the number of matrix clause associations varied across the four conditions as predicted. In particular, the focused dative-second condition triggered more embedded completions than any of the other three conditions, as predicted. When unambiguously matrix (UM) completions were collapsed with matrix-biased (BM) completions

and unambiguously embedded (UE) completions with embedded-biased (BE) completions, a clearer picture of parsers' preferences emerged (Table 3 and Figure 3). Thirty-six percent (36%) of the trials in the focused dative-second condition were completed with an embedded association whereas only eleven percent (11%) of the nonfocused dative-second condition, eight percent (8%) of the focused dative-first condition, and one percent (1%) of the nonfocused dative-first condition were associated with the embedded clause.

TABLE 2. Percentages of completion type for Experiment 2

Condition	UM	UE	BM	BE	AA	OT
focused-dative 2nd	48	20	4	16	13	0
focused-dative 1st	81	5	6	3	5	0
nonfocused-dative 2nd	74	9	3	3	13	0
nonfocused-dative 1st	78	1	13	0	8	1

TABLE 3. Collapsed percentages of completion types for Experiment 2

Condition	Matrix	Embedded	Ambiguous	Others
focused-dative 2nd	51	36	13	0
focused-dative 1st	88	8	5	0
nonfocused-dative 2nd	76	11	12	0
nonfocused-dative 1st	90	1	8	1

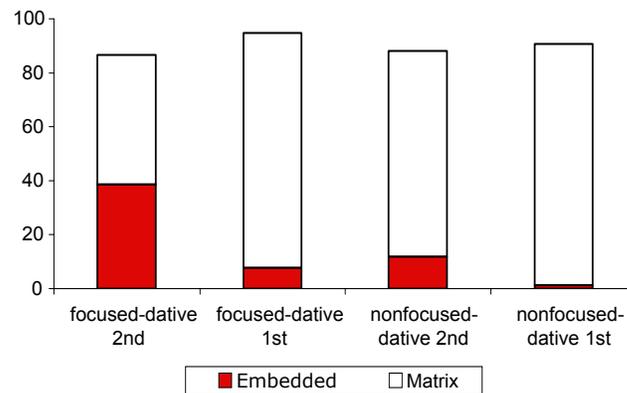


FIGURE 3. Percentages of matrix and embedded clause associations for Experiment 2

Repeated measure ANOVAs, computed on arcsine-transformed proportions of main clause completions, by participants and items, and of embedded clause completions, by participants and items, were conducted. Only the results computed on embedded clause association are reported because both show the same phenomenon from different perspectives. There were significant main effects of the presence of the focus marker *man* ‘only’ ($F_1(1, 19) = 30.53, p < .01$; $F_2(1, 15) = 11.67, p < .01$) and the position of the dative NP ($F_1(1, 19) = 19.96, p < .01$; $F_2(1, 15) = 21.51, p < .01$). Furthermore, the interaction of focus and the position of the dative NP was also significant ($F_1(1, 19) = 5.70, p < .03$, $F_2(1, 15) = 6.39, p < .02$). Pairwise comparisons showed that within the dative-second conditions, the focused condition produced more embedded clause associations than the nonfocused condition ($F_1(1, 19) = 18.67, p < .01$; $F_2(1, 15) = 16.66, p < .01$) as expected; within the dative-first conditions, the focused condition produced more associations with embedded clauses than the nonfocused condition in the participant analysis ($F_1(1, 19) = 4.59, p < .05$), but not in the item analysis ($F_2(1, 15) = 2.27, p < .16$).

3.6 Discussion

The main finding of this experiment was that the focused dative-second condition led participants to complete the sentence fragments by associating the dative (*-eykey*) phrase with the embedded clause more frequently than the other conditions. This result was predicted given that contrastive focus is associated with scrambling.

The focused dative-second condition showed a higher percentage (36%) of embedded completion relative to its nonfocused counterpart (11%), suggesting that parsers interpreted the focused dative (*-eykey*) phrase as being scrambled rather than *in situ* more frequently than the nonfocused dative (*-eykey*) phrase. Whereas Experiment 1 showed that there was a numerical but not significant difference between the focused dative-second condition and the nonfocused dative-second condition, the results from Experiment 2 confirmed that there was a significant difference between the two conditions with respect to parsers’ preference in associating the *-eykey* phrase with the embedded clause.

Within the dative-first conditions, parsers associated the *-eykey* phrase with the embedded clause in the focused condition (8%) more frequently than in the nonfocused condition (1%), which suggests that parsers chose the long-distance scrambling analysis over the short-distance scrambling analysis more frequently in the focused condition than in the nonfocused condition.

4. General Discussion

The results described above show that contrastive focus increases the parser's likelihood of choosing a scrambling analysis over an *in situ* analysis when both options are possible. This is surprising if we consider that the scrambling analysis is more complex than the *in situ* analysis and that the parser is known to choose a simpler analysis over a more complex analysis. However, given that contrastive focus is associated with scrambling, we predict that the parsers interpret a contrastively focused phrase as scrambled more frequently than they interpret a nonfocused phrase as scrambled. Thus, our study provides evidence that contrastive focus is not only associated with scrambling but also facilitates a scrambling analysis.

Assuming that readers impose prosody on written text as they process it, our results may support an idea put forward by Jun (2002, 2003). It is known that a focused word begins a new prosodic phrase in languages such as Korean and French (Jun 2002, 2003). Jun (2002, 2003) claims that focus often dephrases, i.e., deletes a prosodic phrase boundary, and deaccents words after focus. This predicts that a parser will associate an *-eykey* phrase with the embedded clause in (7a) more frequently than in (7b).

- (7) a. Swu-nun [Chaymin-eykey-**man** †*Minho-ka*...
Swu-top Chaymin-dat-**only** *Minho-nom*...
- b. Swu-nun [Chaymin-eykey [*Minho-ka*...
Swu-top Chaymin-dat *Minho-nom*...

The *-eykeyman* phrase in (7a) begins a new prosodic phrase because it has a focus particle and is thus in focus. *Minho-nom* also begins a new prosodic phrase since a nominative-marked phrase usually begins a new clause, which aligns with a prosodic boundary, too. However, the prosodic boundary marked by *Minho-nom* in (7a) is reduced due to the dephrasing effect of the focused phrase *Chaymin-dat-only*. This leads the parser to associate the *-eykey* phrase with the embedded clause rather than the matrix clause, because the *-eykey* phrase is in the same prosodic phrase as the embedded clause. This, in turn, causes the parser to choose the scrambling analysis over the *in situ* analysis. In contrast, the *-eykey* phrase in (7b) does not have the focus particle. Thus, the parser is not motivated to associate the ambiguous *-eykey* phrase with the embedded clause to the same extent as in (7a). Rather, the parser prefers a matrix association to its embedded counterpart, given that the former is a simpler analysis (Koh 1997).

Our results provide empirical evidence that a certain information structure licenses scrambling more easily. It has been found that discourse-prominent items such as given information and contrastive focus can scramble in German whereas new information cannot (Moltmann 1990). This kind of strict rule does not apply in Korean, which allows even new information to scramble. However, our results seem to suggest that contrastive focus – or prominence in general – tends to lead a parser into interpreting the phrase as being scrambled. In short, contrastive focus facilitates scrambling. Whether this effect is a direct association between focus and scrambling or one mediated through accompanying prosodic changes is open to further research.

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