THE EFFECT OF INFORMATION STRUCTURE
ON KOREAN SCRAMBLING

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To the memory of

my mother, Sangyee Choi (1936-2007)

and

my father, Jooha Hwang (1927-2008)
ACKNOWLEDGMENTS

This journey was fun but at the same time challenging. I met lots of people, and I won’t forget about their friendship and support.

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To Jason Jackson, my husband, I do not know how to thank him for his support, friendship, and love. We met in the department in my first year in Hawai‘i as first and second-year students in the PhD program, and we have been through this long journey together. He sometimes sacrificed his progress for mine, and he is even more excited and happy about my progress and achievements than I am. Almost every stage of this journey, he was with me. At this hour (around midnight) I am drafting this acknowledgment, he is still working in the restaurant to support me and our baby, who is due to be born next February.


Finally, I dedicate this dissertation to my parents, who could not wait until I finished this journey.
ABSTRACT

THE EFFECT OF INFORMATION STRUCTURE ON KOREAN SCRAMBLING

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This work investigates the effect of information structure on scrambling in Korean. It shows (1) that scrambling is sensitive to information structure, and (2) that a certain information structure can increase the parser’s likelihood of choosing a scrambling analysis over an in situ analysis when both are possible. Finally, I propose the Prominence Hypothesis: speakers tend to spell out discourse-prominent items earlier than non-prominent items, and discourse-prominence is defined as the combined accessibility at the point when an utterance is produced.

Experiment 1 tests whether scrambled sentences are harder to comprehend compared to their canonical counterparts and whether a supportive context can reduce the difficulty associated with scrambling in Korean. Experiment 2 assesses whether the given-before-new advantage extends to Korean by employing contexts that control the givenness and newness of a target entity. Experiments 3 and 4 explore the effect of contrastive focus on comprehending scrambled sentences without preceding context in Korean, using a self-paced reading task and a sentence completion task, respectively.
The results are summarized as follows: (1) Scrambling is harder to comprehend than its canonical counterparts in Korean; (2) The difficulty associated with scrambling can be reduced by contextual factors such as information structure, but not eradicated completely; (3) Scrambling is sensitive to contrastive focus; and (4) Whereas no previous claim can make all the relevant predictions for the four experiments, the Prominence Hypothesis does account for the results of the four experiments.
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CHAPTER 1
INTRODUCTION

All languages have word order freedom to a certain degree. Even English, which is categorized as a fixed word order language, allows freedom in word order by having options such as that between ‘John gave a book to Alice’ and ‘John gave Alice a book’. On the other hand, there are flexible word order languages such as Korean, Japanese, Latin, or Russian, in which a maximal phrase is frequently observed in different locations than its canonical position. This general phenomenon is called “scrambling” (Ross 1967).

Scrambling has been much studied in the area of theoretical syntax, and recently, with the help of well-developed empirical methods, it has begun to be studied in the area of psycholinguistics, too. While many issues concerning scrambling in syntactic theory still remain controversial, psycholinguistic research has found that scrambled sentences are generally harder to process compared to sentences with canonical word order. For instance, let us compare (1a) and (1b) below:

(1) Korean: Scrambling
a. Chelswu-ka Yenghui-lul cohaha-n-ta.
   Chelswu-NOM Yenghui-ACC like-PRES-DC
   ‘Chelswu likes Yenghui.’

b. Yenghui-lul Chelswu-ka cohaha-n-ta.
   Yenghui-ACC Chelswu-NOM like-PRES-DC
   ‘Chelswu likes Yenghui.’

Sentences such as (1a) are considered to have a canonical word order, while sentences such as (1b) have a scrambled word order. It has been found that canonical word order is
easier to comprehend than scrambled word order in Japanese (Mazuka et al. 2002; Miyamoto and Takahashi 2002). Since Korean has a very similar structure to Japanese, it can be expected to manifest the same tendency. As we will see in Chapters 6 and 7, this expectation was born out.

The present research arises from an apparent contradiction: why do speakers use scrambling at all if it takes extra effort for parsers to comprehend it? This question is worth considering in more detail, particularly because it is generally assumed that speakers cooperate with listeners to facilitate better understanding in communication (Clark and Haviland 1977, among others). In an attempt to resolve the apparent contradiction, the current study investigates the effect of information structure on scrambling. Before we explore the relation between information structure and scrambling, we will take a brief look at information structure.

1.1 Information structure

Many researchers have worked on information structure (Halliday 1967; Valduvi 1992; Lambrecht 1994; and Choi 1999, among others). The term “information structure” may be used interchangeably with information packaging, discourse pragmatics, and informatics. Based on information structure theory, a sentence divides into ground (= given information, theme) and focus (= new information, rhyme). In turn, ground divides into topic and tail, and focus into contrastive focus and information focus. The present dissertation follows Choi’s (1999) categorization to describe information structure.

Choi (1999) used feature distinctions to account for information structure related terms. Two features are relevant in her framework: NEWNESS and PROMINENCE. Topic
and tail, as ground, share the feature [-new], whereas contrastive focus and information focus, as focus, share the feature [+new]. On the other hand, topic and contrastive focus share the feature [+prominent], whereas tail and information focus share the feature [-prominent]. Topic is the element of a sentence that is singled out and then talked about among several potentially topical alternatives in the discourse. Contrastive focus, likewise, is singled out among several potentially focal alternatives. This property of being singled out among potential alternatives is called PROMINENCE. Choi argued that both topic and contrastive focus are “prominent” discourse elements, whereas tail and information focus are not “prominent.” This categorization is represented in the following table.

<table>
<thead>
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<th>Feature</th>
<th>+Prom</th>
<th>-Prom</th>
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<tr>
<td>+New</td>
<td>Contrastive focus</td>
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Now let us consider how information structure is encoded. It is known that syntactic, prosodic, and morphological strategies can be used to encode information structure (Valduvi and Vikuna 1998, among others). English cleft or pseudo-cleft sentences are an example of a syntactic strategy to encode information structure.

(2) English: Cleft sentences
    a. It was John that ate the cookie.
    b. It was the cookie that John ate.

(3) English: Pseudo-cleft sentences
    a. Who ate the cookie is John.
    b. What John ate is the cookie.
In the cleft sentences, *John* in (2a) and *the cookie* in (2b) are known to be in focus. In the pseudo-cleft sentences, *John* in (3a) and *the cookie* in (3b) are in focus.

English also appears to employ a morphological strategy to convey information structure. English *only* may be considered to be one of morphological ways of marking contrastive focus (Rooth 1996, among others).

(4) English: *only*
   a. Only John ate the cookie, (Mary didn’t eat the cookie).
   b. John ate only the cookie, (he didn’t eat the pie).

In (4a), *John* is in contrastive focus, thus contrasted with other alternatives, which include *Mary*. In (4b), *the cookie* is in contrastive focus, thus contrasted with other alternatives, which include *the pie*.

English also uses intonation to convey information structure (Halliday 1967; Rooth 1996; Valduvi and Vikuna 1998; Zubizarreta 1998). Let us look at English sentences such as (5), in which intonational focus is marked by the subscript $\text{f}$. Their wave forms and tones (pitch track) are shown below, respectively.
(5) English: Information structure marked with prosody

a. [John ate the cookie]F.
   (What happened?)

b. [John]F ate the cookie.
   (Who ate the cookie?)

c. John ate [the cookie]F
   (What did John eat?)

In sentences such as (5a), the whole sentence is in focus, and would serve as an answer to the corresponding question, whereas only John or the cookie are in focus in (5b) and (5c).

---

1 I would like to thank Amy Schafer and Jason Jackson for the graphs of waves forms and tones.
respectively. The three cases in (5) are pronounced with different intonations as the above graphs show. Thus, the intonation associated with each sentence in (5a) – (5c) plays a role in conveying different information structures.

Prosodically speaking, some languages are not as information-sensitive as English (Valduvi and Vikuna 1998, among others). Instead, languages may rely more heavily on different strategies, such as syntax. Other than the two syntactic strategies mentioned above (clefting and pseudo-clefting), the syntactic encoding of informational structure is known to include gapping, dative constructions, pronominalization, left and right dislocation, sentential subjects, and topicalization (Prince 1981).

Furthermore, when a language allows more word order freedom, scrambling becomes available as a possible way of conveying informational structure. Taking an approach in which scrambling encodes informational structure, the present study provides evidence that, in Korean, given information as well as contrastive focus is associated with scrambling, and that information structure affects the sentence comprehension of scrambling.

In the next section, I provide a short linguistic summary of word-order and case particles in Korean.

1.2 Korean

Korean is an SOV language. In canonical sentences, a subject comes earlier than a direct object and other arguments, and a predicate comes last. This is shown in (6).
(6) Korean: Canonical SOV word order
Nay-ka Yenghui-lul cohaha-n-ta.
I-NOM Yenghui-ACC like-pres-DC
‘I like Yenghui.’

Sentence (6) also shows that case is marked by particles. A subject takes the nominative marker -ka or -i, and a direct object takes -ul or –lul, depending on the presence or absence of a coda of the last syllable of the subject and the direct object, respectively. Case particles are sometimes dropped, particularly in casual speech. This is shown in (7).

(7) Korean: Case particles can drop
Na Yenghui cohaha-y.
I Yenghui like-DC
‘I like Yenghui.’

In (7), the nominative case particle and the accusative case particle are missing, but the structure is assigned the same propositional meaning as (6). Sentence (7) cannot be interpreted as ‘Yenghui likes me’, which can be taken as an additional indication that Korean is an SOV language.

The case particles used in Korean appear to make it possible for an argument to scramble. Sentence (8) shows that the direct object Yenghui can scramble over the subject.

(8) Korean: Scrambling
Yenghui-lul nay-ka cohaha-n-ta.
Yenghui-ACC I-NOM like-PRES-DC
‘I like Yenghui.’

Notice that the propositional meaning of (8) is the same as that of (6) and (7), even after the direct object has scrambled.
Korean is also a pro-drop language, which means that it allows an argument to be dropped as long as the speaker and the listener can infer its existence. Thus, any argument can be dropped, including the first person pronoun for the speaker and the second person pronoun for the listener, as shown in (9).

(9) Korean: Arguments can drop
   a. Nay-ka cohaha-n-ta.
      I-NOM like-PRES-DC
      ‘I like (Yenghui).’
   b. Yenghui-lul cohaha-n-ta.
      Yenghui-ACC like-PRES-DC
      ‘(I) like Yenghui.’

In (9a), the direct object Yenghui has been dropped, but the sentence can still have the intended meaning ‘I like Yenghui’. In a similar way, the first person pronoun for the speaker has been dropped in (9b), but the intended meaning remains clear.

To summarize, Korean is an SOV language but the word order is rather flexible, allowing an argument to scramble.

1.3 Organization

This dissertation is organized as follows.

Chapter 2 examines two syntactic approaches to scrambling. One approach claims that scrambling is semantically vacuous, and therefore does not contribute to meaning. In contrast, the second approach argues that scrambling is semantically and/or pragmatically meaningful, so it does contribute to the meaning, even though the meaning added by scrambling does not need to be propositional.

In Chapter 3, I discuss syntactic/semantic research suggesting that information status, in particular givenness/newness, affects sentence order in German and Dutch, as
well as in Korean. Then I present findings from psycholinguistic research which show the effect of givenness/newness on sentence production and sentence comprehension, as well as research findings on the effect of scrambling and context on sentence comprehension.

In Chapter 4, I review relevant studies on contrastive focus and its relation to scrambling in order to show that the two are closely associated. Evidence is provided showing that wh-phrases are contrastively focused, too. Finally I summarize empirical observations suggesting that contrastive focus affects the interpretation of scrambled sentences.

Chapter 5 summarizes four experiments conducted for the dissertation and compares predictions generated by previous research. Chapters 6, 7, and 8 provide details of the four experiments and discuss the results. Chapter 9 concludes the dissertation.
This chapter introduces two main approaches to scrambling in the syntax literature. Based on the observation that scrambling shows different properties from other A-bar movements such as $wh$-movement and topicalization, the first approach claims that scrambling is “semantically vacuous” movement and does not contribute to meaning. In contrast, the second approach claims that scrambling does in fact contribute to meaning semantically as well as pragmatically. The evidence comes from quantifier scope in Russian, Japanese, and Korean, as well as information structure. These two approaches will be outlined and evaluated in Sections 2.1 and 2.2.

2.1 Scrambling as semantically vacuous movement

Scrambling has often been divided into short-distance (clause internal or intra-clause) scrambling, in which a phrase moves within a clause, and long-distance (between-clauses or interclause) scrambling, in which a phrase moves out of the clause where it originates. In this section, one approach to long-distance scrambling is outlined, claiming that long-distance scrambling has no semantic effect, and its advantages and disadvantages are discussed.

Saito (1992) argues that scrambling is a unified phenomenon, whether it is short-distance or long-distance movement: scrambling is a movement to a non-operator, non-A position. In particular, he claims that Japanese scrambling shows some properties of A’-movement, but at the same time it differs from typical A’-movement, such as $wh$-
movement or topicalization, in the sense that it does not establish a semantically significant operator-variable relation. On this view, English topicalization and *wh*-movement contribute to semantic interpretation in the sense that they create the representations that are interpreted. In contrast, scrambling does not contribute to semantic interpretation.

The greatest benefit of Saito’s account of scrambling is that he points out how scrambling differs from typical cases of A’-movement. However, his account has at least three weaknesses. First, based on his account, scrambling is inevitably optional movement, in that the scrambled phrase may move back to its theta-position without leaving a trace in the surface position at Logical Form (hereafter LF, the level in a derivation where a sentence is interpreted). To put it another way, a scrambled phrase may or may not leave a trace when it goes back to its theta-position at LF. This optionality of leaving a trace is disadvantageous, assuming that we want to work towards a unified theory of movement. It is not desirable to assume that there is an optional factor in movement, especially if we consider that movement is generally seen as last resort, and thus must itself be justified.

Second, Saito’s account does not explain *why* a phrase is scrambled. In the framework of generative grammar, every movement must be justified in terms of economy. When a phrase does not need to move, it should not move, because movement is seen as being costly. For a phrase to move, it needs to have a justified reason, such as feature checking. Moreover, if a phrase has reason to move, it must move.

Third, and most crucially, Saito claims that scrambling is semantically vacuous, which contradicts the conclusions of many researchers who argue that scrambling
actually does have a semantic effect. This approach will be discussed in more detail in Section 2.2.

Another work which implies that scrambling has no semantic effect is Bošković and Takahashi (1998). They propose that scrambled elements are base-generated in their surface, non-theta positions and that they undergo obligatory LF movement to the position where they receive theta-roles. Based on Bošković and Takahashi’s account, the embedded object, in a sentence such as (1), i.e., *sono hon-o* ‘that book-ACC’, is directly introduced into the matrix clause-adjoined position and remains there in the PF (PF stands for Phonetic Form, and roughly means the level that interfaces with the language external systems, i.e., the Articulatory-Perceptual system). Sentence (1) would be anomalous if the object remained *in situ* at LF since it could not receive a theta-role. Therefore, the object lowers to the embedded object position to receive a theta-role from the embedded verb at LF, thus ensuring the grammaticality of the sentence.

(1) Japanese: Long-distance scrambling

\[
\begin{array}{c}
\text{[Sono hon-o, [John-ga [CP Mary-ga e_i yonda to]}
\text{That book-ACC John-NOM Mary-NOM read COMP}
\text{itta]] (koto)}
\text{said fact}
\end{array}
\]

‘That book, John said that Mary read’

Bošković and Takahashi’s account has the advantage of eradicating the ‘optionality’ associated with scrambling in Saito’s account, by proposing that scrambled phrases are base-generated at surface positions and then obligatorily move to theta-positions. Accordingly, they keep the idea of “last resort” intact, entailing that all movement is obligatory.
However, their account controversially introduced “lowering” movement into generative grammar where lowering is traditionally disfavored (e.g., Bailyn 2001). For example, it has not been reported that any other lowering movements are obligatory, except reconstruction. Note that reconstruction is not real movement, rather it places moved elements back in the original positions for purposes of interpretation or scope. In addition, scrambling does not have a semantic effect in Bošković and Takahashi’s account because a scrambled phrase must lower to its theta-role position at LF, which is the linguistic level at which all grammatical structure relevant to semantic interpretation is provided (Hornstein 1995).

In the next section, I introduce a series of works arguing that scrambling is a significant movement semantically as well as pragmatically.

2.2 Scrambling as semantically/pragmatically significant movement

The observation has been made by Svedova (1980), De Hoop (1992), Diesing (1992), Kiss (1998), Zubizarreta (1998), Choi (1999), and Bailyn (2001) that the meaning of a sentence differs with different word orders. The evidence comes from two primary sources: quantifier scope and information structure, which will be discussed in Sections 2.2.1 and 2.2.2, respectively.

2.2.1 Scrambling and quantifier scope

Many researchers have observed that scrambling can contribute to meaning semantically. The semantic contribution can be seen in the scope differences. Bailyn

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2 De Hoop’s (1992) and Diesing’s (1992) approaches consider scrambling as a syntactic device to mark some semantic features of noun phrases. Their ideas are introduced in Section 3.1.1.
(2001) observed that in Russian, scrambled orders differ from canonical orders with respect to scope, as shown in (2).

(2) Russian: Long-distance scrambling and quantifier scope
   a. Kto-to xocet, ctoby Boris uvidel kazdogo mal’cika.
      Someone-NOM wants that Boris saw every boy.ACC
      ‘Someone wants Boris to see every boy.’
      (i) some > every (ii) *every > some
   b. kazdogo mal’cika Kto-to xocet, ctoby Boris uvidel.
      every boy.ACC Someone-NOM wants that Boris saw
      ‘Every boy, someone wants Boris to see.’
      (i) *some > every (ii) every > some

Someone takes wide scope in the canonical word order sentence (2a), whereas every boy must take wide scope in the scrambled counterpart (2b). This scope difference between canonical word order sentences and scrambled counterparts also appears in Japanese short-distance scrambling. An example from Miyagawa (2000) is shown in (3).

(3) Japanese: Short-distance scrambling and quantifier scope
      all-NOM that test-ACC take-NEG-PST
      ‘All did not take that test.’
      (i) *not > all (ii) all > not
   b. Sono tesuto-o zen’in-ga uke-nakat-ta.
      that test-ACC all-NOM take-NEG-PST
      ‘All did not take that test.’
      (i) not > all (ii) all > not

In (3a), in the canonical word order, all must have wider scope than not, whereas both scopes are possible in (3b), even though the narrow scope interpretation of (3b) is more prominent. A similar phenomenon is found in both short-distance scrambling and long-distance scrambling in Korean, as shown in (4) and (5).
(4) Korean: Short-distance scrambling and quantifier scope³

a. nwukunka motwu-lul cohaha-y
   somebody all-ACC  like-DC
   ‘Somebody likes everyone.’
   (i) #everyone > somebody    (ii) somebody > everyone

b. Motwu-lul nwukunka $t_i$ cohaha-y.
   all-ACC  somebody  like-DC
   ‘Somebody likes everyone.’
   (i) everyone > somebody     (ii) somebody > everyone

(5) Korean: Long-distance scrambling & quantifier scope

   Chelswu-\textsc{top} somebody all-ACC  like-\textsc{comp}   think-DC
   ‘Chelswu thinks that somebody likes everyone.’
   (i) #everyone > somebody    (ii) somebody > everyone

   all-ACC  Chelswu-\textsc{top} somebody  like-\textsc{comp}   think-DC
   ‘Chelswu thinks that somebody likes everyone.’
   (i) everyone > somebody     (ii) somebody > everyone

In (4a) and (5a), the canonical word order, the interpretation that \textit{somebody} takes wide scope over \textit{everyone} is easier to get than the interpretation that \textit{everyone} takes wide scope over \textit{somebody}. Once the direct object of the embedded clause has scrambled to the sentence-initial position in (4b) and (5b), the interpretation that \textit{everyone} takes wide scope over \textit{somebody} becomes much easier than its canonical counterparts. The scope difference between canonical word order and scrambled word order, i.e., long-distance scrambling in Russian, short-distance scrambling in Japanese, and short- and long-distance scrambling in Korean, suggests that scrambling in Russian, Japanese, and

³ I would like to thank Jung-Hee Kim for discussing this data with me.
Korean has a semantic effect; otherwise, it becomes an additional challenge to explain the contrasts shown in (2) through (5).

In the next section, I introduce the information structure account on scrambling, which argues that scrambling contributes to meaning pragmatically, in particular, by the way of packing information.

2.2.2 Scrambling and information structure

As stated in Section 1.1, the present dissertation follows Choi’s (1999) categorization, which is based on the distinction of the two features, NEWNESS and PROMINENCE (see Table 1.1 in Section 1.1). Four primary concepts are related to information structure: GIVEN INFORMATION versus NEW INFORMATION, and CONTRASTIVE FOCUS versus INFORMATION FOCUS. Given information is marked with [-new], and it is defined as easily accessible, and accordingly inferable, old information. New information is marked with [+new], and corresponds to noninferable new information. Contrastive focus is marked with [+prom] and [+new], and it is defined as information that presupposes a set of relevant entities. Information focus is marked with [-prom] and [+new], and defined as new information which is supposed to just fill up information gaps.

Now let us consider how information structure accounts for scrambling. Svedova (1980) claimed that varying the word order of a sentence affects its information structure (Bailyn 2001). Her argument is based on the systematic relationship holding between given information and new information, shown in (6) and (7).
Russian: Subject as new information

a. Kto citaet knigu?
   who reads book-ACC
   ‘Who is reading the book?’

b. Knigu citaet Ivan.
   book-ACC reads Ivan-NOM
   ‘IVAN is reading the book.’

Russian: Object as new information

a. Cto delaet Ivan?
   what does Ivan-NOM
   ‘What is Ivan doing?’

b. Ivan citaet knigu.
   Ivan-NOM reads book
   ‘Ivan is reading A BOOK.’

Canonical word order such as (7b) is contrasted with scrambled word order such as (6b).

As shown by the corresponding questions (7a) and (6a), the sentences (7b) and (6b) have different information structures (Svedova used the term “functional perspectives”). The sentence (6b) carries new information, ‘Ivan’, as an answer to (6a). On the other hand, (7b) carries new information ‘to read a book’ as an answer to (7a). The fact that (7b) is an irrelevant answer to question (6a) highlights this point. In the same way, (6b) is an improper answer to question (7a).

This phenomenon is manifest not only in Russian, but also in Japanese and Korean. Consider the sentences in (8) and (9).

Japanese: Long-distance scrambling (neutral)

a. John-wa doo shiteiru no?
   John-TOP how doing Q
   ‘How is John doing?’
   John-NOM Mary-NOM that book-ACC bought-COMP thinks  
   ‘John thinks that Mary bought the book.’

c. #Sono hon-o, John-ga [Mary-ga t_i katta-to] omotteiru.  
   that book-ACC John-NOM Mary-NOM bought-COMP thinks  
   ‘The book, John thinks that Mary bought t_i.’

(9) Japanese: Long-distance scrambling  
   (direct object of embedded clause is given information)

   a. Sono hon ni-kanshite nanika atta no?  
      that book about something happened Q  
      ‘Did anything happen to that book?’

      John-NOM Mary-NOM that book-ACC bought-COMP thinks  
      ‘John thinks that Mary bought the book.’

   c. Sono hon-o_i, John-ga [Mary-ga t_i katta-to] omotteiru.  
      that book-ACC John-NOM Mary-NOM bought-COMP thinks  
      ‘The book_i, John thinks that Mary bought t_i.’

As in the Russian example sentences (6) and (7), Japanese canonical sentences such as (8b) seem to be the proper answer to questions such as (8a). But (8c) is an awkward answer to (8a). By contrast, the scrambled sentence (9c) is a perfect answer for a question such as (9a), but as we might have predicted, (9b) is an awkward reply to a question such as (9a). A similar phenomenon is observed in Korean, though I do not reiterate the relevant Korean data here.

Furthermore, it has been argued that scrambling is a major source for encoding information structure (Choi 1999). Choi claimed that topic (+prom, -new) and contrastive focus (+prom, +new) can scramble, but information focus (-prom, +new) cannot (see Table 1.1 in Section 1.1). She suggested that the shared property between the scrambled elements is prominence (marked with [+prom]). In other words, ‘prominent’
materials such as topic and contrastive focus can scramble to sentence initial position, whereas ‘non-prominent’ materials such as tail and information focus cannot.

Choi claimed that a piece of evidence is the ‘topic’ marker nun in Korean, which is a case where topic and contrastive focus are grouped together. A phrase marked with nun is always either a topic or a contrastive focus, but never information focus or tail. For this reason, she dubbed -nun as a ‘prominence’ marker. The distinctive usage of -nun is shown in sentences such as (10).

(10) Korean: Prominence marker -nun

a. Swuni-ka Inho-lul mannassta.
   Swuni-NOM Inho-ACC met
   ‘Swuni met Inho.’

b. Swuni-nun Inho-lul mannassta.
   Swuni-TOP Inho-ACC met
   ‘As for Swuni, she met Inho.’

The subject phrase Swuni in (10a), marked with nominative case marker -ka, is neutral in the sense that it is not informationally restricted. Thus, it can be interpreted as new or old, prominent or non-prominent information, depending on the context. On the other hand, Swuni in (10b) is marked by topic marker nun; and according to Choi’s (1999) idea it is ‘prominent’. This means that the subject Swuni in (10b) is a distinct entity singled out among the potential alternatives, and what the remaining part of the sentence is commenting on. On the other hand, Inho-nun ‘Inho-TOP’ in (11b), marked with topic marker nun, encodes contrastive focus, as shown in the corresponding translation, whereas Inho-lul ‘Inho-ACC’ is neutral in the sense that it is not informationally restricted.
In other words, the so-called ‘topic’ marker -nun in Korean is ambiguous between topic and contrastive focus, but both of these share the property [prominence]. Based on Choi (1999), the reason -nun carries the feature [+prom] is due to -nun’s lexical property that entails the existence of other entities than the entity marked by it.

In a similar vein, Choi (1999) claims that scrambling in Korean is motivated by information structure. In particular, she proposed the following INFORMATION STRUCTURING CONSTRAINTS.

(12) Information Structuring Constraints (Choi 1999)

a. NEW: [-new] should precede [+new]

b. PROM: [+prom] should precede [-prom]

She argues that Korean makes use of constituent order as an information encoding mechanism and that the informational structuring constraints are the major driving force for constituent reordering in Korean. Finally, she concludes that “scrambling is motivated and constrained by the interaction of syntax and discourse, and further constrained by semantics and prosody” (Choi 1999:3).
2.3 Conclusion

This chapter summarized two primary accounts of long-distance scrambling. One account suggests that long-distance scrambling does not have a semantic effect. Saito (1992) and Bošković and Takahashi (1998) are examples of this approach. Unfortunately, their works fail to address the semantic effect that scrambling carries.

The contrasting account claims that scrambling does have a semantic effect. Bailyn (2001) and Svedova (1980) take this approach, and they convincingly showed that scrambling contributes to meaning. In a similar vein, the information structural approach claims that scrambling is one of the ways for flexible word order languages to encode information structure, whereas prosody-sensitive languages like English encode information structure by relying more heavily on prosody. Taking an information structural approach, Choi (1999) argued that scrambling is a result of the interaction of all the relevant modules, such as syntax, discourse, semantics, and prosody.

In Chapter 3 and 4, I discuss theoretical and empirical findings on the interaction of scrambling and two main components of information structure, i.e., givenness/newness and contrastive focus.
CHAPTER 3
THE EFFECT OF GIVENNESS/NEWNESS ON SCRAMBLING

Following the brief discussion of syntactic/pragmatic accounts of scrambling in chapter 2, this chapter elaborates on syntactic and pragmatic research which suggests that information status, particularly givenness/newness, affects sentence order in Germanic languages such as German and Dutch, as well as in Korean. Then psycholinguistic results are presented showing the effect of noncanonical word order on sentence comprehension, the effect of context on the comprehension of noncanonical word order, and finally the effect of givenness/newness on sentence production as well as sentence comprehension.

3.1 Syntactic/Pragmatic approach

3.1.1 German and Dutch

It has been found that in German a scrambled element should be definite or specific and thus an indefinite or nonspecific NP cannot be in a scrambled position (Mahajan 1990; Moltmann 1990; Webelhuth 1992; Choi 1999, among others). This contrast is shown in (1) and (2). The sentences of (1) and (2) are from Webelhuth (1992:197-198) and Choi (1999:60).
(1) German: Scrambling of definite NP
   a. weil er wohl das Buch gelesen hat
      because he probably the book read has
      ‘because he has probably read the book’
   b. weil er das Buch wohl gelesen hat
      because he the book probably read has
      ‘same as (1a)’

(2) German: Scrambling of indefinite NP
   a. weil er wohl ein Buch gelesen hat
      because he probably a book read has
      ‘because he has probably read a book’
   b. *weil er ein Buch wohl gelesen hat
      because he a book probably read has
      ‘same as (2a)’

(1a) and (2a) are considered to be canonical word order, whereas (1b) and (2b) are scrambled word order. In a canonical word order such as (1a), a definite object NP ‘the book’ follows the adverb ‘probably’, whereas the latter follows the former in a scrambled order such as (1b). In contrast, an indefinite direct object NP such as ‘a book’ cannot precede the adverb, as shown in (2b).

   It has also been observed that under certain special interpretations indefinite NPs can scramble as well. The special interpretations involve specific, referential, partitive, and generic readings (de Hoop 1992; Diesing 1992; Moltmann 1990; Choi 1999). Let us consider the following Dutch examples from de Hoop (1992:50) and Choi (1999:62).

(3) Dutch: Scrambling
   a. dat de politie een kraker gisteren opgepakt heeft
      that the police a squatter yesterday arrested has
      (referential reading ‘a specific squatter’)  
   b. dat de politie twee krakers gisteren opgepakt heeft
      that the police two squatters yesterday arrested has
      (partitive reading ‘two of the squatters’)
In Dutch, a sentential adverb such as ‘yesterday’ and ‘always’ precedes a direct object NP in the canonical word order as in German. In (3a), scrambled word order, the indefinite NP *een kraker* ‘a squatter’ scrambles over the adverb *gisteren* ‘yesterday’, and can only be interpreted with a specific/referential reading and not with the existential reading that it has in the canonical word order. In a similar way, in (3b), the indefinite NP ‘two squatters’ scrambles over the adverb ‘yesterday’, in which case it can only be given a partitive reading (‘two of the squatters’), and not an existential cardinal reading. Lastly, the indefinite NPs in (3c) and (3d) scramble over the adverb, and they are interpreted as generic, which corresponds roughly to ‘squatters in general’. The generic reading cannot arise in its canonical word order counterpart (de Hoop 1992, among others).

De Hoop (1992) and Diesing (1992) called the specific, referential, partitive, and generic readings “presuppositional” (De Hoop) and “strong” (Diesing), and tried to provide syntactic accounts by saying that there is a one-to-one mapping between syntax and semantics. These approaches consider scrambling as a syntactic device to encode a certain aspect of semantic meaning of noun phrases, i.e., strong, presuppositional, or specific meaning.
However, Choi (1999:65) pointed out that their accounts cannot explain the optionality of scrambling of definite NPs shown in (4).

(4)  German scrambling: definite NP
a. Ich habe meinem Bruder den Brief geschickt.  
I have my brother-DAT the letter-ACC sent  
‘I sent my brother the letter.’
b. Ich habe den Brief meinem Bruder geschickt.  
I have the letter-ACC my brother-DAT sent  
‘I sent the letter to my brother.’

Diesing (1992) claims that a definite NP must move out of VP to avoid existential closure because it is a “familiar” entity, which means that it must necessarily scramble. Choi (1999) observed that a definite NP can stay in its canonical position as shown in (4a), contrary to Diesing’s (1992) prediction.

Furthermore, the sentences in (4) do not have any difference in “strongness” or “presuppositionality,” as Diesing’s (1992) and De Hoop’s (1992) accounts would predict. Instead, Choi observed that the scrambled NP in (4b) receives more of a “topic-like” interpretation whereas its counterpart in (4a) receives more of a “focus-like” interpretation. This led Choi (1999) to propose that the ability of a phrase to scramble is affected by discourse factors in Korean.

In the next section, I discuss the relation between givenness/newness and Korean scrambling.

3.1.2  Korean

Choi (1997, 1999) proposed that there is a discourse preference on scrambling in Korean, which does not like a scrambled phrase to be discourse-new (Note that Japanese has the same tendency in scrambling, as shown in Section 2.2.2).
Let us briefly describe prosodic patterns in Korean as background for the relevant example sentences below. The intonational structure in Korean is hierarchically organized so that an INTONATIONAL PHRASE (IP) comprises one or more ACCENTUAL PHRASES (AP), which in turn are composed of one or more words (Jun 1993). I also assume that Korean has a DECLINATION EFFECT as in Japanese, i.e., a downward trend of F₀ contour throughout an utterance (Pierrehumbert and Beckman 1988), in which the tonal peak of an accentual phrase tends to be lower than that of the preceding accentual phrases.

Having in mind the Korean prosodic features described above, let us turn to the following sentences, which are from Choi (1997).

(5) Korean scrambling
   Mary-NOM yesterday John-ACC meet-PST-DC
   ‘Mary met John yesterday.’

b. Mary-ka John-ul ecey manna-ss-e.
   Mary-NOM John-ACC yesterday meet-PST-DC
   ‘Mary met John yesterday.’

c. John-ul Mary-ka ecey manna-ss-e
   John-ACC Mary-NOM yesterday meet-PST-DC
   ‘Mary met John yesterday.’

First of all, if (5a) is produced with four accentual phrases, John-ul corresponds to the third accentual phrase, and thus its peak is predicted to be lower than those of the preceding accentual phrases ‘Mary-NOM’ and ‘yesterday’ due to the declination effect. Nevertheless, Choi found that the peak of ‘John-ACC’ tends to show a higher peak than
the one predicted from declination. This is because John-ul is in information focus and newly introduced.4

Compared to (5a), John-ul in (5b) has moved leftward. Choi explained that ecey ‘yesterday’ is pronounced with a higher peak than the one predicted, which suggests that it is in information focus and newly introduced in the discourse. However, ‘John-ACC’ in (5b) is not pronounced with the higher peak seen in (5a). Instead, it is pronounced with a lower peak than the previous phrase, the one predicted from the declination effect. This implies that it is old (given) information, not new information. At the same time, it takes on a sort of partial topicality with respect to the rest of the sentence, even though the topic of the whole sentence is still the subject Mary (Choi 1997:555). Topics present given information, not new information. Therefore, the new information in (5b) is only ecey ‘yesterday’. In (5c), John-ul is the topic of the whole sentence including the subject Mary-ka. Choi (1997) claims that the subject and the rest of the sentence are old information in (5c). However, ecey ‘yesterday’ is pronounced with a higher peak than the one predicted from a general declination5 pattern, which suggests that it is new information and accordingly has information focus. Overall, the preverbal phrase has a higher peak in each of the sentences in (5), than predicted by declination. However, this does not clearly show information structure, considering that Choi analyzes contrastive focus as [+new] and that contrastive focus is easily licensed to scramble.

Finally, Choi (1999) proposed the INFORMATION STRUCTURING CONSTRAINT (see (12) in Section 2.2.2), which prevents a scrambled phrase in Korean from being

4 The link between pitch expansion and focus in Korean has been provided by Jun and Oh (1996), among others.
5 DECLINATION is defined in Section 4.3.1 (See page 53).
discourse-new. Choi’s idea is reminiscent of Kim’s (1985) observation that information focus is in the preverbal position in Korean. Kim (1985) analyzed Korean based on the Principle of Information Flow, which is an idea similar to information structure or the given-new contract (Halliday 1967; Chafe 1970; Clark and Haviland 1977, among others). The principle of information flow requires the sequential alignment of the sentence to be organized in such a way that any constituent carrying given, old information comes first and any constituent carrying new, contextually unpredictable information comes later. According to this principle, topicalized elements and other bridging material occur in the initial portion of a sentence and information focus appears towards the end of the sentence. This idea is represented as the configuration in (6).

(6)  [TOPIC……………….(Information) FOCUS]

Korean is a verb-final language, so the final position is reserved for the verb. This entails that focus must come right before it. Unless the verb has focus, any focused element comes immediately before the verb. This is shown in (7).

(7)  [TOPIC……………….(Information) FOCUS Verb]

Consistent with the idea put forward by Choi (1999) and Kim (1985), ecey ‘yesterday’ in (5c) is pronounced with high pitch by default, and accordingly is information focus. In other words, ecey ‘yesterday’ is new information in both (5b) and (5c), and the difference between (5b) and (5c) comes from what is the topic of the whole sentence: whereas Mary is the topic of the whole sentence in (5b), John is the topic of the whole sentence in (5c).
To sum up, it has been observed that elements fronted by scrambling tend to be topical relative to the rest of the sentence and that new information tends to come later in the sentence and thus be placed in preverbal position in Korean.

In the next section, I discuss previous empirical findings on scrambling and its relation with givenness/newness.

3.2 Psycholinguistic approach

This section introduces the findings of Mazuka, Itoh, and Kondo (2002), Miyamoto and Takahashi (2002), Kaiser and Trueswell (2004), Clifton and Frazier (2004), and Ferreira and Yoshita (2002) in order to outline the effects of scrambling and the effects of givenness/newness on sentence comprehension and production.

3.2.1 Mazuka, Itoh, and Kondo (2002)

The findings of an eye-tracking study and a self-paced reading study conducted by Mazuka, Itoh, and Kondo (2002) are that noncanonical word order sentences have increased processing cost, not only in simple sentences such as (8a) versus (8b), but also in complex sentences such as (8c) versus (8d).
(8)  Japanese: Mazuka et al.’s (2002) example sentences

a.  Canonical simple sentence
   [NP-NOM  NP-ACC  V]
   Mariko-ga  ootoo-o  yonda.
   Mariko-NOM  brother-ACC  called
   ‘Mariko called her younger brother.’

b.  Scrambled simple sentence
   [NP-ACC  NP-NOM  V]
   ootoo-o  Mariko-ga  yonda.
   brother-ACC  Mariko-NOM  called
   ‘Mariko called her younger brother.’

c.  Canonical sentence with center-embedding
   [NP-NOM  [Modifier phrase]  NP-ACC  V]
   Mariko-NOM  [outside  a  swing  on  swing-ing  brother-ACC  called
   ‘Mariko called her younger brother who was swinging on a swing outside.’

d.  Scrambled sentence with center-embedding
   [NP-ACC  [Modifier phrase]  NP-NOM  V]
   Mariko-ACC  outside  a  swing-on  swing-ing  brother-NOM  called
   ‘The younger brother, who was swinging on a swing outside, called Mariko.’

Mazuka, Itoh, and Kondo’s eye-tracking study found no difference at the first argument position in simple sentences such as (8a) and (8b). However, at the second argument position, they found significant differences: first gaze time\(^6\) approached significance in the subject analysis; the number of regressive eye-movements (looks backward to an earlier portion of the sentence) was significantly larger for noncanonical word order sentences both in the subject and the item analyses; the total gaze time\(^7\) was significantly

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\(^6\) The first gaze time is defined as the sum of fixation times on each region from the first fixation on that region until there is a fixation on another region.

\(^7\) The total gaze time is defined as the sum of all fixations on each region.
larger for noncanonical word order sentences both in the subject and the item analyses. At the verb, no difference was detected.

In complex sentences such as (8c) and (8d), they found no difference at the first argument position. At the pre-verbal position, they found significant differences: first gaze time, total gaze time, and total regressive eye movements for noncanonical word order sentences were significantly greater than for canonical sentences. At the verb position, first gaze time, total gaze time, and total regressive eye movements for noncanonical word order sentences were significantly greater than for canonical sentences, but only in the subject analysis.

In summary, the pattern of results for complex sentences was similar to that for the simple sentences. That is, at the first argument position, there was no difference; at the pre-verbal position, the noncanonical word order sentences increased processing cost, as measured by first gaze time, total gaze time, and total regressive eye movement.

Mazuka, Itoh, and Kondo tested the materials from their eye-tracking study by using a self-paced reading study. Overall, the results from the self-paced reading study are consistent with their eye-tracking study. They found no difference at the first argument position in either simple sentences or complex sentences. This is predicted because Japanese allows an argument drop as Korean does. Thus, parsers could not tell whether a particular sentence was canonical or scrambled at the first argument position. At the pre-verbal position, parsers read noncanonical simple sentences more slowly than canonical simple sentences, but the difference did not reach significance. In complex sentences, the difference was significant. Noncanonical complex sentences were read
significantly more slowly (i.e., had longer reading times) than canonical complex sentences.

The contrast in findings between simple sentences and complex sentences suggests a possible reason why some earlier work failed to uncover the difficulty associated with scrambling (see Yamashita 1997). Mazuka et al. suggested that it could have been due to the overall simplicity of the stimuli, which possibly makes it hard to note the difference in sentence comprehension between canonical and noncanonical word order sentences.

According to Mazuka et al., speakers of head-final languages such as Japanese experience more difficulty in comprehending noncanonical word order sentences than canonical word order sentences. However, their experiments were inconclusive in establishing a scrambling effect for several reasons. First, Mazuka et al. (2002) did not provide any preceding context. Their isolated target sentences may not be natural enough to catch the real effect of noncanonical word order on sentence comprehension. The difficulty attributed to noncanonical word order could be alleviated or disappear if a supportive context were provided. If this is the case, the effect that they report should be associated not with the word order, but with the lack of a supportive context.

Second, Mazuka et al. (2002) tested only sentence-initial scrambling. Even though it is plausible that the effect associated with sentence-initial scrambling is extended to sentence-medial scrambling, that was not tested.

Finally, even if Mazuka et al.’s experiment demonstrated a general scrambling effect, the source of the difficulty associated with noncanonical word order is still controversial. It could be due to the infrequency of the structure, or due to the inherent
structural complexity. The sentence-initial scrambled sentences which Mazuka et al. (2002) tested are known to be infrequent compared to their canonical counterparts, so it is hard to verify which account is correct.

3.2.2 Miyamoto and Takahashi (2002)

Like Mazuka et al. (2002), Miyamoto and Takahashi (2002) showed through a self-paced reading task that scrambling leads to longer reading times in Japanese. They used the ditransitive verb construction for their target sentences. Examples are shown in (9) below.

(9) Japanese: Miyamoto and Takahashi’s (2002) example sentences

a. Ofisu-de shokuin-ga kakarichoo-ni ocha-o dasita
   office-at employee-NOM manager-to tea-ACC served
   josei-o teineini hometa-to Aiharasan-ga hanasiteita.
   woman-ACC politely praised-COMP Aihara-nom said
   ‘At the office, Aihara said that the employee politely praised the woman who had served tea to the manager.’

b. Ofisu-de shokuin-ga ocha-o kakarichoo-ni dasita
   office-at employee-NOM tea-ACC manager-to served
   josei-o teineini hometa-to Aiharasan-ga hanasiteita.
   woman-ACC politely praised-COMP Aihara-nom said
   ‘At the office, Aihara said that the employee politely praised the woman who had served tea to the manager.’

Sentences such as (9a) are considered to have a canonical word order for the most embedded clause, in which the goal ‘manager-to’ comes before the theme ‘tea-ACC’. In (9b), the theme ‘tea-ACC’ is scrambled over the goal ‘manager-to.’

Noncanonical word order sentences are typically considered to occur much less frequently than canonical word order sentences. It has often been argued that this difference in frequency may be the reason that parsers have more difficulty in
comprehending noncanonical word order sentences. To argue against the frequency-based accounts, Miyamoto and Takahashi tested ditransitive verb constructions which a corpus study showed to be equally frequent, such as (9a) and (9b). Thus, Miyamoto and Takahashi could control the frequency confound associated with word order.

Their results revealed that parsers read (9a) more quickly than (9b). At the critical region—the argument prior to the ditransitive verb—the scrambled condition resulted in significantly slower reading times than in the canonical condition. This effect was found in the subject analysis as well as in the item analysis.

Miyamoto and Takahashi’s results thus showed that the difficulty associated with noncanonical word order is extended to sentence-medial scrambling, and that frequency may not be the proper explanation for the difficulty associated with noncanonical word order sentences. Nevertheless, their experiment did not include discourse contexts, so the difficulty associated with scrambling could still be attributed to the lack of context.

3.2.3 Kaiser and Trueswell (2004)

Whereas Mazuka et al. (2002) and Miyamoto and Takahashi (2002) found processing difficulty associated with scrambling, Kaiser and Trueswell (2004) tried to show that the difficulty could be eradicated by introducing discourse factors. Their self-paced reading study in Finnish demonstrated that the usual difficulty associated with noncanonical word order was partially alleviated in the presence of supporting discourse contexts.

The Finnish basic word order, SVO, is thought to be easier to process than its noncanonical (scrambled) counterpart, OVS. Kaiser and Trueswell manipulated the new
versus given status of the subject and object in SOV and OVS sentences. Their example sentences are shown below.

(10) Finnish: Canonical word order

a. Supportive context \([S_{\text{given}} \text{ VO}_{\text{new}}]\)

Lotta etsi eilen sieniä metsässä.
Lotta looked-for yesterday mushrooms forest-in.
‘Lotta looked for mushrooms yesterday in the forest.’

Hän huomas heinikossa hiiren joka liikkui varovasti eteenpäin.
She.NOM noticed grass-in mouse-ACC that was moving carefully forward.
‘She noticed in the grass a mouse that was moving carefully forward.’

<target>
Hiiri seurasi jänistä ja linnut lauloivat.
Mouse.NOM followed hare.PART, and birds were-singing.
‘The mouse followed a hare, and birds were singing.’

b. Unsupportive context \([S_{\text{new}} \text{ VO}_{\text{given}}]\)

Lotta etsi eilen sieniä metsässä.
Lotta looked-for yesterday mushrooms forest-in.
‘Lotta looked for mushrooms yesterday in the forest.’

Hän huomas heinikossa jäniksen joka liikkui varovasti eteenpäin.
She.NOM noticed grass-in hare.ACC that was moving carefully forward.
‘She noticed in the grass a hare that was moving carefully forward.’

<target>
Hiiri seurasi jänistä ja linnut lauloivat.
Mouse-NOM followed hare-PART, and birds were-singing.
‘A mouse followed a hare, and birds were singing.’

(11) Finnish: Noncanonical (or scrambled) word order

a. Supportive context \([O_{\text{given}} \text{ VS}_{\text{new}}]\)

Lotta etsi eilen sieniä metsässä.
Lotta looked-for yesterday mushrooms forest-in.
‘Lotta looked for mushrooms yesterday in the forest.’

Hän huomas heinikossa jäniksen joka liikkui varovasti eteenpäin.
She-NOM noticed grass-in hare-ACC that was moving carefully forward.
‘She noticed in the grass a hare that was moving carefully forward.’

<target>
Jänistä seurasi hiiri ja linnut lauloivat.
Hare-PART followed mouse-NOM, and birds were-singing.
‘A hare was followed by the mouse, and birds were singing.’
b. Unsupportive context \([O_{new} \text{ VS} \text{ given}]\)

Lotta etsi eilen sieniä metsässä.
Lotta looked for yesterday mushrooms forest-in.
‘Lotta looked for mushrooms yesterday in the forest.’

Hän huomasi heinikossa hiiren joka liikkui varovasti eteenpäin.
She-NOM noticed grass-in mouse-ACC that was moving carefully forward.
‘She noticed in the grass a mouse that was moving carefully forward.’

Jänistä seurasi hiiri ja linnut lauloivat.
Hare-PART followed mouse-NOM, and birds were singing.
‘A hare was followed by a mouse, and birds were singing.’

They hesitated to accept that the processing difficulty found in previous studies on scrambling is primarily due to the complexity or relative infrequency of scrambled structures. Instead, they hypothesized that the difficulty found in processing scrambled sentences is due to the fact that the target sentences lacked context. This hypothesis generates predictions that providing supportive context should remove the difficulty associated with scrambling, even though their explicit prediction was that “the establishment of a discourse that satisfies the presuppositions of such structures ought to greatly mitigate any processing difficulty” (Kaiser and Trueswell 2004:122).

The results showed that at the first argument position (region 1), there was a significant effect of context but no effect of word order: sentences with supportive context were read faster than sentences with unsupportive context. The lack of word order effect was expected because it was not possible for participants to notice the sentence had noncanonical word order at the first region (some Finnish verbs are known to take partitive-marked subjects).

At the verb position (region 2), there was again a significant effect of context: sentences with supportive context were read faster than sentences with unsupportive
context. The effect of word order was also significant: canonical word orders were read faster than noncanonical word orders. Crucially, however, the interaction between word order and context was not significant.

At the second argument position (region 3), there was a marginal effect of context: sentences with supportive context were read faster than sentences with unsupportive context. The effect of word order was significant: canonical word orders were read faster than noncanonical word orders. The interaction between word order and context was significant in the subject analysis, but not in the item analysis. Pairwise comparison showed that the effect of word order was significant in unsupportive contexts but not in the supportive contexts.

At region 4, the effect of context was marginal both in the subject and the item analysis. The effect of word order was significant in the subject analysis, and marginal in the item analysis. The interaction of these two factors was significant in the subject analysis, but not in the item analysis. Pairwise comparison showed that the effect of word order was significant in unsupportive contexts but not in the supportive contexts.

Region 5 has a similar pattern as regions 3 and 4. There was no effect of context, but the effect of word order was significant. The interaction between those two factors was also significant. Pairwise comparison showed that the effect of word order was significant in unsupportive contexts but not in the supportive contexts.

Now let us consider how the results fit with Kaiser and Trueswell’s hypothesis that the difficulty associated with processing scrambled sentences is due to the fact that the target sentences were provided without a discourse context. In particular, let us consider the predictions that parsers should not have any difficulty in processing
scrambled sentences in supportive contexts, whereas they should in unsupportive contexts, which in turn should result in an interaction between word order and context. These predictions were borne out from region 3 to region 5, but not at region 2. That is, the difficulty associated with scrambling was alleviated at regions 3 to 5, but it remained at region 2. The fact that their predictions were not borne out at region 2 is critical because region 2 is the point where parsers encountered the first evidence that some of the sentences were scrambled. Thus, the lack of the interaction effect between word order and context at region 2 casts doubt on Kaiser and Trueswell’s (2004) hypothesis. Instead, it suggests that there may exist inherent structural difficulty associated with the comprehension of scrambling, or more properly, that the effect of context is constrained to later stages of processing even though the initial comprehension difficulty attributed to scrambling can be subsequently alleviated by discourse factors.

To summarize, Kaiser and Trueswell (2004) found that the comprehension difficulty associated with scrambling was reduced by discourse factors, particularly by manipulating given/new information status of scrambled phrase, but that the difficulty was not entirely eradicated at the earliest stages of comprehension.

3.2.4 Clifton and Frazier (2004)

In order to investigate the effect of English word order, Clifton and Frazier (2004) measured the reading times of English double accusative constructions (NP NP) and their corresponding prepositional phrase (NP PP) constructions while varying the definiteness/indefiniteness of noun phrases. They chose a speeded acceptability judgment task, in which participants read whole sentences as quickly as possible and then
judged whether the sentence was acceptable or not. The test items for their first experiment are exemplified in (12a–d).

(12) Clifton and Frazier’s (2004) example sentences for experiment 1
   a. The pitcher threw the umpire a ball.
   b. The pitcher threw an umpire the ball.
   c. The pitcher threw the ball to an umpire.
   d. The pitcher threw a ball to the umpire.

Sentences such as (12a) and (12b) are considered to be double accusative constructions because the verb *threw* takes two noun phrases (one NP for the goal, one NP for the theme) as its arguments. In sentences such as (12c) and (12d), only the theme is realized as an NP and the goal takes the form of a prepositional phrase (PP).

Clifton and Frazier found a highly significant interaction of word order and the definiteness of noun phrases. Whereas definite-before-indefinite was accepted more quickly and more often than indefinite-before-definite for the double-NP structure (as in (12a) and (12b)), the opposite held for the NP-PP structure. The preference for indefinite-before-definite in the NP-PP construction was also significant.

Clifton and Frazier (2004) noticed that it could be a possible confound to not provide a supportive context to build up “givenness.” They reasoned that their results might just reflect the anomaly of using a definite NP to introduce an entity into a nonexistent discourse context. Thus, in their second experiment, they presented a one-sentence context that served to make the definite NP of the experimental sentences refer to a given discourse entity, as shown in (13).
(13) Clifton and Frazier’s (2004) example sentences for experiment 2
   a. All the players were watching an umpire.  
      The pitcher threw the umpire a ball.
   b. The catcher tossed a ball to the mound. 
      The pitcher threw an umpire the ball
   c. The catcher tossed a ball to the mound. 
      The pitcher threw the ball to an umpire.
   d. All the players were watching an umpire.  
      The pitcher threw a ball to the umpire.

Clifton and Frazier found a significant interaction of word order and definiteness of noun phrases, as in their first experiment. The given-before-new advantage was significant for double accusative constructions, but not for the NP-PP constructions. However, the advantage of new-before-given order for the NP-PP constructions that was detected in their first experiment vanished unexpectedly. Clifton and Frazier integrated the results from these two experiments: (1) the effect of new-before-given advantage for the NP-PP constructions found in their first experiment somehow reflected the anomaly of using a definite NP to refer to an entity that was not introduced into a discourse context, and (2) the given-before-new advantage was limited to double-accusative constructions.

In their third experiment, Clifton and Frazier tested whether the given-before-new advantage carries over to heavy NP shift sentences by using the same kind of task, i.e., a speeded acceptability judgment task. In this experiment, they did not provide a preceding context. A set of examples is shown in (14).

(14) Clifton and Frazier’s (2004) example sentences for experiment 3
   a. The pitcher threw to the umpire a badly damaged baseball.
   b. The pitcher threw to an umpire the badly damaged baseball.
   c. The pitcher threw to the umpire the badly damaged baseball.
   d. The pitcher threw to an umpire a badly damaged baseball.
The results showed that definite-before-indefinite was accepted more quickly than indefinite-before-definite for the heavy NP shift structure. Thus, the given-before-new advantage observed in the double accusative constructions was extended to the heavy NP shift constructions.

To summarize, Clifton and Frazier (2004) found that the given-before-new advantage appears in English double-object constructions and heavy NP shift constructions but the effect was not extended to NP-PP constructions.

The findings of Clifton and Frazier (2004) raise several questions. First, why does the given-before-new advantage appear in only some English constructions? Second, would the given-before-new advantage be found in other languages, in particular those that are structurally different from English, such as flexible word order languages? A third question has to do with whether the given-before-new advantage appears in production, which in turn raises the question whether the given-before-new advantage is basically comprehension-oriented or production-oriented.

3.2.5 Ferreira and Yoshita (2002)

Whereas the studies introduced above tested how scrambling or noncanonical word order affects sentence comprehension, Ferreira and Yoshita (2002) investigated how it affects production. In particular, they explored how the given-before-new advantage influences the production of Japanese scrambled sentences. Following the design of Bock and Irwin (1980), they adopted a sentence recall task, in which speakers were presented with a full set of twenty-four eliciting sentences, such as (15), and then
presented with all twenty-four targets, such as (16). The participants were instructed to remember the targets and to provide each target as an answer for the corresponding eliciting sequence in the third phase. Lastly, speakers were again presented with the same twenty-four eliciting sequences in the same order heard in the first phase. This time, they were asked to produce a suitable answer from target lists they heard in the second phase.

(15) Japanese: Ferreira and Yoshita’s (2002) eliciting sentence-question sequences

a. Dative marked NP with the same form as the target

okusan-ga otetsudaisan-ni kanshashiteita.
housewife-NOM housekeeper-DAT was grateful

sorekara doushita?
What happened next?

‘The housewife was grateful to the housekeeper. What happened next?’

b. Dative marked NP with a different form from the target

okusan-ga meidosan-ni kanshashiteita.
housewife-NOM housemaid-DAT was grateful

sorekara doushita?
What happened next?

‘The housewife was grateful to the housemaid. What happened next?’

c. Accusative marked NP with the same form as the target

okusan-ga purezento-o katta. sorekara doushita?
Housewife-NOM present-ACC bought What happened next?

‘The housewife bought a present. What happened next?’

d. Accusative marked NP with the different form from the target

okusan-ga okurimono-o katta. sorekara doushita?
housewife-NOM gift-ACC bought What happened next?

‘The housewife bought a gift. What happened next?’
Japanese: Ferreira and Yoshita’s (2002)’s target sentences

a. Canonical

okusan-ga otetsudaisan-ni purezento-o okutta
housewife-NOM housekeeper-DAT present-ACC gave
‘The housewife gave the housekeeper a present.’

b. Scrambled

okusan-ga purezento-o otetsudaisan-ni okutta
housewife-NOM present-ACC housekeeper-DAT gave
‘The housewife gave a present to the housekeeper.’

Their dependent measure was a shift in the relative order of dative-marked NP and accusative-marked NP when speakers recalled target sentences.

Their results were as follows. First, targets were recalled with shifted word orders more often when the originally presented sentence was new-given structure compared to when it was given-new. Second, targets presented with new-given structure were produced with shifted word orders more often when the given argument was previously mentioned both in the same form and in the different form. Third, although speakers produced shifted word order more with new-given structure rather than with given-new structure, both in the same form and in the different form, the effect was larger in the same form condition than in the different form condition.

To summarize, given information tends to be produced earlier, either as an indirect object or a direct object, than new information in Japanese dative sentences. Thus, Ferreira and Yoshita (2002) found that the given-before-new advantage carries into sentence production in Japanese. Their work raises a question whether there exists a given-before-new preference in Japanese sentence comprehension, as well as in Korean sentence comprehension.
3.3 Conclusion

In free word order languages such as Japanese (Mazuka, Itoh, and Kondo 2002; Miyamoto and Takahashi 2002) and Finnish (Kaiser and Trueswell 2004), it was observed that canonical word order sentences are read faster than noncanonical word order sentences. In Finnish, it was found that the reading times in comprehending noncanonical word order sentences were affected by discourse factors.

In fixed word order languages such as English, it was observed that definite-before-indefinite (or perhaps given-before-new) order in double accusative constructions and heavy NP shift constructions are comprehended faster than the opposite (new-before-given) order by assuming a correlation between definiteness and givenness (Clifton and Frazier 2004). However, the preference for the given-before-new order was not carried over to prepositional phrase constructions. The given-before-new advantage was also found in the sentence production of Japanese (Ferreira and Yoshita 2002).

This chapter has introduced research showing that information status, in particular givenness/newness, influences sentence order. In the next chapter, we introduce research suggesting that contrastiveness affects sentence order as well.
CHAPTER 4

THE EFFECT OF CONTRASTIVE FOCUS ON SCRAMBLING

In the previous chapter I discussed the influence of givenness/newness on the comprehension and the production of scrambled sentences. This chapter investigates how contrastive focus affects constituent order.

Although there is a great deal of research from theoretical and experimental linguistics on scrambling and other word order variations, there has been not much research on the relation between scrambling and contrastive focus. The research previously done on this subject has been concentrated within formal linguistics, so nothing has been done to show how contrastive focus affects the interpretation of scrambling, particularly during the real time course of sentence processing. In this chapter, I will show that contrastive focus is closely associated with scrambling.

The organization of the chapter is as follows: I review relevant studies on contrastive focus and its relation with scrambling in German and Korean in sections 4.1 and 4.2, respectively. Evidence is provided in section 4.3 showing that wh-phrases are also contrastively focused. Finally, in section 4.4, I introduce empirical observations suggesting that contrastive focus affects the interpretation of scrambled sentences.
4.1 German

It has been observed that any element of a sentence can be focused in its canonical position, whereas a scrambled phrase cannot be focused. This contrast between noncanonical word order and scrambled word order is shown in (1) and (2) (Lenerz 1977:20-21; Choi 1999:67-68).

(1) German: A time adverb in focus
   a. Wann hast du das Buch gelesen?
      when have you the book read
      ‘When did you read the book?’
   b. Canonical word order
      Ich habe GESTERN das Buch gelesen.
      I have yesterday the book read
      ‘I read the book yesterday.’
   b’. Scrambled word order
      Ich habe das Buch GESTERN gelesen.
      I have the book yesterday read
      ‘I read the book yesterday.’

(2) German: A theme in focus
   a. Was hast du gestern gelesen?
      What have you yesterday read
      ‘What did you read yesterday?’
   b. Canonical word order
      Ich habe gestern das BUCH gelesen.
      I have yesterday the book read
      ‘I read the book yesterday.’
   b’. Scrambled word order
      *Ich habe das BUCH gestern gelesen.
      I have the book yesterday read
      ‘I read the book yesterday.’

As stated later in this section, Moltmann (1990) observed that scrambled phrases can be contrastively focused. This observation can be paraphrased as ‘a scrambled phrase cannot be informationally focused.’ See Table 1.1 in Section 1.1 for the difference between contrastive focus and information focus.
The answer to the question in (1a) should be about the time of the event. Accordingly, the time adverb, *gestern* ‘yesterday’, has a focus both in the answer (1b), with canonical word order and in the answer (1b’), with scrambled word order. In the canonical word order, in (1b), the time adverb *gestern* ‘yesterday’ precedes the direct object *das Buch* ‘the book’. In contrast, the time adverb *gestern* follows *das Buch* ‘the book’ in a scrambled word order such as that in (1b’), where *das Buch* ‘the book’ is assumed to have scrambled over the focused element *gestern*. Notice that both (1b) and (1b’) are grammatical.

Whereas question (1a) is about time, question (2a) is about the theme ‘what is read’. Accordingly, the theme *das Buch* ‘book’ is predicted to have a focus both in (2b)—canonical word order—and in (2b’)—scrambled word order. Notice that (2b’) parallels (1b’), so *das BUCH* ‘the book’ is assumed to have scrambled over *gestern* ‘yesterday’, as in (1b’). The focused item *das Buch* is in canonical position in (2b), whereas it is in scrambled position in (2b’). As indicated by the asterisk, (2b’) is not acceptable. This is because a scrambled phrase must be (informationally) nonfocused in Germanic languages (Lenerz 1977; Webelhuth 1992; Choi 1999, among others). This has been called as the **antifocality effect** (Choi 1999).

The antifocality effect also appears in ditransitive constructions as shown in (3) and (4) (Lenerz 1977:43; Choi 1999:68-69).

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9 I follow the standard idea that adjuncts do not scramble, but only arguments scramble.
German ditransitive construction: A recipient in focus

a. Wem hast du das Geld gegeben?
   whom have you the money given
   ‘Who did you give the money?’

b. Canonical word order
   Ich habe dem KASSIERER das Geld gegeben.
   I have the cashier the money given
   ‘I gave the cashier the money.’

b’. Scrambled word order
   Ich habe das Geld dem KASSIERER gegeben.
   I have the money the cashier given
   ‘I gave the money to the cashier.’

The set of question and answers in (3) is about the recipient, ‘to whom the money was given’, and thus the focus is given to the ‘cashier’ both in (3b)—canonical word order—and in (3b’)—scrambled word order. The nonfocused direct object das Geld ‘the money’ has scrambled over the indirect object dem Kassierer ‘the cashier’ in (3b’). Neither (3b) nor (3b’) violates the antifocality effect, which requires a scrambled phrase to be nonfocused.

In contrast, the question and answers in (4) are about the theme ‘what was given’, and thus the focus is given to das Geld ‘money’ both in (4b)—canonical word order—and (4b’)—scrambled word order. (4b) is acceptable but (4b’) is not, because the scrambled phrase das Geld ‘the money’ is in (information) focus and thus violates the antifocality requirement, which requires a scrambled phrase to be nonfocused.
(4) German ditransitive construction: A theme in focus

a. Was hast du dem Kassierer gegeben?
   what have you the cashier given
   ‘What did you give the cashier?’

b. Canonical word order
   Ich habe dem Kassierer das GELD gegeben.
   I have the cashier the money given
   ‘I gave the cashier the money.’

b’. Scrambled word order
   *Ich habe das GELD dem Kassierer gegeben.
   I have the money the cashier given
   ‘I gave the money to the cashier.’

In sum, the sentences (1) through (4) seem to suggest that a scrambled phrase cannot be focused and tend not to be interpreted as new information.

However, Moltmann (1990:15-16) indicates that focused phrases, especially contrastively focused phrases, can scramble or be positioned out of their canonical positions in German, as shown below.

(5) German ditransitive construction: A theme in contrastive focus

a. Canonical word order
   Hans hat dem Mann ein buch gegeben.
   Hans has the man (DAT) a book (ACC) given
   ‘Hans gave a book to the man.’

b. Scrambled word order
   Hans hat ein BUCH dem Mann gegeben (nicht eine ZEITUNG).
   Hans has a book the man given (not a newspaper)
   ‘Hans gave a BOOK to the man (not a NEWSPAPER).’

In (5a), the canonical word order in German, a dative-marked NP dem Mann ‘the man’ precedes an accusative-marked NP ein buch ‘a book’, whereas the accusative-marked NP precedes the dative-marked NP in (5b), a scrambled sentence. In (5b), the scrambled NP ein Buch ‘a book’ is focused, carrying a focus accent, and this seems to violate the
antifocality requirement. However, notice that the focused phrase *ein BUCH* ‘a book’ in (5b) is contrasted with another phrase, *eine ZEITUNG* ‘a newspaper’, demonstrating that the focused phrase carries contrastive focus, rather than information focus. Bear in mind that contrastive focus is different from information focus. Information focus simply provides an answer to fill an informational gap, whereas contrastive focus denies an established proposition either explicitly or implicitly and provides a new answer (Lambrecht 1994; Choi 1999; Cowles 2003, among others). Therefore, the antifocality requirement prevents a scrambled phrase from being in informational focus, but leaves open the possibility that it can be in contrastive focus (Moltmann 1990; Choi 1999, among others).

4.2 Korean

Based on the research on German scrambling mentioned in the previous section, Choi (1999) tried to provide a unified account of German and Korean scrambling relying on information structure and optimality theory. She observed that there is an apparent problem: why do both topic (given information) and contrastive focus (focus, new information) tend to scramble in German (recall that given information tends to come before new information as discussed in Chapter 3)? To solve the apparent problem, she factored out PROMINENCE as a factor affecting scrambling in German. Choi’s definition of PROMINENCE, once again, is as a property of “being singled out among potential alternatives” (Choi 1999:90). Choi observed that topic is a singled-out element of a sentence to be predicated of among several possible alternative topics. Likewise, it is
known that contrastive focus triggers an alternative set and it is itself a singled-out element among that set (Rooth 1996).

Choi extended this account to Korean and proposed that the Korean “topic” marker –*nun* is a prominence marker. Traditionally, -*nun* is called a “topic” marker and is said to mark a topic in sentences such as (6), but it has also been observed to carry contrastive focus in sentences such as (7).

(6)  Korean: –*nun* as a topic marker

a. Chelswu-nun onul hakkyo-ey ka-ki-ka silh-ta.
   Chelswu-TOP today school-LOC go-NML-NOM dislike-DC
   ‘Chelswu doesn’t like to go to school today.’

b. Yenghui-nun sonnye-ka cinanhay tayhak-ey tuleka-ss-ta.
   Yenghui-TOP grand.daughter-NOM last year university-LOC enter-PST-DC
   ‘As for Yenghui, her granddaughter entered a university last year.’

(7)  Korean: –*nun* as a contrastive marker

   Yenghui-NOM cola-TOP drink-PST-DC
   ‘Yenghui drank cola (but not beer).’

b. Yenghui-ka Chelswu-nun cohaha-n-ta.
   Yenghui-NOM Chelswu-TOP like-PRES-DC
   ‘Yenghui likes Chelswu (but not Minho).’

Choi explains this multiple distinct usage of -*nun* by saying that it is a prominence marker. As such, it can encode both topic, as in (6), and contrastive focus, as in (7).

Furthermore, Choi argues that the feature [+prom] motivates scrambling. Since both Topic and Contrastive Focus have the feature [+prom], they are able to undergo scrambling. This leads us to predict that a scrambled sentence is at least two-way ambiguous; that is, a scrambled phrase may be interpreted as topic or contrastive focus. This prediction too is borne out. Choi observed that Korean scrambled sentences are
ambiguous between a topic interpretation and a contrastive focus interpretation as shown in (8b).

(8) Korean

a. Canonical word order
   Swuni-ka Minho-lul cohaha-y.
   Swuni-NOM Minho-ACC like-DC
   ‘Swuni likes Minho.’

b. Scrambled word order
   Minho-lul Swuni-ka cohaha-y.
   Minho-ACC Swuni-NOM like-DC
   ‘As for Minho, Swuni likes him.’ (topic interpretation)
   ‘It is Minho that Swuni likes.’ (contrastive focus interpretation)

(8a) has a canonical word order whereas (8b) has a scrambled word order. As shown in the corresponding English interpretations, the scrambled sentence (8b) has two different interpretations: a topic interpretation and a contrastive interpretation. The two distinct interpretations are predicted to have two different prosodic patterns, too, but that is beyond the current study and open to further research.

To sum up, Choi explains that topic and contrastive focus share a common property—prominence—defined as “being singled out among an alternative set,” and claimed that the feature [+prom] motivates scrambling both in German and Korean.

In the next section, I provide evidence from prosody, syntax, and semantics to show that wh-phrases are associated with contrastive focus.

4.3 Wh-phrases and contrastive focus

It has often been suggested that wh-phrases are related to contrastive focus. The evidence comes from prosody, syntax/semantics, and old Japanese.
4.3.1 Prosodic similarities

This section shows that \(wh\)-phrases and contrastive focus show a parallel in prosodic behavior. This suggests that \(wh\)-phrases and contrastive focus share a common property. I will begin by introducing some basic prosodic phenomena and then discuss prosodic similarities between \(wh\)-phrases and contrastive focus.

It has been observed that fundamental frequency (\(F_0\)) has a general tendency to decline during an utterance (Poser 1984, among others), as mentioned in Section 3.1.2. This downtrend is called DECLINATION (it is also often called DOWNSTEP or CATATHESIS). Furthermore, pitch register is reset upwards at the left edge of each new domain for declination in Japanese, which makes \(F_0\) rebound from decline each time a new domain boundary occurs in an utterance (Pierrehumbert and Beckman 1988).

It is also well known that focus (or narrow focus) has prosodic effects cross-linguistically. A focused item generally has a longer duration, higher amplitude, and a larger pitch range than a neutral item (Jun 1993). Contrastiveness, contrastive focus, or focus is marked phonologically as well. For instance, Jun (1989, 1993) claimed that focus becomes the left head of an Accentual Phrase (=AP) in Korean, and that any following words tend to be dephrased. Furthermore, Jun and Lee (1998) found that “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” (Jun and Lee 1998:1295).
In a similar vein, Ladd (1996) and Ishihara (2000, 2001) point out that an emphatic (or focal) accent is accompanied by suppression of following lexical accents in Japanese. The high tones (H) of lexical accents are suppressed when an emphatic accent precedes them. This makes the lowest pitch associated with the emphatic accent stretch to the right boundary of a relevant phrase. Let us compare nuclear accent and focus accent as shown in (9) and (10). These sentences are developed in Korean based on Japanese sentences chosen from Deguchi and Kitagawa (2002:74-75). Suppression is marked by ‘↓___↓’.

(9) Korean: Default accent
   a. MAry-nun [VP Achim-ulo THOsuthu-lul ↓mekessta↓]-KO↑?
      -TOP breakfast-for toast-ACC ate-Q
      ‘Did Mary have toast for breakfast?’
   b. MAry-nun Achim-ulo THO’suthu-lul ↓mekessta↓]-KO↑?
      [suppression]

(10) Korean: Focus prosody
   a. Uh?! MAry-nun [VP ↓achim-ulo chuethang-ul mekessta↓]-kO↑?
      what -TOP breakfast-for fish.stew-ACC ate -Q
      ‘What?! You mean MARY had fish stew for breakfast?’
   b. MAry-nun ↓achim-ulo chuethang-ul mekessta↓ KO↑?
      [suppression → ←]

In the default case in (9), thosuthu ‘toast’ corresponds to the RHEME (i.e., new information) since the rhyme is known to appear at preverbal position in head final languages such as Japanese and Korean (Kim 1985a, 1985b), and accordingly thosuthu is in information focus. As a result, the high tone of mekessta ‘ate’ in (9) is suppressed. On the other hand, in focus prosody such as (10), Mary has an emphatic focus, presumably for a discourse-related reason. Notice that the emphatic focus associated with Mary
suppresses the lexical accent of the following words up to the right boundary of the clausal structure, as shown in (10b).

Furthermore, Deguchi and Kitagawa (2002) found that the prosody of focus behaves in a similar way to the prosody of \textit{wh}-phrases. A bi-clausal sentence that includes the focus marker \textit{only} can be produced in the two ways indicated in (11a) and (11b).

(11) Japanese: Focus with \textit{dake} ‘only’

a. Long Emphatic Prosody
   [konyano-ryoori-no-nakade,] ‘Among the dishes served tonight,’
   [{IP boku-\textit{wa} [IP \textit{U’ni-daKE’-ga ↓uma‘i]-to oMOW-a’na-katta↓}-zE↑}
   I-TOP sea.urchin-ONLY-NOM delicious-COMP didn’t.think -EMP
   ‘sea urchin was the only delicious food that I didn’t find delicious.’
   (FOCUS > NEG)

b. Short Emphatic Prosody
   [konyano-ryoori-no-nakade,] ‘Among the dishes served tonight,’
   [{IP boku-\textit{wa} [IP \textit{U’ni-daKE’-ga ↓uma‘i]-to oMOW-A’na-katta]-zE↑}
   I-TOP sea.urchin-ONLY-NOM delicious-COMP didn’t.think -EMP
   ‘I didn’t think that the sea urchin was the only delicious food.’
   (NEG > FOCUS)

In (11a), the lexical accent of all the words following \textit{only} is suppressed up to the end of the matrix clause, and it is interpreted so that focus has wide scope over negation as shown in the English translation. In contrast, the lexical accents of following words are suppressed only up to the end of the embedded clause in (11b), and negation has wide scope over focus). A similar pattern appears in an embedded \textit{wh}-question, as shown in (12).
(12) Japanese: Wh-question
a. Long Emphatic Prosody in direct wh-question

[JO’hn-wa [MA’y-ry-ga NAKi-o ↓ era’nda-t0] i’mademo omo’tteiru↓ nO↑]?
-TOP -NOM what-ACC selected-COMP even.now think -Q

‘What does John still think that Mary selected?’

a’. Short Emphatic Prosody in direct wh-question

# [JO’hn-wa [MA’y-ry-ga NAKi-o ↓ era’nda-t0] ↓ i’mademo omo’tteiru-nO↑]?
-TOP -NOM what-ACC selected-COMP even.now think -Q

‘What does John still think that Mary selected?’

b. Short Emphatic Prosody in indirect wh-question

[JO’hn-wa [MA’y-ry-ga NAKi-o ↓ era’nda-ka] ↓ i’mademo omo’tteiru-nO↑]?
-TOP -NOM what-ACC selected-COMP even.now think -Q

‘Doesn’t John know yet what Mary selected?’

b’. Long Emphatic Prosody in indirect wh-question

# [JO’hn-wa [MA’y-ry-ga NAKi-o ↓ era’nda-t0] ↓ i’mademo omo’tteiru↓ nO↑]?
-TOP -NOM what-ACC selected-COMP even.now think -Q

‘Doesn’t John know yet what Mary selected?’

In (12a), the lexical accent on all the words following nani ‘what’ is suppressed up to the end of the matrix clause, and the wh-phrase is interpreted in the matrix clause as shown in (12a). If the suppression is just up to the embedded clause with the same intended interpretation, (12a’) would be unacceptable. In contrast, if the suppression is up to the embedded clause in (12b), the wh-phrase is interpreted in the embedded clause. If the suppression is up to the matrix clause with the same meaning, it is unacceptable as shown in (12b’). The data in (12) show that short emphatic prosody can accompany an embedded wh-question only when the wh-phrase, as a focus, takes embedded scope.

Thus, the parallel between focus scope (11) and wh-scope (12) suggests that there exists a common property between the two. Deguchi and Kitagawa (2002) claim that a wh-question involves focus at least in default cases. This is consistent with Ishihara (2000), who proposes that focus is the norm of wh-questions in general. These findings
on Japanese prosody and syntax carry over to Korean, which is not striking if we consider that Japanese and Korean behave similarly in syntax and prosody.

However, the prosodic parallel between contrastive focus and *wh*-phrase described above does not necessarily mean that *wh*-phrases are contrastively focused. Instead, it might suggest only that they are both scope-bearing items. Thus, the next section further explores the similarities of contrastive focus and *wh*-phrases in the syntax and semantics of some European languages and Old Japanese.

4.3.2 Syntactic and semantic similarities

The previous section presented a parallel in prosodic behavior between focus and *wh*-questions, suggesting that focus and *wh*-questions share a common property. This section intends to show the syntactic and semantic similarities of contrastive focus and *wh*-phrases.

The discussion is mainly based on Italian and Serbo-Croatian. This may raise the question of whether these findings could be extended to other languages, for example, Korean. However, it has often been suggested (and found) that there are language universals or universal processing mechanisms, which opens up the possibility that the relation between contrastive focus and *wh*-phrases is a universal phenomenon. More research needs to be done to prove the claim, but it is worthwhile to consider studies which suggest that contrastive focus and *wh*-phrases show some syntactic and semantic similarities in some languages.
4.3.2.1 Rizzi (1997)

Rizzi (1997) claimed that contrastive focus and *wh*-phrases compete for the same position by using evidence from Italian. This suggests that contrastive focus and *wh*-phrases share some common property.

Based on the assumptions of generative grammar that there is no optional movement, Rizzi proposed that every movement to the left periphery of a clause must be motivated by some feature such as [topic] or [(contrastive) focus]. The topic feature licenses a topicalized phrase and the (contrastive) focus feature licenses a focalized phrase. Thus, he suggested the configuration shown below for languages in general.

(13) Rizzi’s (1997) configuration for a clause

```
Force P
   Force
   TopP*
   Top°
   FocP
   Top°
   TopP*
   Foc°
   IP (S or clause)
   Top°
```

The configuration (13) has multiple slots at the left periphery of a clause (IP). For instance, the highest head is reserved for Force, which encodes the clause type such as declarative and interrogative. He also suggested that there exist an indefinite number of heads for topic, but a unique head for focus, based on his observations of Italian data.
What is relevant for our discussion here is that a *wh*-phrase in a main question can co-occur with a topic in Italian, but not with a focus, as shown in (14) and (15).

(14) Italian: Topic and *wh*-phrases

A Gianni, che cosa gli hai detto?
‘To Gianni, what did you tell him?’

(15) Italian: Focus and *wh*-phrases

a. *A GIANNI che cosa hai detto (, non a Piero)?
   ‘To GIANNI what did you tell (, not to Piero)?’

b. *Che cosa A GIANNI hai detto (, non a Piero)?
   ‘What To GIANNI did you tell (, not to Piero)?’

Sentence (14) shows that the topic phrase *a Gianni* can co-occur with the *wh*-phrase *che cosa* ‘what’. In contrast, sentences (15a) and (15b) show that the focused phrase *A GIANNI* can neither precede nor follow the *wh*-phrase. Thus, (15) shows that a focused phrase is not compatible with a *wh*-phrase. To account for the phenomenon, Rizzi proposed that (contrastive) focus and *wh*-phrases compete for the same position, which suggests that they share a common property.

4.3.2.2 Stjepanović (1998) and Bošković (1999)

Stjepanović (1998) shows that contrastively focused non-*wh*-phrases must move overtly in Serbo-Croatian. In addition, she claimed that *wh*-phrases are inherently focused in Serbo-Croatian and therefore must undergo focus movement. Bošković (1999:162) also mentioned that a similar phenomenon was found in a number of other languages, including Aghem, Basque, Hungarian, Somali, and Quechua (Horvath 1986; Rochemont 1986; Kiss 1995). Horvath (1986) also argues that if a language has a special position for contrastively focused phrases, *wh*-phrases will move to that position.
Furthermore, it has been suggested that there is a similarity in the interpretation of \textit{wh}-phrases and contrastively focused phrases (Bošković 1999, among others). Whereas simple new information (i.e., information focus) does not project an alternative set, contrastive focus does project an alternative set. In a similar vein, Bošković claimed that the set over which the focus operates is closed with contrastive focus, in contrast to simple new information (Bošković 1999:162). This claim is consistent with many other studies such as Rooth (1996), who suggested that contrastive focus is defined as “having an alternative set.”

Stjepanović (1998) noticed that a similar situation is found with \textit{wh}-phrases, whose value is drawn from an inferable and therefore closed set of items, delimited by the question itself. Thus, Stjepanović suggested that both contrastive focus and a \textit{wh}-phrase share a semantic property of “having a closed set over which a value is drawn.” This in turn reminds us of Choi’s (1999:90) definition of \textsc{Prominence} as “being singled out among potential alternatives” (See Section 2.3).

4.3.2.3 Focus particle \textit{-ka} in Old Japanese

The last piece of evidence showing that focus shares a common property with \textit{wh}-phrases comes from Old Japanese, in which the focus particle \textit{-ka} used to be attached to \textit{wh}-words and focused words (Nomura 1993; Watanabe 2001). The focus particle \textit{-ka} is attached to a \textit{wh}-word in (16a), and to a focused word in (16b).
Old Japanese: Focus particle -ka

a. Kasugano-no fuji-ha chiri-ni-te nani-wo-ka-mo mikari-no
   Kasugano-GEN wisteria-TOP fall-PERF-CONJ what-ACC-KA-MO hike-GEN
   Hito-no ori-te kazasa-mu?
   Person-NOM pick-CONJ wear.on.the.hair-will
   ‘Since the wisteria flowers at Kasugano are gone, what should hikers pick and wear on the hair?’
   (Man’youshuu #1974)

b. ...Hatsuse-no kawa-ha ura na-mi-ka fune-no yori-ko-nu?
   Hatsuse-GEN river-TOP shore absent-ness-KA boat-NOM approach-come-NEG
   ‘Is it because Hatsuse River has no shore that no boat comes near?’
   (Man’youshuu #3225)

Watanabe (2001) claimed that the -ka particle has a focus feature, which caused an overt wh-/focus movement in Old Japanese. Thus, the fact that a focus particle is attached to focus and wh-phrases in Old Japanese suggests that focus is closely associated with wh-phrases.

To summarize so far, prosodic, syntactic, and semantic evidence shows that there is a parallel between focus and wh-phrases in a number of languages. This does not necessarily mean that the similarity between contrastive focus and wh-phrases is extended evenly to all other languages including Korean, but nevertheless it suggests that there is a possibility that the phenomenon can be universal due to the semantics and/or a sort of universal processing mechanism.

In the next section, I introduce an empirical study suggesting a parallel between contrastive focus and wh-phrases with respect to scrambling in Japanese.
4.4 Contrastive focus, *wh*-phrases, and scrambling

There has been some work on the effect of given (old) information on scrambling, as discussed in Chapter 3, whereas nothing has been reported on the effect of contrastive focus on scrambling in psycholinguistic studies, to my knowledge. A relevant but indirect study on the issue was done by Aoshima, Phillips, and Weinberg (2004). They investigated the effect of *wh*-phrases in Japanese long-distance scrambling, by examining the Filled Gap Effect (Stowe 1986) and the Typing Mismatch Effect (Miyamoto and Takahashi 2000, 2003).

The filled-gap effect was observed by Stowe (1986), who observed slower reading times for the pronoun *us* in the *wh*-fronting condition (17b), relative to a control condition that did not involve *wh*-fronting (17a).

(17) English: Filled-gap effect

a. My brother wanted to know if Ruth will bring us home to Mom at Christmas.
b. My brother wanted to know who Ruth will bring us home to ___ at Christmas.

The slowdown is expected if the parser actively posits a direct object gap position in (17b) as soon as possible after it encounters the transitive verb *bring*, and hence encounters difficulty when it finds an overt pronoun in the direct object position. This is called the filled gap effect, and it is used frequently in experiments to verify hypotheses related to thematic roles, syntactic movement, and word order variation.

A similar effect is found in Japanese. Based on the finding that languages with in-situ *wh*-phrases require a question particle for interrogatives (Cheng 1991) and that parsers have a general preference for early gaps, Miyamoto and Takahashi (2000) proposed the typing mismatch effect, which may result in a slowdown in reading times.
when a required item does not occur in a predicted position. More specifically, they found that Japanese speakers showed a longer reading time for declarative complementizer conditions such as (18a) compared to interrogative complementizer conditions such as (18b). They attributed the slowdown at the declarative complementizer conditions to the parser’s expectation of finding the interrogative complementizer required by *wh*-phrases as quickly as possible.

(18) Japanese: Typing mismatch effect (Miyamoto and Takahashi 2000)

a. Declarative complementizer

   Senmu-ka   donna-pasokon-o   tukatteiru-to
director-NOM what.kind-computer-ACC using.is-COMP (AFF)

   kakarichoo-ga   ittano?
supervisor-NOM   said-Q

   ‘What kind of computer did the supervisor say the director is using?’

b. Interrogative complementizer

   Senmu-ka   donna-pasokon-o   tukatteiru-ka
director-NOM what.kind-computer-ACC using.is-COMP (Q)

   kakarichoo-ga   ittano?
supervisor-NOM   said-Q

   ‘Did the supervisor ask what kind of computer the director is using?’

Whereas Miyamoto and Takahashi (2000, 2003) tested the typing mismatch effect by using an accusative-marked *wh*-phrase in a mono-clausal sentence, Aoshima et al. (2004) extended the idea to a dative marked *wh*-phrase in a bi-clausal sentence. In particular, they attempted to determine whether dative-marked *wh*-phrases show the typing mismatch effect in long-distance scrambled sentences. In a self-paced reading study using sentences such as (19), they measured reading times at region 5.
Japanese: Aoshima et al.’s (2004) example sentences for experiment 1

a. Scrambled, declarative complementizer

Dono-seito-ni/tannin-wa/koocyoo-ga/hon-o/yonda-to/
which student-DAT/class teacher-TOP/principal-NOM/book-ACC/read-DC/
tosyositu-de/sisyo-ni/iimashita-ka?
library-AT/librarian-DAT/said-Q

‘Which student did the class teacher say to the librarian at the library that the principal read a book for?’

b. Canonical, declarative complementizer

Tannin-wa/koocyoo-ga/dono-seito-ni/hon-o/yonda-to/
class teacher-TOP/principal-NOM/which student-DAT/book-ACC/read-DC/
tosyositu-de/ sisyo-ni/iimashita-ka?
library-AT/ librarian-DAT/ said-Q

‘same as (19a)’

c. Scrambled, interrogative complementizer

Dono-seito-ni/tannin-wa/koocyoo-ga/hon-o/yonda-ka/
which student-DAT/class teacher-TOP/principal-NOM/book-ACC/read-Q/
tosyositu-de/sisyo-ni/iimashita.
library-AT/ librarian-DAT/said

‘The class teacher said to the librarian which student the principal read a book for.’

d. Canonical, interrogative complementizer

Tannin-wa/koocyoo-ga/dono-seito-ni/hon-o/yonda-ka/
class teacher-TOP/principal-NOM/which student-DAT/book-ACC/read-Q/
tosyositu-de/sisyo-ni/iimashita?
library-AT/ librarian-DAT/said

‘same as (19c)’

They predicted that declarative complementizer conditions will show slower reading times at region 5 than interrogative complementizer conditions—the typing mismatch effect—because parsers expect a interrogative complementizer. Their prediction was partially borne out. They found a slower reading time at region 5 for declarative complementizer conditions than for interrogative complementizer conditions in
scrambled conditions. Unexpectedly, the effect was delayed in the canonical conditions: they found a difference of reading times between declarative complementizer conditions and interrogative complementizer conditions not at region 5, but at region 6. They also found a marginal effect of scrambling at region 5: scrambled conditions were read faster than in situ conditions ($F_1 (1, 49) = 2.14, p = .15; F_2 (1, 20) = 4.06, p = .06$).

Aoshima et al. (2004) also found that parsers tend to associate a dative-marked long distance scrambled *wh*-phrase with an embedded clause. In a self-paced reading task using the sentence types exemplified in (20), they found a slowdown at region 5 for scrambled conditions.

(20) Japanese: Aoshima et al’s (2004) example sentences for experiment 2

a. Scrambled condition

Dono-syain-ni/senmu-wa/syacyoo-ga/kaigi-de/
*which employee-DAT/managing director-TOP/president-NOM/meeting-AT/*

kacyoo-ni/syookkyuu-o/yakusokusita-to/iimashita-ka?
*assistant manager-DAT/raise-ACC/promise-DC/told-Q*

‘To which employee did the managing director tell that the president promised a raise to the assistant manager at the meeting?’

b. Control condition

Dono-syain-ga/senmu-ni/gyacyoo-ga/kaigi-de/
*which employee-NOM/managing director-DAT/president-NOM/meeting-AT/*

kacyoo-ni/syookkyuu-o/yakusokusita-to/iimashita-ka?
*assistant manager-DAT/ raise-ACC/promise-DC/told-Q*

‘Which employee told the managing director that the president promised a raise to the assistant manager at the meeting?’

The slowdown at region 5 arises because readers do not expect to encounter another dative NP in the embedded clause after they interpret the *wh*-phrase as being in the embedded clause. The embedded dative NP was read more quickly in the control condition than the scrambled condition. Aoshima et al. suggested that parsers’ tendency
to interpret *wh*-phrases as being in the embedded clause is due to the thematic requirement (the *wh*-phrase must be associated with a thematic role), the scope-fixing requirement, or both.

However, a slightly different analysis can account for their results, too. If a scrambled phrase is associated with contrastive focus (Moltmann 1990, among others), it is plausible that parsers are more likely to interpret sentence initial *wh*-phrases in the embedded clause than in the matrix clause because a *wh*-phrase is a type of contrastive focus and accordingly more likely to be scrambled than being *in situ*. In the scrambled condition, such as (20a), the parsers associate ‘which employee-*DAT’ with the embedded clause, because it is contrastively focused. In contrast, the *wh*-phrase in (20b) is a nominative case–marked NP and thus not easily able to cross another nominative case–marked NP. Thus parsers are not motivated enough to interpret the *wh*-phrase as being scrambled in the control condition with sentences like (20b).

Notice also that ‘managing director-*DAT’ in (20b) can be interpreted as scrambled out of an embedded clause even though it is in canonical position. However, it does not have any focus-related marker, which prevents parsers from being committed to the scrambled analysis.

It is possible to explain the data from (19) in this way, too. In scrambled conditions (19a) and (19c), the scrambled *wh*-phrases can be interpreted as being scrambled. If the *wh*-phrases are contrastively focused (as shown in Section 4.3), it is plausible that the parser is more likely to interpret them as scrambled, and previous evidence (Kamide and Mitchell 1999; Koh 1997) suggests that at least some interpretation are for scrambling out of an embedded clause rather than out of a matrix
clause. So the parsers slow down when they encounter the declarative particle at the embedded verb, presumably because of the typing mismatch effect.

To sum up, Aoshima et al. (2004) found that long-distance scrambled *wh*-phrases tend to be associated with the embedded clause, rather than with the matrix clause. They suggested that parsers’ tendency to interpret *wh*-phrases in the embedded clause is due to a thematic requirement, scope-fixing requirement, or both. However, I propose that there can be an alternative account, by which the tendency is explained by the fact that *wh*-phrases are contrastively focused, and contrastively focused phrases are easily associated with scrambling, and sometimes even long-distance scrambling.

4.5 Conclusion

In this chapter, I showed that scrambling is associated with contrastive focus by considering German, Dutch, Japanese, and Korean evidence. I also suggested that *wh*-phrases are closely related to contrastive focus. The evidence comes from the literature on syntactic, semantic, pragmatic, and psycholinguistic research.

The next chapter introduces the four experiments conducted to investigate the effect of information structure on scrambling, and compares the predictions generated by the previous claims.
CHAPTER 5
EXPERIMENTS AND PREDICTIONS

In the preceding chapters, I discussed the previous syntactic literature on scrambling, including the effect of information structure (i.e., givenness/newness and contrastive focus). This chapter begins with a summary of relevant observations and claims concerning the comprehension of scrambling. I then provide an overview of four experiments investigating the effect of information structure on scrambling and introduce predictions generated by each claim.

The first and perhaps most important observation on scrambling is that scrambled sentences are harder to comprehend than canonical sentences (e.g., Mazuka et al. 2002; Miyamoto and Takahashi 2002), but that the difficulty can be reduced by contextual factors (e.g., Kaiser and Trueswell 2004). In particular, a given-before-new preference has been found in the production of Japanese sentence-medial scrambling (Ferreirea and Yoshita 2003). In the syntactic literature, it has been argued that a scrambled phrase tends to be associated with the topic (old but prominent information) and with contrastive focus in German, Dutch, and Korean (e.g., Choi 1999).

This dissertation reports on four experiments on the comprehension of Korean scrambling designed to investigate the effect of information structure on scrambling. Experiment 1 uses a self-paced reading task to investigate whether scrambled sentences are harder to comprehend compared to their canonical counterparts and whether

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10 In English – even though English is not a scrambling language – the given-before-new advantage was found in comprehending some noncanonical sentence types (e.g., Clifton and Frazier 2004).
supportive context can reduce the difficulty associated with scrambling in Korean. Experiment 2 assesses whether the given-before-new advantage extends to Korean by employing contexts that control the givenness and newness of a target entity. Experiments 3 and 4 explore the effect of contrastive focus on comprehending scrambled sentences with no preceding context in Korean, using a self-paced reading task and a sentence completion task, respectively.

Let us consider the predictions generated by each claim introduced earlier. Mazuka et al (2002) and Miyamoto and Takahashi (2002) found that scrambling is harder to comprehend than its canonical counterpart. Their findings would predict an effect of scrambling in all four experiments, but no other effect, i.e., a context effect or contrastive focus effect.

Kaiser and Trueswell (2004) claimed that the comprehension difficulty for scrambling could be reduced (or eradicated) by contextual factors. Their claims would predict that supportive context will reduce the difficulty of scrambling. Thus, their claim mainly predicts an effect of context in Experiments 1 and 2 and an effect of scrambling in all four experiments, but no effect of contrastive focus in Experiments 3 and 4 because these two experiments do not provide any relevant preceding context.

Clifton and Frazier (2004) make claims that would predict a given-before-new advantage in Experiments 1 and 2, but would not predict any effect in Experiments 3 and 4, which differentiate the presence or absence of a contrastive focus particle. Ferreira and Yoshida (2003) might predict a given-before-new advantage in Experiments 1 and 2 if production affects comprehension, but again they would not predict any effect in
Experiments 3 and 4. Besides, the link between sentence production and comprehension needs to be elaborated.

Aoshima and her collaborators (2004) claimed that the parser tends to associate a dative-marked long distance scrambled *wh*-phrase with an embedded clause in Japanese because it prefers to resolve thematic requirements and scope-fixing requirements for *wh*-phrases as early as possible. These claims do not supply any predictions for Experiments 1 and 2, which tested the effect of scrambling, the effect of context, and the effect of the given-before-new advantage. Neither do clear predictions follow for Experiments 3 and 4, because the contrastive focus particle attached to the dative-marked NP does not seem to have scope-fixing requirements and thus both focused conditions and nonfocused conditions have only the thematic requirement.

Choi (1999) argued that scrambling is motivated by prominence (e.g., contrastive focus) in Korean. She would predict the given-before-new effect in Experiments 1 and 2, and the effect of contrastive focus in Experiments 3 and 4. However, contrary to the other findings (Kaiser and Trueswell 2004), she would also predict that supportive context will override the scrambling effect, because she claimed that scrambling is motivated and constrained by the interaction of syntax and discourse. More crucially, it is hard to base a direct prediction on the effect of scrambling based on her approach because it does not take sentence processing into consideration, even though her claims could be translated into processing.

In the following four chapters, I introduce and discuss the four experiments in more detail. In Chapter 9, I discuss the possibility of developing an integrated account for scrambling.
CHAPTER 6

EXPERIMENT 1: THE EFFECTS OF SCRAMBLING AND CONTEXT

There are two important empirical findings about flexible word order languages. First, native speakers of flexible word order languages experience difficulty when reading noncanonical (i.e., scrambled) sentences (Mazuka et al. 2002; Miyamoto et al. 2002, 2004, among others). Second, the difficulty associated with scrambling can be alleviated by manipulating discourse factors (Kaiser and Trueswell 2004).

Kaiser and Trueswell (2004) found that the presence of appropriate discourse contexts partially alleviated the usual difficulty associated with non-canonical constructions in Finnish. Their results show that the supportive context condition (sentences containing subjects with given status) showed shorter reading times than the unsupportive condition (sentences containing subjects with new status). In Experiment 1, I extend Kaiser and Trueswell’s experiment to Korean.

Experiment 1 has two primary goals. First, it aims to test if Korean scrambled sentences are harder to comprehend than their canonical counterparts. Considering empirical findings in other flexible word order languages, it is predicted that Korean scrambled sentences are more difficult to comprehend than canonical sentences, but this has never been tested, to my knowledge. Second, Experiment 1 investigates whether a supportive context (i.e., a particular information structure) can reduce the difficulty associated with noncanonical sentences in Korean if scrambled sentences are harder to comprehend than their canonical counterparts.
Before the method for Experiment 1 is introduced, it is necessary to discuss some differences between Finnish and Korean. In Finnish, SVO word order is regarded as canonical and the most common, whereas OVS is regarded as scrambled and less common (Kaiser and Trueswell 2004; Hakulinen and Karlsson 1979). Based on a corpus study by Hakulinen, Karlsson, and Vilkuna (1980), Finnish subjects can be marked by either the nominative case (89%) or the partitive case (7%), whereas direct objects can carry either the partitive case (58%) or the accusative case (20%). This means that a sentence-initial NP marked with partitive case is temporarily ambiguous between the subject of canonical SVO (taking an experiencer verb) and the object of scrambled OVS. This ambiguity resolves at the verb since only an experiencer verb takes a partitive-marked subject.

Korean has SOV as canonical word order, and OSV as scrambled order. Furthermore, any argument can drop in Korean. A sentence initial accusative-marked NP in Korean is temporarily ambiguous between canonical and scrambled word order; it can be either the object of canonical (S)OV in which the subject was dropped or the object of OSV in which the object has scrambled over the subject. The ambiguity resolves at the verb for the canonical (S)OV word order or at the subject for the scrambled OSV word order.

6.1 Participants

Twenty (20) undergraduate and graduate students from the University of Hawai‘i at Mānoa participated in this experiment. The participants were recruited by posters and
solicitation, and were paid ten dollars to take part in this and two other experiments (3 and 4). Participants were not informed of the purpose of the experiment.

6.2 Materials

Since this experiment aims to extend Kaiser and Trueswell 2004 to Korean, the materials adopted the design of Kaiser and Trueswell’s (2004) Experiment 1, which tested SVO (canonical word order) and OVS (scrambled word order) in Finnish. In my Experiment 1, SOV (canonical word order) and OSV (scrambled word order) in Korean were tested.

The critical materials manipulated the given/new status of the subject as well as the object in SOV and OSV sentences. Twenty-four (24) critical items were developed. Each item consisted of a two-sentence context and one target sentence. The contexts were used to manipulate the information status (new vs. given) of either the subject or the object in the target sentence. For instance, if a context sentence introduces an entity, and the following target sentence begins with a reference to the same entity (nominative-marked if canonical word order, or accusative-marked if scrambled word order), the information status of the first entity in the target is given because the entity was introduced earlier in the preceding context. This kind of case will be called “given-new” order because the target begins with an entity introduced in the preceding context. In contrast, even though a context may introduce an entity, if the following target sentence begins with a reference to a different entity (nominative-marked if canonical word order, or accusative-marked if scrambled word order), the information status of the first entity in
the target is new. This case is called “new-given” order because the target begins with an entity that was not previously introduced in the given context.

Manipulation of context and word order resulted in four conditions: canonical sentences in given-new order where given information comes before new information and the word order is SOV (alternatively represented as \([S_{\text{given}} O_{\text{new}} V]\)); noncanonical sentences in given-new order \([O_{\text{given}} S_{\text{new}} V]\); canonical sentences in new-given order \([S_{\text{new}} O_{\text{given}} V]\); and noncanonical sentences in new-given order \([O_{\text{new}} S_{\text{given}} V]\). A set of target examples is shown in (1). Target sentences were partitioned into seven presentation regions, which are marked by slashes (/) below. A full list of materials appears in Appendix A.

(1) Korean: an example of the materials used in Experiment 1

a. Given new, canonical word order

(Context)

Cwunki-nun cinan ilyoil sikol-lo haikhing-ul ka-ss-ta.
Cwunki-TOP last Sunday country-LOC hiking-ACC go-PST-DC

‘Cwunki went hiking last Sunday.’

Sikolkil-ey kyengwunki-ka nathana-ss-ta.
Countryroad-LOC tractor-NOM appear-PST-DC

‘A tractor appeared at the country road.’

(Target)

Kyengwunki-ka/sungyongcha-lul/chuwwelha-lye-nun tus/mopsi/
tractor-NOM/car-ACC/outrun-VOL-RC like/very/

ppalun/sokto-lo/tallyewa-ss-ta.
fast/speed-with/run-PST-DC

‘The tractor moved at a very fast speed as if it wanted to catch up to a car.’

b. Given-new, scrambled word order

(Context)

Cwunki-nun cinan ilyoil sikol-lo haikhing-ul ka-ss-ta.
Cwunki-TOP last Sunday country-LOC hiking-ACC go-PST-DC
‘Cwunki went hiking last Sunday.’
Sikolkil-ey sungyongcha-ka nathana-ss-ta.
Countryroad-LOC car-NOM appear-PST-DC
‘A car appeared at the country road.’

<Target>
Sungyongcha-lul/kyengwunki-ka/chwuwelha-lye-nun tus/mopsi/
car-ACC/tractor-NOM/outrun-VOL-RC like/very/
ppalun/sokto-lo/tallyewa-ss-ta.
fast/speed-with/run-PST-DC
‘A tractor moved at a very fast speed as if it wanted to catch up to the car.’

c. New-given, canonical word order

<Context>
Cwunki-nun cinan ilyoil sikol-lo haikhing-ul ka-ss-ta.
Cwunki-TOP last Sunday country-LOC hiking-ACC go-PST-DC
‘Cwunki went hiking last Sunday.’
Sikolkil-ey sungyongcha-ka nathana-ss-ta.
Country.road-LOC car-NOM appear-PST-DC
‘A car appeared at the country road.’

<Target>
Kyengwunki-ka/sungyongcha-lul/chwuwelha-lye-nun tus/mopsi/
tractor-NOM/car-ACC/outrun-VOL-RC like/very/
ppalun/sokto-lo/tallyewa-ss-ta.
fast/speed-with/run-PST-DC
‘A tractor moved at a very fast speed as if it wanted to catch up to the car.’

d. New-given, scrambled word order

<Context>
Cwunki-nun cinan ilyoil sikol-lo haikhing-ul ka-ss-ta.
Cwunki-TOP last Sunday country-LOC hiking-ACC go-PST-DC
‘Cwunki went hiking last Sunday.’
Sikolkil-ey kyengwunki-ka nathana-ss-ta.
Countryroad-LOC tractor-NOM appear-PST-DC
‘A tractor appeared at the country road.’

<Target>
Sungyongcha-lul/kyengwunki-ka/chwuwelha-lye-nun tus/mopsi/
car-ACC/tractor-NOM/outrun-VOL-RC/like/very/
The tractor moved at a very fast speed as if it wanted to catch up to a car.’

The target sentences introduced a subject at region 1 or 2, as well as an object at region 1 or 2, and a verb or an adverb at region 3.

Four presentation lists were constructed by pseudo-randomly combining the twenty-four (24) target stories with forty-eight (48) filler stories. The filler stories were similar in length and complexity to the critical items. Within a presentation list, twelve (12) of the target trials appeared with SOV structure and twelve (12) appeared with OSV structure. For each of these sentence structure types, six (6) appeared in supportive contexts and six (6) appeared in unsupportive contexts. Each target item was then rotated through these four conditions, generating four different presentation lists.

6.3 Procedure

The experiment began by introducing participants to the format of the experiment with one 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 using PsyScope and a button box. Subjects initiated a trial by pressing a yellow button on the button box. Then participants read through the context, sentence by sentence, by pressing the yellow button each time they were ready for the next sentence. After they finished reading the context, the target sentence appeared on the monitor for self-paced reading, phrase by phrase. The sentences were presented in non-cumulative fashion, which means that when subjects press the button
the phrase they have just read disappears and the following phrase appears on the monitor. Each critical sentence was composed of seven (7) regions.

Participants were instructed to read sentences at a natural pace. To make sure that they understood the materials, participants responded to a simple yes/no question by pressing a red or a green button on the button box at the end of each sentence. The experiment took participants approximately twenty (20) minutes.

6.4 Predictions

It was predicted that canonical word order would be easier to comprehend than scrambled word order and that previously mentioned nouns would be read faster than newly mentioned nouns. However, the advantage of reading previously mentioned nouns was not predicted to remove the difficulty associated with scrambling. Therefore, it was predicted that there would be main effects of word order and context as well as an interaction of word order and context at critical regions.

6.5 Data analysis

Participants’ reading times were analyzed. The 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. Reading times that were more than two point five (2.5) SDs away from the mean were replaced with mean plus or minus two point five (2.5) SDs. This resulted in replacement of less than 4% of the data.
6.6 Results

Table 6.1 and Figure 6.1 show reading times for each of the seven regions.

Table 6.1 Reading times per region for Experiment 1 (ms)

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Region</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given-new, canonical</td>
<td></td>
<td>395</td>
<td>461</td>
<td>737</td>
<td>502</td>
<td>489</td>
<td>488</td>
<td>595</td>
</tr>
<tr>
<td>Given-new, scrambled</td>
<td></td>
<td>402</td>
<td>504</td>
<td>990</td>
<td>692</td>
<td>547</td>
<td>486</td>
<td>640</td>
</tr>
<tr>
<td>New-given, canonical</td>
<td></td>
<td>456</td>
<td>544</td>
<td>809</td>
<td>525</td>
<td>468</td>
<td>447</td>
<td>578</td>
</tr>
<tr>
<td>New-given, scrambled</td>
<td></td>
<td>455</td>
<td>711</td>
<td>893</td>
<td>627</td>
<td>534</td>
<td>496</td>
<td>646</td>
</tr>
</tbody>
</table>

Analyses of variance were conducted with both subjects and items as random variables. At region 1 (the first noun), there was a significant main effect of context ($F_1 (1, 19) = 10.16, p < .01; F_2 (1, 23) = 13.79, p < .01$). That is, the nouns that had been
mentioned in the preceding context sentences were read significantly faster than the nouns that were newly introduced in the target sentences. There was no other effect.

At region 2 (the second noun), there was a significant main effect of context \((F_1 (1, 19) = 18.64, p < .01; F_2 (1, 23) = 19.67, p < .01)\), a significant main effect of word order \((F_1 (1, 19) = 8.72, p < .01; F_2 (1, 23) = 8.56, p < .01)\) and a significant interaction between context and word order \((F_1 (1, 19) = 5.76, p < .03; F_2 (1, 23) = 5.67, p < .03)\).

The sentences with given-new order were read faster than the sentences with new-given order; furthermore, canonical word order conditions were read faster than their scrambled counterparts. Pairwise comparisons were performed: within given-new conditions, the canonical condition was read numerically faster than the scrambled condition, but the difference did not approach significance \((F_1 (1, 19) = 1.31, p < .27; F_2 (1, 23) = 1.24, p < .28)\). Within new-given conditions, the canonical condition was read significantly faster than the scrambled condition \((F_1 (1, 19) = 11.50, p < .01; F_2 (1, 23) = 11.54, p < .01)\).

Within canonical conditions, the given-new condition was read significantly faster than the new-given condition \((F_1 (1, 19) = 10.58, p < .01; F_2 (1, 23) = 5.28, p < .04)\).

Similarly, within scrambled conditions, the given-new condition was read significantly faster than the new-given condition \((F_1 (1, 19) = 14.66, p < .01; F_2 (1, 23) = 19.87, p < .01)\).

At region 3, there was a significant main effect of word order only in the subject analysis \((F_1 (1, 19) = 5.25, p < .04)\), but not in the item analysis \((F_2 (1, 23) = 2.64, p < .26)\). Thus, canonical word order sentences were read faster than scrambled counterparts in the subject analysis.
6.7 Discussion

The goals of Experiment 1 were to test whether scrambled sentences are harder to comprehend than canonical sentences and, if so, whether the difficulty associated with scrambled sentences could be alleviated by supportive context. It was predicted that scrambled sentences would be read more slowly than canonical sentences and that the slow reading times associated with scrambling would be reduced by supportive contexts. These predictions were borne out.

The results showed that scrambled sentences were read more slowly than their canonical counterparts but that the difficulty associated with scrambling was alleviated by contextual factors. More importantly, the results confirmed that the difficulty associated with scrambling, although alleviated, persisted from region 2 to region 5, as shown in Figure 6.1. This effect was also found in Kaiser and Trueswell (2004).

At region 1, the scrambled sentences were ambiguous between canonical word order and scrambled word order. When the sentences started with accusative marked NPs, they could be canonical word order sentences from which the subjects had dropped, because Korean is a pro-drop language. In other words, parsers could not tell if the
sentences were scrambled at this point. Thus, there was no effect of scrambling. In addition, parsers were predicted to read a previously mentioned (i.e., given) NP more easily than a new NP because it is known that it takes less time to activate an old entity than a new entity. This prediction was borne out; the effect of givenness/newness was significant.

At region 2, parsers encountered the first cue that some of the sentences were scrambled. They were predicted to read scrambled sentences more slowly than canonical sentences, and the effect of the word order was indeed significant. It was also predicted that given-new conditions should be read faster than new-given. This was confirmed by the results. Furthermore, it was found that canonical conditions were read significantly faster than scrambled sentences, but that the difficulty associated with scrambled sentences was greater in new-given contexts than in given-new contexts.

Parsers read scrambled sentences significantly more slowly than their canonical counterparts at region 3, region 4, and region 5, whereas the significant differences between supportive and unsupportive contexts did not appear beyond regions 1 and 2.

To summarize, Experiment 1 found that scrambled sentences in Korean are harder to comprehend than canonical sentences, but that the difficulty associated with comprehending scrambled sentences can be reduced by contexts containing prior mention of the scrambled item. Although alleviated, the difficulty that scrambling created for comprehension was never eradicated.

By finding a scrambling effect and a context effect, Experiment 1 laid the foundation for further experiments on scrambling in Korean. Experiment 2 further
investigates whether readers manifest a given-before-new advantage while comprehending Korean scrambled sentences. The next chapter presents Experiment 2.
CHAPTER 7

EXPERIMENT 2: THE GIVEN-BEFORE-NEW ADVANTAGE
IN SCRAMBLING

Experiment 1 found that scrambled sentences are harder to comprehend than their canonical counterparts but that the difficulty associated with scrambling is reduced by contextual factors in Korean. Building upon this groundwork, Experiment 2 aims to illuminate the property of supportive contextual factors which reduces the comprehension difficulty of scrambling. In particular, this experiment explores whether the given-before-new advantage will facilitate sentence comprehension of Korean scrambled sentences.

It has been observed that given information comes earlier than new information in natural languages (Halliday 1967; Clark and Haviland 1977, among others). Furthermore, it has been reported that parsers tend to process given-before-new orders more quickly than new-before-given orders (Beckman 1996; Clifton and Frazier 2004, among others). This is sometimes called “the given-before-new advantage.” Two approaches have often been proposed to account for the given-before-new advantage: production-based and comprehension-based approaches. Production-based approaches claim that the given-before-new advantage is a production preference rather than a comprehension preference. Arnold et al. (2000), using a spoken-language corpus study and a two-person communication experiment, showed that speakers prefer to produce a discourse-new phrase later in a sentence, after a discourse-given phrase. They suggested
that these effects are related to timing issues including planning and production, so that speakers produce more available phrases earlier and less available phrases later.

Bock and Warren (1985) found a tendency for people to recall more imageable noun phrases earlier in a sentence and less imageable ones later by examining errors in a sentence recall task. In their experiment, speakers recalled more imageable NPs as the subjects rather than the objects of sentences, which changed sentence structures from active to passive or from passive to active. Furthermore, speakers recalled more imageable NPs as the first object NP right after the verb rather than the second object position in double object constructions, which caused a change to an NP-NP form when the goal or recipient was more imageable than the direct object, and a change to an NP-PP form when the direct object was more imageable than the goal or the recipient. Bock and Warren suggested that these results arise because conceptual accessibility governs production: more accessible elements are produced at higher positions in the grammatical hierarchy. They suggested that givenness could also increase accessibility.

As reviewed earlier (see Chapter 4), Ferreira and Yoshita (2003) found that, in Japanese dative constructions, speakers recalled sentences with shifted word orders more often when the originally presented sentence was a new-given structure than when it was given-new, which shows indirectly that scrambled elements are associated with given information.

On the other hand, Kaan (1998) adopted a comprehension-based approach to the given-before-new advantage. She used a sentence-interpretation task to show that subject-before-object preferences in Dutch are stronger when an extracted NP is more definite. Hence, an extracted definite NP was more likely to be taken as given
information than a nonextracted NP, compared with when the extracted NP was less
definite. Furthermore, Carlson (2002) found that a final NP was more likely to be taken
as the subject of a second clause rather than the second of two conjoined NPs when it was
definite (1a) than when it was indefinite (1b).

(1) a. John met a doctor at the café and the dentist _______
b. John met a doctor at the café and a dentist _______

Her results suggest that parsers preferred a definite NP to an indefinite NP as a clause
subject.

Beckman (1996) found that the given-before-new effect is extended to double-
object constructions in English. Beckman investigated double-object questions as shown
in (2).

(2) a. Which patient did the nurse bring \( t_{\text{goal}} \) the doctor \( t_{\text{theme}} \)?
b. Which patient did the nurse bring \( t_{\text{goal}} \) a doctor \( t_{\text{theme}} \)?

Questions such as (2) are ambiguous because \textit{which patient} can be interpreted as either a
goal or a theme. In (2), \( t_{\text{goal}} \) and \( t_{\text{theme}} \) stand for the possible base-generated positions for
\textit{which patient}. If \textit{which patient} is assumed to be base-generated at \( t_{\text{goal}} \), it will be
interpreted as a goal, which makes \textit{the/a doctor} be interpreted as a theme. In contrast,
\textit{which patient} will be interpreted as a theme if it is assumed to be base-generated at \( t_{\text{theme}} \),
which makes \textit{the/a doctor} be interpreted as a goal. The results showed that readers
preferred the preposed NP \textit{which patient} to be the theme or direct object when the
postverbal NP was definite, but they preferred the preposed NP to be the goal or indirect
object when the postverbal NP was indefinite.
Beckman also investigated double-object declarative constructions, shown in (3), using a speeded whole-sentence reading study, in which participants pressed a button right after they understood a sentence.

\[(3)\]

a. The pitcher threw the umpire a ball.
b. The pitcher threw an umpire the ball.

The results showed that sentences like (3a), in which a definite NP preceded an indefinite NP, were read more quickly than sentences like (3b), in which an indefinite NP preceded a definite NP.

As described earlier, Clifton and Frazier (2004) tested the double-object constructions used by Beckman together with NP-PP constructions. They introduced a one-sentence context so that speakers could easily build up discourse-givenness and discourse-newness for definite and indefinite NPs, respectively. The results showed that readers read given-before-new sentences more quickly than new-before-given sentences, which replicated Beckman’s (1996) finding. In addition, they showed that the given-before-new advantage was not extended to NP-PP constructions, even though the advantage appeared in heavy NP shift constructions.

My second experiment tested Korean dative sentences to investigate the effect of the given-before-new advantage in scrambling constructions. Korean does have double accusative constructions (“NP-ACC, NP-ACC”), but the usage is very limited. Instead, Korean allows scrambling, by which the word order in Korean is more flexible than in English. In this experiment, Korean dative sentences such as “NP-DAT (analyzed as PP) NP-ACC” were tested with their scrambled counterparts to explore whether there exists a given-before-new advantage in Korean scrambling, and, more importantly, to verify the
hypothesis that scrambled elements are associated with discourse-prominent elements such as given information.

7.1 Participants

Forty (40) Korean native speakers from the University of Hawai‘i at Mānoa participated in the experiment. They were recruited by posters and solicitation and paid five dollars for participating. Participants were not informed of the purpose of the experiment.

7.2 Materials

The critical materials manipulated information structure (given-new vs. new-given) and word order (scrambled vs. canonical). Twenty-four (24) critical items were developed, and each item consisted of a one-sentence context and one target sentence. An example of the materials is shown in (4) below. A full list of materials appears in Appendix B.
Korean: an example of the materials used in Experiment 2

<Context>
Ecey phathi-eyse Chelswu-nun chinkwu han myeng-kwa
Yesterday party-LOC Chelswu-TOP friend one classifier-with
ewulikey toyessta.
hang.out-COMP became

‘Yesterday Chelswu happened to hang out with a friend at a party.’

<Target>

a. Given-new, canonical
Chelswu-nun ku chinkwu-eykey yumyengan miswulka-lul sokayhayssta.
Chelswu-TOP that friend-DAT famous artist-ACC introduced

‘Chelswu introduced a famous artist to the friend.’

b. Given-new, scrambled

ku chinkwu-eykey Chelswu-nun yumyengan miswulka-lul sokayhayssta.
that friend-DAT Chelswu-TOP famous artist-ACC introduced

‘Chelswu introduced a famous artist to the friend.’

c. New-given, canonical
Chelswu-nun yumyengan miswulka-eykey ku chinkwu-lul sokayhayssta.
Chelswu-TOP famous artist-DAT that friend-ACC introduced

‘Chelswu introduced the friend to a famous artist.’

d. New-given, scrambled
yumyengan miswulka-eykey Chelswu-nun ku chinkwu-lul sokayhayssta.
famous artist-DAT Chelswu-TOP that friend-ACC introduced

‘Chelswu introduced the friend to a famous artist.’

A one-sentence context introduced a new entity, which was realized with the dative marker -eykey or as an accusative marked NP in the target. The target also introduced a new entity, which is marked either by the dative marker -eykey or by the accusative case. This configuration resulted in four conditions: given-new in canonical
word order, given-new in noncanonical word order, new-given in canonical word order, 
and new-given in noncanonical word order.

7.3 Procedure

Each session began with instructions and a 6-item practice list. Each trial began 
with an asterisk in the middle of the monitor. When participants pressed a yellow button, 
the asterisk disappeared and a context sentence appeared. Participants were instructed to 
read the context sentence quickly yet for comprehension, and press a yellow button again 
after they understood the context sentence. When participants pressed a button, the 
context sentence disappeared and a whole target sentence appeared. Again, participants 
were instructed to read it quickly for comprehension and to press a button as soon as they 
understood it. Thus, each target sentence was read as a whole sentence. Each 
experimental sentence was immediately followed by a yes-no comprehension question. 
The participants indicated a choice by pressing a ‘yes’ button or a ‘no’ button. Response 
times were recorded.

7.4 Predictions

First of all, it was predicted that scrambled sentences would be harder to 
comprehend than their canonical counterparts, as found in Experiment 1. More 
importantly, it was predicted that given-before-new orders would be easier to read than 
new-before-given orders both in canonical and scrambled sentences if there is a general 
given-before-new advantage. However, if Clifton and Frazier’s (2004) finding that the 
given-before-new advantage holds only in some noncanonical English structures is
extended to Korean, the given-before-new advantage will appear only in scrambled sentences. Accordingly, scrambled new-before-given sentences will be harder to read than scrambled given-before-new sentences, whereas canonical sentences will not show any difference.

7.5 Data analysis

The primary dependent measure was reading time. The raw reading times were trimmed in the following way. The mean reading time and the SD (Standard Deviation) were computed for each subject. Reading times that were more than three SDs away from the mean were replaced with mean plus or minus three (3) SDs. Item 2 and 19 were excluded because they used the same phrase for the critical dative-marked NP, which may have distorted the parsers’ natural reading times. This resulted in replacement of less than 2% of the data.

7.6 Results

Table 7.1 and Figure 7.1 show the reading times for each condition.

Table 7.1. Reading times for Experiment 2 (ms)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given-new, canonical</td>
<td>3109</td>
</tr>
<tr>
<td>Given-new, scrambled</td>
<td>3683</td>
</tr>
<tr>
<td>New-given, canonical</td>
<td>3098</td>
</tr>
<tr>
<td>New-given, scrambled</td>
<td>4182</td>
</tr>
</tbody>
</table>
There was a significant main effect of word order both in the subject analysis ($F_1 (1, 39) = 62.02, p < .01$) and in the item analysis ($F_2 (1, 21) = 72.04, p < .01$). Canonical sentences were read significantly faster than their scrambled counterparts. There was also a significant effect of information structure in the subject analysis ($F_1 (1, 39) = 4.91, p < .04$) but not in the item analysis ($F_2 (1, 21) = 1.91, p < .19$). Sentences with a given-new order were read more quickly than their counterparts with a new-given order. Finally, there was a significant interaction between word order and information status both in the subject analysis and in the item analysis ($F_1 (1, 39) = 5.17, p < .03$; $F_2 (1, 21) = 3.42, p < .03$). Scrambled sentences were read more slowly than canonical sentences when given information followed new information compared to when new information followed given information.
7.7 Discussion

Experiment 2 found that participants read canonical sentences faster than scrambled sentences both when given information preceded new information and when new information preceded given information. Together with the results from Experiment 1, this confirmed that scrambling is harder to comprehend than canonical word order, and that a supportive context reduces but does not remove the structural difficulty associated with scrambling. Furthermore, it was found that participants read given-new word order more quickly than new-given word order. Therefore, the findings of Beckman (1996) and Clifton and Frazier (2004) on English were extended to Korean scrambling, increasing the possibility that the given-before-new advantage could be universal. Most importantly, it was found that scrambled sentences are read more slowly than canonical sentences when new information precedes old information than when old information precedes new information. In other words, given-before-new sentences were read as easily as their new-before-given counterparts when they had canonical word order, whereas given-before-new sentences were read more easily than new-before-given sentences when they had scrambled word order. This indirectly supports the claim that given information is more easily associated with scrambling compared to new information during sentence comprehension.

To sum up, the results from Experiment 2 suggest a strong given-before-new order advantage in comprehending scrambled sentences. Nevertheless, the effect of supportive context from the given-before-new information structure was not sufficient to eradicate the comprehension difficulty for scrambled sentences.
The next chapter discusses Experiment 3, which explores the effect of contrastive focus on the comprehension of Korean scrambling.
In German, a discourse-prominent item carrying contrastive focus or given information can scramble whereas less prominent items, such as those carrying new information, cannot (e.g., Moltmann 1990). This kind of strict rule does not apply in Korean, which allows even items that introduce new information to scramble. However, it is possible that the parser tends to associate discourse-prominent items with scrambling. If this is the case, and given that scrambling is associated with contrastive focus, the prediction is that the parser will show a preference to interpret a contrastively focused phrase as scrambled rather than in situ when both analyses are possible. This hypothesis was tested in Experiment 3, which used the Korean dative marker -eykey.

The dative marker -eykey ‘toDAT’ is ambiguous between matrix association and embedded association in Korean. This is exemplified in (1).

(1) Korean: the ambiguity of -eykey


a. ‘Chelswu told Yenghui that Minho gave a book.’
b. ‘Chelswu said that Minho gave a book to Yenghui.’

In interpretations like (1a), the -eykey phrase is interpreted in the matrix clause as the addressee, argument of the matrix verb malha- ‘to say’ and accordingly assumed to be in canonical word order. In contrast, in (1b), the -eykey phrase is interpreted as the goal,
argument of the embedded verb *cwu*- ‘to give,’ and thus assumed to have scrambled out of the embedded clause.

Now let us consider contrastive focus. Contrastive focus can be conveyed in various ways. One way is to use a focus particle, such as English *only* or *even*. English *only* corresponds to the Korean expression *-man*, which is “contrastive” since it presupposes a reference set and contrasts one entity with the rest of the set. This is shown in sentence (2).

(2) Korean: *-man* is contrastive

Chelswu-man ku seymina swuep-ey tuleka-ss-e.
Chelswu-only that seminar class-LOC enter-PST-DC

‘Only Chelswu entered that seminar class (among, e.g., the students who registered for the class).’

Sentence (2) literally means ‘Only Chelswu entered that seminar class’, but it implies a reference set, such as a set of students who registered for the class, and ‘Chelswu’ is contrasted with the rest of the reference set.

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), parallel to (1a) and (1b).

(3) Korean: *-man* is attached to the *-eykey* phrase

Chelswu-nun *Yenghui-eykey-man* Minho-ka chayk-ul
Chelswu-TOP *Yenghui-DAT-ONLY* Minho-NOM book-ACC
cwu-ess-ta-ko malhay-ss-ta.
give-PST-QUOTEsay-PST-DC.

a. ‘Chelswu told only Yenghui that Minho gave a book.’
b. ‘Chelswu said that Minho gave a book only to Yenghui.’

Although (1) and (3) are structurally ambiguous in the same way, comprehenders should have different preferences when they interpret the two sentences. Specifically, if
contrastive focus is associated with scrambling, the parser will have a stronger preference for interpreting the -eykeyman phrase in (3) as scrambled than for interpreting it as in situ, compared with the -eykey phrase in (1).

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) Korean: a filled gap effect by using a second -eykey phrase

a. Chelswu-nun Yenghuy-eykey Minho-ka Swuni-eykey chayk-ul
   Chelswu-TOP Yenghuy-DAT Minho-NOM Swuni-DAT book-ACC
   cwu-ess-ta-ko malhay-ss-ta.
give-PST-QUOT say-PST-DC.
   ‘Chelswu told Yenghuy that Minho gave a book to Swuni.’

b. Chelswu-nun Yenghuy-eykey-man Minho-ka Swuni-eykey chayk-ul
   cwu-ess-ta-ko malhay-ss-ta.
give-PST-QUOT say-PST-DC.
   ‘Chelswu told only Yenghuy that Minho gave a book to Swuni.’

If a parser initially interprets the first dative-marked phrase Yenghuy-eykey (man) ‘(only) to Yenghuy’ 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 (Minho-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, more processing difficulty is predicted at the second dative phrase in (4b) than in (4a). This prediction was tested in Experiment 3.

8.1 Experiment 3: Self-paced reading study

Experiment 3 tested preferences for disambiguating the -eykey phrase. That is, it aimed to investigate how the contrastive focus marker -man ‘only’ affects the reading times of the second -eykey phrase with respect to scrambling in Korean. It was predicted that parsers would be more likely to interpret a contrastively focused -eykey phrase as scrambled rather than in situ if scrambled phrases are associated with contrastive focus.

Targets such as (5) were developed and the reading times were measured at the second dative NPs (region 5) (each region is marked with slashes). Two factors were manipulated: the position of the -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) Korean: examples of the materials used in Experiment 3

a. Focused, Dative-Second

[NP-top/NP-d*at-MAN/NP-nom/adverb/NP-dat…]

yepcip halmeni-nun/yeccai-eykey-man/emeni-ka/onul achim/apeci-eykey/
next.door old.lady-TOP/girl-DAT-ONLY/mother-NOM/this morning/father-DAT/
lunch box-ACC/pass-PST-DC-QUOT/say-PST-HUM-NML-DC

‘An old lady living next door told only the girl that (her) mother gave a
lunchbox to (her) father this morning.’

b. Focused, Dative-First

[NP-d*at-MAN/NP-top/NP-nom/adverb/NP-dat…]

yeccai-eykey-man/yepcip halmeni-nun/ emeni-ka/onul achim/apeci-eykey/
girl-DAT-ONLY/next.door old.lady-TOP/mother-NOM/this morning/father-DAT/
lunch box-ACC/pass-PST-DC-QUOT/see-PST-HUM-NML-DC

‘Same as (5a).’

c. Nonfocused, Dative-Second

[NP-top/NP-d*at/NP-nom/adverb/NP-dat…]

yepcip halmeni-nun/yeccai-eykey/emeni-ka/onul achim/apeci-eykey/
next.door old.lady-TOP/girl-DAT/mother-NOM/this morning/father-DAT/
lunch box-ACC/pass-PST-DC-QUOT/say-PST-HUM-NML-DC

‘An old lady living next door told the girl that (her) mother gave a
lunchbox to (her) father.’

d. Nonfocused, Dative-First

[NP-d*at/NP-top/NP-nom/adverb/NP-dat…]

yeccai-eykey/yepcip halmeni-nun/emeni-ka/onul achim/apeci-eykey/
girl-DAT/next.door old.lady-TOP/mother-NOM/this morning/father-DAT/
lunch box-ACC/pass-PST-DC-QUOT/say-PST-HUM-NML-DC

‘Same as (5c).’
8.1.1 Participants

Forty (40) Korean native speakers from the University of Hawai‘i at Mānoa participated in the experiment. They were recruited by posters and solicitation and paid five dollars for participating. All gave informed consent.

8.1.2 Materials

As described above, the critical materials manipulate 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 (28) target sentences like those shown in (5) were used in the experiment. A full list of materials appears in Appendix C.

Four presentation lists were constructed to distribute these twenty-eight sets of stimuli. Within a presentation list, fourteen (14) of the target trials appeared with canonical word order and fourteen (14) appeared with scrambled word order. For each of these word order sentences, seven (7) appeared with the focus marker man ‘only’ and seven (7) appeared without the focus marker. Each target item was then rotated through these four conditions, generating the four separate presentation lists.

Forty eight (48) filler sentences composed of two types of constructions were used to divert subjects’ attention from the goal of the experiment. Filler sentences were similar to critical items in length and complexity. The twenty-eight (28) target sentences were randomly ordered with the forty-eight (48) filler sentences.
8.1.3 Procedure

For the experiment, each subject read sentences that were presented on a Macintosh computer screen, in a self-paced reading task. The experiment began by introducing participants to the format of the experiment through a screen of instructions. This was followed by six practice trials. 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 subject 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 (8) 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 (25) minutes.

8.1.4 Predictions

When readers encountered the first dative-marked NP at region 2 in a nonfocused dative-second condition such as (5c), it was predicted that they would associate it with the matrix clause because that is the canonical position for the dative-marked noun phrase in a mono-clausal analysis (Miyamoto and Takahashi 2002), and there is no reason to
build up a bi-clausal analysis at that moment (e.g., Frazier 1987). 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 would 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 would not run into any difficulty in interpreting the second dative NP, because it can be quickly associated with the embedded clause. The prediction was 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, short reading times are predicted in both dative-first conditions.

To sum up, I 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 nonfocused dative-first conditions.

8.1.5 Data analysis

The primary dependent measure was reading times. 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 mean plus or minus two and a half (2.5) SDs. This resulted in replacement of less than 3% of the data.

### 8.1.6 Results

Table 8.1 and Figure 8.1 shows the reading times for each region and condition. Figure 8.2 shows the reading times for region 5, the critical region.

#### Table 8.1. Reading times for Experiment 3 (ms)

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

![Figure 8.1. Reading times for Experiment 3](image-url)
Figure 8.2 Reading times at region 5 for Experiment 3

There were no effects at region 1. At region 2, there was a main effect of the position of the dative NP: 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 subject 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 subject analysis. Pairwise comparison showed that within focused conditions, the dative-first condition was read significantly faster than the dative-second condition in the subject analysis ($F_1(1, 39) = 5.75, p < .02$), but not in the item analysis. 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 dative NP in the subject 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 subject 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 subject 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 subject 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 \( (F_2 < 1) \).

8.1.7 Discussion

Overall, the pattern of the results was weakly 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 nonfocused dative-second condition at region 5, although the effect approached significance in the subject 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 3 motivated Experiment 4. A sentence completion task was chosen for Experiment 4 to see how participants would interpret focused versus nonfocused dative phrases when they were free to construct continuations of the sentences.

8.2 Experiment 4: Sentence completion study

Experiment 4 aimed to investigate whether participants associate the dative NP with the matrix or the embedded clause as evidenced by their unconstrained sentence completion. Participants were provided with the first four phrases of the sentences used for Experiment 3, and were asked to complete the sentence fragment to make a sentence.
A set of example stimuli is shown in (6). As in Experiment 3, dative-second versus dative-first word order was crossed with the presence or absence of the focus marker.

(6) Korean: examples of the materials used in Experiment 4

a. Focused, Dative-Second
   yepcip halmeni-nun yecaai-eykey-man emeni-ka onul achim…
   next-door old.lady-TOP girl-DAT-only mother-NOM this morning

b. Focused, Dative-First
   yecaai-eykey-man yepcip halmeni-nun emeni-ka onul achim…
   girl-DAT-only next-door old.lady-TOP mother-NOM this morning

c. Nonfocused, Dative-Second
   yepcip halmeni-nun yecaai-eykey emeni-ka onul achim …
   next-door old.lady-TOP girl-DAT mother-NOM this morning

d. Nonfocused, Dative-First
   yecaai-eykey yepcip halmeni-nun emeni-ka onul achim …
   girl-DAT next-door old.lady-TOP mother-NOM this morning

8.2.1 Participants

Twenty (20) Korean native speakers were recruited by posters and solicitation for the experiment. All of the participants were undergraduate or graduate students of the University of Hawai‘i at Mānoa. Subjects were paid five dollars ($5) for the participation. All gave informed consent.

8.2.2 Materials

Sixteen sets of sentences were chosen from the critical items in Experiment 3. As mentioned above, these materials manipulated the presence of the (contrastive) focus marker man ‘only’ (focused or nonfocused) and the position of the dative NP (dative-second or dative-first) in the same way as Experiment 3, resulting again in four
conditions: focused dative-second, focused dative-first, nonfocused dative-second, and nonfocused dative-first. In Experiment 4 participants were presented with only four regions, consisting of region 1 through region 4 of Experiment 3, as shown above in (1). A complete set of materials is shown in Appendix 4. These fragments were randomly interspersed with thirty-two (32) filler fragments (from the fillers used in Experiment 3) to prevent participants from noticing the goal of the experiment and to avoid the 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 (16) target sentence fragments with thirty-two (32) filler sentence fragments. Within a presentation list, eight (8) of the target trials contained the dative phrase as the second phrase of the sentence fragments and eight (8) contained the dative phrase as the first phrase of the sentence fragments. For each of these word order patterns, four (4) appeared with the focus marker man ‘only’ and four (4) appeared without it. Each target item was then rotated through these four conditions, generating four different presentation lists.

8.2.3 Procedure

Participants in Experiment 4 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 (25) minutes.
8.2.4 Predictions

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, it creates a filler-gap dependency. Thus, parsers will try to resolve the filler-gap dependency as quickly as possible (Clifton and 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, more embedded clause associations were predicted for the focused dative-second condition than the nonfocused dative-second condition and the dative-first conditions.

8.2.5 Data analysis

This study yielded a total of 320 codable sentence fragment completions, which were classified by the 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, but 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).

8.2.6 Results

The results are shown in Tables 8.2 and 8.3 and Figure 8.3. Table 8.2 shows the percentages of completion types for each of the six categories. Table 8.3 shows collapsed percentages of unambiguous and biased associations. Figure 8.3 shows the collapsed percentages of matrix/embedded clause associations.

Overall the number of completions for matrix clause association was higher than for embedded clause association, showing participants’ preference for mono-clausal completions. However, the number of matrix clause associations varied across the four conditions as predicted.
Table 8.2. Percentages of completion types for Experiment 4

<table>
<thead>
<tr>
<th>Condition</th>
<th>UM</th>
<th>UE</th>
<th>BM</th>
<th>BE</th>
<th>AA</th>
<th>OT</th>
</tr>
</thead>
<tbody>
<tr>
<td>focused-dative 2nd</td>
<td>48</td>
<td>20</td>
<td>4</td>
<td>16</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>focused-dative 1st</td>
<td>81</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>nonfocused-dative 2nd</td>
<td>74</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>nonfocused-dative 1st</td>
<td>78</td>
<td>1</td>
<td>13</td>
<td>0</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 8.3. Collapsed percentages of completion types for Experiment 4

<table>
<thead>
<tr>
<th>Condition</th>
<th>Matrix</th>
<th>Embedded</th>
<th>Ambiguous</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>focused-dative 2</td>
<td>51</td>
<td>36</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>focused-dative 1</td>
<td>88</td>
<td>8</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>nonfocused-dative 2</td>
<td>76</td>
<td>11</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>nonfocused-dative 1</td>
<td>90</td>
<td>1</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 8.3. Percentages of matrix and embedded clause associations for Experiment 4

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 8.3 and Figure 8.3). Thirty-six percent (36%) of the trials in the focused dative-second condition were completed with embedded association whereas 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.

Repeated measure ANOVAs, computed on arcsine-transformed proportions of main clause completions, by subjects and items, and of embedded clause completions, by subjects and items, were conducted. Only the results computed on embedded clause association are reported because both of the results computed on embedded clause and on matrix clause show the same phenomenon from different perspectives. There were significant main effects of the presence of the focus marker man ‘only’ (F₁ (1,19) = 30.53, \( p < .01 \); F₂ (1,15) = 11.67, \( p < .01 \)) and the position of the dative NP (F₁ (1,19) = 19.96, \( p < .01 \); F₂ (1,15) = 21.51, \( p < .01 \)). Furthermore, the interaction of focus and the position of the dative NP was also significant (F₁ (1,19) = 5.70, \( p < .03 \); F₂ (1,15) = 6.39, \( p < .02 \)). Pairwise comparisons revealed that within the dative-first conditions, focused conditions produced more embedded clause associations (F₁ (1,19) = 4.59, \( p < .05 \); F₂ (1,15) = 2.27, \( p < .16 \)) than the nonfocused conditions and that within the focused conditions, dative-second conditions were more associated with embedded clauses (F₁ (1,19) = 18.67, \( p < .01 \); F₂ (1,15) = 28.47, \( p < .01 \)).
8.2.7 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 3 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 4 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.
8.3 General discussion

The results described above show that contrastive focus increases the likelihood of the parser 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 generally choose a simpler analysis over a more complex analysis. However, given that contrastive focus is associated with scrambling, the prediction is that the parsers will interpret a contrastively focused phrase as scrambled more frequently than they will interpret a nonfocused phrase as scrambled. Thus, Experiments 3 and 4 provide 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, these 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)  
\begin{align*}
a. & \text{Swu-nun [Chaymin-eykey-\textbf{man} \textit{\{Minho-ka\}…}} \\
& \text{Swu-TOP Chaymin-DAT-\textbf{only} Minho-NOM…}
\end{align*}

\begin{align*}
b. & \text{Swu-nun [Chaymin-eykey [Minho-ka…}} \\
& \text{Swu-TOP Chaymin-DAT Minho-NOM…}
\end{align*}

The *-eykeyman* phrase in (7a) should begin 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) should be reduced due to the dephrasing effect of the focused phrase *Chaymin-DAT-only*. This would lead 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).

The results of these experiments provide empirical evidence that a certain information structure licenses scrambling more easily. Korean, which does not have the kind of strict rules limiting scrambling that Moltmann (1990) describes for German, allows even new information to scramble, as well as given information and contrastive focus. However, the results of this study 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.
Experiment 1 showed that the scrambling effect could be reduced but never eradicated. Whether there was a supportive context or not, scrambled sentences were read more slowly than canonical sentences. Experiment 2 confirmed that there is a given-before-new advantage in Korean scrambling and supported the hypothesis that a scrambled element is associated with given information. Specifically, it showed that parsers read scrambled sentences more quickly when the scrambled element denotes given information than when it introduces new information. Experiments 3 and 4 found that parsers often chose scrambling analyses over in situ analyses when both analyses were possible, suggesting that scrambling is also closely associated with contrastive focus. Contrary to the general prediction that parsers prefer a simpler structure to a more complex structure, it was shown that contrastive focus could lead parsers to choose a more complex structure (scrambling analysis) over a simpler structure (in situ analysis).

Integrated with findings from previous research, the present experiments confirmed that: (1) scrambling is harder to comprehend than its canonical counterparts, (2) the difficulty associated with scrambling can be reduced but not removed by supportive contexts, and (3) information structure affects the comprehension of scrambling. In particular, given information and contrastive focus somehow facilitate the comprehension of scrambling.
In this chapter, several residual issues related with these findings are discussed. First, processing mechanisms are discussed and evaluated to account for the difficulty associated with scrambling. Then I propose the Prominence Hypothesis to account for the results related to scrambling. Finally, the syntactic implications are discussed.

9.1 Mechanisms to account for the difficulty associated with scrambling

It has been proposed that frequency of occurrence of a particular construction can influence sentence comprehension (MacDonald, Perlmutter, and Seidenberg 1994, among others). It is well accepted that canonical word order sentences occur much more frequently than noncanonical word order sentences. In particular, proponents of multiple constraints models argue that the difficulty of comprehending noncanonical word order sentences, as compared to canonical word orders, is due to the infrequency of the noncanonical word order structures. Based on this argument, the more frequent a certain structure is, the easier it is to comprehend.

However, it has also been noted that frequency alone is not enough to account for the findings on word order effects in relation with sentence comprehension. First, Miyamoto and Takahashi (2002) argued that frequency of occurrence per se is not a complete explanation for the processing of scrambled word order sentences. They pointed out that there should be an explanation for why people do not produce scrambled word order sentences as frequently as their canonical counterparts.

Second, frequency of occurrence cannot account for Miyamoto and Takahashi’s (2002) findings on the Japanese ditransitive construction. In Miyamoto and Takahashi (2002), the canonical word order “NP-DAT NP-ACC” was compared with the
noncanonical word order “NP-ACC NP-DAT”. The assumption that parsers have difficulty in comprehending noncanonical word order sentences due to the infrequency of their occurrence predicts that parsers will show no difference in comprehending “NP-DAT NP-ACC” and “NP-ACC NP-DAT” pattern because the frequency of the two word orders is similar. Contrary to the prediction, Miyamoto and Takahashi’s results showed that the former was read faster than the latter.

A possible alternative to a frequency account makes reference to the notion of a FILLER-GAP DEPENDENCY. In many languages, phrases are displaced from their canonical position. Once parsers encounter a filler (a displaced phrase), they try to posit a gap in a variety of potential positions, according to this account. As sentence processing is incremental, it is assumed that parsers actively predict locations for a possible gap while parsing a sentence incrementally, even before the sentence is over (e.g., Frazier and Flores d’Arcais 1989; Stowe 1986).

It has been suggested that effects based on word order can be accounted for by way of the filler-gap dependency. For example, Miyamoto and Takahashi (2002) suggested that the difficulty associated with scrambling can be explained based on the assumption that readers compute gaps for scrambled constituents. The positing of a gap leads to a slow-down of processing, which in turn is affected by the amount of working memory that readers have available during parsing and, consequently, by the distance between the gap and its antecedent (a.k.a., filler). The more working memory a parse uses, the slower the comprehension is; and the longer the distance from the filler to the gap, the slower the comprehension is. The processing of a gap necessarily requires
maintaining and eventually finding a discourse entity (the antecedent for the gap) in working memory.

Based on findings on the effects of word order, it seems that readers slow down as soon as it becomes clear that a constituent is in noncanonical word order. Miyamoto and Takahashi (2002) suggest that this is because a gap must be posited at this early point. Furthermore, Miyamoto and Takahashi claim that the slowdown is more noticeable when the task requires close attention and, presumably, more working memory.

Whereas the filler-gap dependency hypothesis can account for the general difficulty associated with noncanonical word order sentences, it has limitations in explaining how discourse or informational status can affect the word order effect on sentence comprehension. For instance, Experiment 2 found that there is a given-before-new advantage in reading scrambled sentences in Korean, but the advantage was not extended to canonical sentences. This asymmetry is similar to that seen in a study by Clifton and Frazier (2004), which found a given-before-new advantage in double-object constructions and heavy NP constructions but not in NP-PP constructions. The results of the current study suggest that the given-before-new asymmetry is more general than Clifton and Frazier (2004) found. The similarity of the findings in Korean and English raise the possibility that there is a sort of universal property related to word order and information structure. Noncanonical word orders seem to be associated with specific information structures.

Clifton and Frazier (2004) mentioned that the word order flexibility provided by noncanonical structures such as English heavy NP constructions or double-object constructions may be due to the speaker’s need to delay a relatively unavailable entity. In
this vein, scrambled sentences, as a type of noncanonical structure, can also be considered as helping to meet a speaker’s needs in planning and producing sentences: speakers use scrambling to delay a relatively unavailable entity.

Going back to the mechanisms needed to account for the processing difficulty associated with scrambling, it appears that the filler-gap dependency is not easily able to account for the discourse effect. Moreover, the presence of the filler-gap dependency does not account for the given-before-new advantage in English double object constructions and in heavy NP shift constructions. The filler-gap dependency may not account for the entire range of data found in the work reviewed above concerning the effects of word order because it is just one of the mechanisms required to account for syntactic processing.

Given all the findings about word order effect on sentence comprehension, there is a clear need to frame the results within the bigger picture of how discourse factors, or information structure, interact with word order. In the next section, I introduce one approach that takes these factors into consideration.

9.2 Prominence Hypothesis

The experiments described above showed that the relative order of given/new information and contrastive focus affect the comprehension of scrambling. This leads us to ask precisely how the given-before-new advantage and contrastive focus influence comprehension of scrambling. A possible answer may come from the CONCEPTUAL ACCESSIBILITY HYPOTHESIS (Bock and Warren 1988).
Conceptual accessibility is defined as “the ease with which the mental representation of some potential referent can be activated in or retrieved from memory” (Bock and Warren 1988:50). Bock and Warren (1988) suggested that a continuum of conceptual accessibility underlies the hierarchy of grammatical relations such as subject and object. In other words, the more accessible concepts are realized as higher grammatical relations. For instance, an animate referent is a more accessible concept and thus is more likely to be realized as a subject than an inanimate referent is. In this way, the conceptual accessibility hypothesis focuses on the relationship between conceptual accessibility and grammatical relations.

More recently, Prat-Sala and Branigan (2000) claimed that conceptual accessibility has two elements: inherent accessibility and derived accessibility. They convincingly argue that “an entity’s overall conceptual accessibility within a particular communicative context is the sum of its fixed inherent accessibility and its temporary derived accessibility”. Prat-Sala and Branigan state that the conceptual accessibility of an entity is not fixed, but that it varies according to the communicative context. This semantic priming (see, e.g., Bock 1986) may make an entity more accessible in a certain context, and givenness and saliency may also increase the accessibility of an entity.

A given entity is often definite in natural language. Contrastive focus makes an entity “salient” by contrasting it with the other members of a certain set. If it is not coincidental that scrambled phrases can be definite or carry contrastive focus (but not new information) in German and Dutch (see Chapters 3 and 4), it is possible that conceptual accessibility is closely related with scrambling. In this vein, Choi (1999) proposed that scrambling is licensed by a [PROMINENCE] feature, and topicality and
contrastive focus have this feature. Furthermore, she suggested that scrambling is motivated and constrained by syntax and discourse, and that it is also constrained by prosody. In other words, scrambling is constrained by multiple factors such as syntax, discourse, and prosody. Since scrambling for Choi is a result of all the relevant modules of a language, she explained scrambling by using a multiple-constraint model.

However, an alternative “top-down” account is also possible. That is, scrambling is a natural consequence of a universal sentence processing mechanism, which influences syntax, discourse, and prosody. Taking this second approach, I propose the Prominence Hypothesis to account for the phenomena related with scrambling.

(1) Prominence Hypothesis

Speakers tend to spell out discourse-prominent items earlier than non-prominent items. Discourse-prominence is defined as the combined accessibility at a given point when an utterance is produced.

I assume that sentence production feeds sentence comprehension. Given this assumption, the Prominence Hypothesis predicts that discourse-prominent items are licensed for scrambling more easily than non-prominent items in the sentence comprehension of natural languages.

The degree to which this propensity is grammaticalized may differ depending on languages. German and Dutch seem to have more strict constraints on word order than Korean or Japanese. Thus, they do not permit non-prominent items to scramble whereas Korean and Japanese do. Even though Korean and Japanese do not have that sort of strict constraint on scrambling, the Prominence Hypothesis predicts that there will be some difference in licensing scrambling depending on an entity’s prominence. To put it in
another way, the Prominence Hypothesis is more grammaticalized in German and Dutch scrambling than in Korean and Japanese scrambling.

The process of licensing scrambling could be reflected in measurable phenomena such as reading times and eye-movements. It could also influence parsers’ preference when a certain structure is ambiguous at a given point. The results of Experiments 1 and 2 suggest that the licensing of scrambling could be reflected in reading times. In particular, Experiment 2 showed that parsers read sentences in which given information (old entity) had been scrambled more quickly than the ones in which new information (new entity) had been scrambled. Experiments 3 and 4 showed that the Korean (contrastive) focus particle -man can lead readers to choose a more complex scrambling analysis over a simpler in situ analysis when a given structure was ambiguous between scrambling and in situ analyses.

There is another set of data which the Prominence Hypothesis can explain but Choi’s (1999) idea cannot. In sentence production, it has been reported that animacy influences scrambling in Japanese (Chang, Kondo, and Yamashita, 2000) and in Korean (Dennison 2008). The Prominence Hypothesis predicts that inherent accessibility such as animacy facilitates scrambling because discourse-prominence is defined as the combined accessibility, which includes both inherent accessibility and derived accessibility. However, Choi’s [PROMINENCE] feature considers only derived accessibility, but not inherent accessibility, and thus it can only make predictions about the influence of derived accessibility on scrambling, but not of inherent accessibility.

Finally, the Prominence Hypothesis is advantageous in that it offers a processing-based account for scrambling, and thus opens up the possibility of providing a processing
account for other phenomena related to scrambling which have previously been explained by relying on syntactic constraints. The next section explores this possibility further.

9.3 Implications for syntax: Processing-based accounts for scrambling

Psycholinguistic and neurolinguistic methodologies have encouraged widespread efforts to provide a processing-based account for various phenomena that had previously been given syntactic accounts. For instance, O’Grady 2005 attempted to provide processing-based accounts for various phenomena that previously had been associated with principles of Universal Grammar.

In a similar spirit, Sag et al (to appear) tries to provide a processing-based account for the Superiority Effect Violation. It was observed that a wh-phrase in higher position must move in multiple wh-questions in English as shown in (2).

(2) Superiority effect violation
   a. Who __ broke what?
   b.(*)What did who break __?

From the perspective of generative grammar, the Minimality Link Condition (Chomsky 1995) was used to account for this contrast. A minimal link (between a filler and its gap) is preferred all other things being equal. The link between the wh-phrase and its canonical position, marked by __ in (2a), is shorter than in (2b). This is why (2a) is preferred to (2b). However, Kuno and Takami (1993:120) make the following observation that (3b) improves much better than (2b).

(3) A case where superiority effect violation does not work
   a. Which professor assigned which books?
   b. Which books did which professor assign?
   (In a context, where it makes sense to sort agents on the basis of themes)
In an attempt to provide for a processing account for this set of data, Sag et al proposed the *WH*-PROCESSING HYPOTHESIS, which states that processing factors influence all filler-gap dependencies, including those involving *wh*-interrogatives. They claimed that all the sentences in (2) and (3) are grammatical, but that their acceptability can vary depending on processing factors. In other words, when speakers have a choice between several grammatical options, they disprefer those with greater processing cost. Their account is appealing in the sense that they can get rid of seemingly redundant grammatical constraints.

The Prominence Hypothesis can also account for the contrast shown in (2) and (3). Sentences (2a) and (2b) do not have a particular context and thus it is hard to tell which *wh* word is more prominent. This makes (2a)—a form with less processing cost—preferred. Notice that (2a) has less processing cost than (2b) because the former has more words intervening between the filler and the gap than the latter. In contrast, the set shown in (3) has a an easy-to-imagine context, which makes *which books* more prominent than *which professor*, because the themes (*books*) can easily be seen to be the main criteria to sort the agents (*professors*). In such a context, speakers will presumably produce the more prominent item *which books* earlier than *which professors* as the Prominence Hypothesis states. This explains why (3b) appears to be noticeably more acceptable than (2b).

The Prominence Hypothesis can account for another set of data. Like German and Russian, Korean does not show the Superiority Effect, presumably because it has case particles. Beck and Kim (1997) claimed that a *wh*-phrase in Korean cannot be
c-commanded by the negative polarity item *amwuto* ‘anybody’, so that the *wh*-phrase must scramble over *amwuto* in a certain context. They called this an **INTERVENTION EFFECT**. Examples are shown in (4).

(4) Korean: Intervention effect

a. (*) *Amwuto nwukwu-lul chotayhaci anh-ass-ni?*
   anyone who-ACC invite not.do-PST-Q
   ‘Who did no one invite?’

b. *nwukwu-lul amwuto chotayhaci anh-ass-ni?*
   who-ACC anyone invite not.do-PST-Q
   ‘same as (4a).’

According to Beck and Kim’s judgment, (4a) is unacceptable whereas (4b) is acceptable. Notice that (4a) has a canonical word order whereas (4b) has a scrambled word order. To account for the contrast, put forward a grammatical constraint whose content need not concern us here.

However, many Korean speakers feel that (4a) is not really unacceptable—which becomes clearer if *amwuto* has a modifying phrase that makes the head noun more salient. Sentence (5a) with a modifying clause *Chelswu-uy kacok* ‘Chelswu’s family’ becomes perfectly acceptable.

(5) Korean: *amwuto* has a modifying clause\(^{11}\)

a. *Chelswu-uy kacok amwuto nwukwu-lul chotayhaci anh-ass-ni?*
   Chelswu-GEN family anyone who-ACC invite not.do-PST-Q
   ‘Who did no one of Chelswu’s family invite?’

b. *nwukwu-lul Chelswu-uy kacok amwuto chotayhaci anh-ass-ni?*
   who-ACC Chelswu-GEN family anyone invite not.do-PST-Q
   ‘same as (5a).’

The Prominence Hypothesis correctly predicts the contrasts in (4) and (5). Scrambling may be licensed easily in (4b) because a *wh*-phrase has been scrambled, provided that *wh*-phrases are contrastively focused, as discussed in Chapter 4. (5a) sounds more

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\(^{11}\) I would like to thank Mi-ho Choo for her comments about this set of data.
acceptable than (4a) because the salience of the *amwuto* phrase thanks to the modifier (Prat-Sala and Branigan 2000, among others).

So far, the Prominence Hypothesis is able to account for several phenomena associated with word order variation, even though it needs to be tested more by empirical studies, and definitely needs to be more elaborated. Still, it appears to be on the right track.

9.4 Conclusion

Scrambling has been discussed for a long time, which has resulted in numerous observations and proposals in theoretical linguistics. More recently, empirical linguistics including psycholinguistics has started to pay more attention to scrambling and has produced a good amount of empirical findings. However, there has not been much interdisciplinary work to integrate the findings from the two areas.

The present dissertation attempts to bridge the gap and provide a processing-based account for scrambling. As a piece of interdisciplinary work, it has investigated the effect of information structure on the comprehension of Korean scrambling. Integrating my results with the findings of previous studies, I proposed the Prominence Hypothesis, a processing-based account for word order variation as well as scrambling. According to this idea, scrambling is a speaker-oriented phenomenon. Given the assumption that sentence production feeds sentence comprehension, it can also explain the effect of scrambling on sentence comprehension.

As mentioned in Section 9.2, the Prominence Hypothesis is a top-down explanation in the sense that scrambling results from speakers’ tendency to produce more
discourse-prominent items earlier than less discourse-prominent items. This implies that the tendency affects syntax, discourse, and prosody, contrary to Choi’s (1999) idea that scrambling results from the interaction of all the relevant modules.

Furthermore, the Prominence Hypothesis entails a discourse-related property, but the deeper motivation behind it may be memory-related, as noted earlier. It is often mentioned that a speaker is under pressure because of her limited memory resources on the one hand and the burden of producing natural and fluent utterances on the other hand. According to the Prominence Hypothesis, this burden can be reduced by uttering memory-favorable entities sooner in order to remove them from memory and use the resulting increase in available memory to produce the rest of the sentence.

However, the current dissertation focuses mainly on the comprehension of scrambling in reading. Whether the same effect extends to sentence production and whether it will be reflected in other indices such as event-related brain potential (ERP) is open to further research. Additionally, how the Prominence Hypothesis affects prosody of scrambling waits to be more thoroughly investigated.
APPENDIX A

TEST SENTENCES FOR EXPERIMENT 1

1. 영화는 어제 동물원으로 소풍을 갔다.
yenghuy-nun ecey tongmwulwen-ulo sophwng-ul kassta
Yenghuy-TOP yesterday zoo-LOC picnic-ACC went
‘Yenghi went to the zoo for a picnic yesterday.’
그녀는 산토끼(다람쥐)가 뛰어다니는 것을 보았다.
kunye-nun santhokki(talamcuy)-ka ttuyetaninun kes-ul poassta
she-TOP wild.rabbit (squirrel)-NOM jumping thing-ACC saw
‘She saw a rabbit (squirrel) running around.’
산토끼가(을)/다람쥐를(가)/뛰어 다니고 있었고/
santhokki-ka (lul)/talamcuy-lul (ka)/ccochataniko issess-ko/
wild.rabbit-NOM (ACC)/squirrel-ACC (NOM)/chasing existed-and/
세들은/나무 가지 위에서/줄겁게/노래하고 있었다.
saytul-un/namu kaci wi-eyse/culkepkey/nolayhako issesssta
birds-TOP/tree branch top-LOC/happily/singing existed
‘Wild rabbits were chasing a squirrel around, and birds were singing merrily on the tree branches.’

2. 선생은 교수회의에 취재차 참석했다.
senhyey-nun kyoswuhouyuy-ey chwicaycha chamsekhayssta
Senhyey-TOP faculty.meeting-LOC for.report participated
‘Senhyek went to a faculty meeting for the report.’
그녀는 부학장(김교수)이 와 있는 것을 보았다.
kunye-nun pwuhakcang(kimkyoswu)-i waissnun kes-ul poassta
she-TOP vice.dean (Prof. Kim)-NOM was.present thing-ACC saw
‘She saw that the vice dean (Prof. Kim) was present.’
부학장이 김교수를 몰시 청찬했고
pwuhakcang-i (ul)/kim kyoswu-lul (ka)/mopsi chingchanhayss-ko
vice.dea-NOM (ACC)/Kim professor-ACC (NOM)/very praised-and
회의는 지루하게도 한시간 늦게서야 끝이 났다.
hoyuy-nun/cilwuhakeyto/hansikan nuckeyseya/kkuti nassta
meeting-TOP/boringly/one.hour late/end-NOM came.out
‘The vice dean praised Prof. Kim a lot, and the meeting boringly ended one hour late.’

3. 정수는 친구들과 함께 수족관에 갔다.
cengswu-nun chinkwutul-kwa hamkkey swucokkwan-ey kassta
Chengswu-TOP friends-with together water.tank-LOC went
‘Chengswu went to a water tank with her friends.’
그녀는 돌고래(오징어)가 참 귀엽다고 생각했다.
kunye-nun tolkolay (ocinge)-ka cham kwieyteptako sayngkakhayssta
she-TOP dolphin (squid)-NOM very cute thought
‘She thought that the dolphin was very cute.’
돌고래가(를)/오징어를(가)/뒤에서 믿고/
tolkolay-ka (lul)/ocinge-lul (ka)/twieyse mil-ko/
dolphin-NOM (ACC)/squid-ACC (NOM)/behind push-and/
The dolphin was pushing the squid from behind, and fish were swimming around them as if they were cheering them.

Swuceng went to the back hill with her friends.

She saw azalea (forsythia) fully blooming.

The azaleia bloomed right next to the forsythia as if the azacelia liked the forsythia, and the forest was full of the flower scent.

Huyceng went to the Kwachen zoo with her boyfriend.

She spotted an elephant (baby bear).
The way the elephant was following a baby bear was so cute that she watched them for a while.

“A reporter talked of a news that Mt. Cili passed Mt. Selak in number of hikers.”

As if portulaca hates dandelion, they were blooming far away from each other.

“Simhycin (Choycinsil) was seen acting for a drama.”
심혜진이(을)/최진실을(이)/만나서/
simhyeycin-i (ul)/choyceinsil-ul (i)/mannase/
simheycin-NOM/choyceinsil-ACC/meet/
남편과/해어져/달라고/부탁하고 있었다.
namphyen-kwa/hyeeye/tallako/pwuthakhako issessta
husband-with/break.up/do.favor/asking existed
‘Simhyecin met Choycinsil and asked her a favor for her to break up with her husband.’

10. 한국에도 외국계 커피점이 많이 있다.
hankwuk-etoy ookwukkyey chephicem-i manhi issta
Korea-at foreign coffee.store-NOM much existed
‘There are lots of foreign coffee stores even in Korea.’
최근에는 커피빈(별다방)이 인사동에 문을 열었다.
chorykenay-nun chephipin (pyeltapang)-i insadong-ey mwun-ul yelessta
recently-TOP Coffee.Bean (Starbucks)-NOM insadong-LOC door-ACC opened
‘Recently, a Coffee Bean (Starbucks)s has opened at Insadong.’
커피빈이(을)/별다방을(이)/매출액에서/
chehpin-i (ul)/pyeltapang-ul (i)/maychuwulkyey-eysye/
Coffee.Bean-NOM (ACC)/star.coffee.store-ACC (NOM)/sales-LOC/
따라/잡을 수 있을지/사람들이/궁금해 한다.
ttala/capul swu issulci/salamtul-i/kwungkwumhayhanta
following/catch.up/people-NOM/wonder
‘People wonder if Coffee Bean can catch up to Starbucks in amount of sales.’

11. 짱좋은 동물을 좋아한다.
cengcwun-un tongmwul-ul cohahanta
Cengcwun-TOP animal-ACC like
‘Cengcwun likes animals.’
그는 친구집 파티에서 고양이(강아지)를 보았다.
ku-nun chinkwu cip phathi-eysye koyangi (kangaci)-lul poassta
he-TOP friend house party-LOC cat (puppy)-ACC saw
‘He saw a cat at his friend’s party.’
고양이가(을)/강아지를(가)/피해 다니느리/
koyangi-ka (lul)/kangaci-lul (ka)/phihay taninula/
cat-NOM (ACC)/puppy-ACC (NOM)/avoid go.around/
어리저리/숨는 모습이/귀여워서/미소지었다.
iliceli/swumnun mosup-i/kwiyeese/misocietiessta
here.there/hiding way-NOM/cute/smiled
‘He smiled because the way the cat was hiding here and there to avoid a dog was cute.’

12. 현대 미술가에 관한 책을 읽었다.
hyuntay miswulk-ey kwanhan chayk-ul ilkessta
modern artist-LOC be about book-ACC read
‘I read a book on modern artists.’
피카소(마티스)의 이야기가 인상적이었다.
phikhaso (mathisu)-uy iyaki-ka insangeckiessta
Picasso (Matisse)-GEN story-NOM impressive
‘A story about Picasso (Matisse) was impressive.’
Picasso-NOM (ACC)/Matisse-ACC (NOM)/like/ his/drawing-ACC/draw.after/did/say

‘Picasso used to paint the paintings of Matisse because he liked Matisse.’

13. 해영은 서점에 책구경을 하러 갔다.

‘Hyeyeng went to a book store to shop for books.’

14. 진숙은 유명가수의 콘서트에 갔었다.

‘A bookstore staff member said that the Avatamska Sutra is ahead the Sutra of the Lotus in number of books sold.’

15. 추석특집으로 옛날 가수들이 전ভ TV에 나왔다.

‘Many singers of old days appeared on Chwusek TV special.’
16. 민영은 이번 휴가에 사이판에 다녀왔다.  
minyeng-un ipen hyuka-ey saipan-ey tanyewassta  
Minyeng-TOP this.time vacation-LOC Saipan-LOC visited  
‘Mineng visited Saipan for the vacation.’

공항에서 우연히 탭런트 송혜경(이명한)을 보았다.  
konghang-eyse wuyenhi thalentu songhyeykyo (ipyenghen)-lul poassta  
airport-LOC by.chance actress Songhyeykyo (Ipyenghen)-ACC saw  
‘She saw Songhyeyko (Ipyenghen) at the airport by chance.’

손혜교가(플)/이명한(이)/웃나래/사귀다가/  
songhyeykyo-ka (lul)/ipyenghen-ul (i)/yeyncal-ey/sakwitaka/  
Sonhyeykyo-NOM (ACC)/Ipyenghen-ACC (NOM)/old.days-LOC/dated/  
차버렸다는/소문이/생각했다.

chapelyesstanun/somwun-i/sayngkaknassta  
dumped/rumor-NOM/was.reminded  
‘She was reminded of a rumor that Songhyeyko dumped Ipyenghen after they dated.’

17. 이번 여름은 장마가 유난히 길었다.  
ipen yelum-un cangma-ka yunanhii kilesta  
this.time summer-TOP rainy.season-NOM particularly was.long  
‘This summer had such a long rainy season.’

장마비가 오는 날 개구리(두꺼비)가 눈에 띄었다.  
cangmapi-ka onun nal kaykwuli (twukkepi)-ka nwun-ey ttuyessta  
rainy.season.rain-NOM coming day frog (toad)-NOM eye-LOC was.seen  
‘On one rainy day, a frog (toad) was seen.’

개구리가(혈)/두꺼비들(가)/마주보고/신기한 듯/바라보는/모습이/우스웠다.  
kaykwuli-ka (lul)/twukkepi-lul (ka)/macwupoko/sinkihan tuc/palaponun/mosup-i/wusuwsessta  
frog-NOM (ACC)/toad-ACC (NOM)/facing/amazed as.if/ looking/looks-NOM/was.funny  
The way the frog faced a toad and looked at it full of awe was funny.’

18. 나은은 집에 수족관을 가지고 있다.  
Nawen-un cip-ey swucokkwan-ul kaciko isstsa  
Nawen-TOP house-LOC fish.bowl-ACC having exist  
‘Nawen has a fish bowl at her house.’

얼마전에는 수족관에 거북이(금붕어)를 넣었다.  
Elmacency-nun swucokkwan-ey kepwiki (kwumpwuge)-lul nehessta  
a.while.ago-TOP fish.bowl-LOC turtle (toad)-ACC put  
‘She put a turtle (toad) in the fish bowl a while ago.’

거북이가(혈)/금붕어들(가)/괴류하는/않을까/  
kepwuli-ka (lul)/kwumpwuge-lul (ka)/koypthicinun/anhulkka/  
turtle-NOM (ACC)/gold.fish-ACC (NOM)/annoy/not/  
걱정했었는데/의외로/사이좋게 잘 지낸다.
‘She worried that the turtle might annoy the gold fish but they get along surprisingly well.’

19. Swunok watched the voting news on the last make up election.

First Minnotang (Yelwutang) came out.

‘A reporter said that Minnotang is ahead of Yelwutang in number of votes.’

20. Chaymin said with emphasis that he thinks Kimkitek as his rival.

‘Chaymin’s friend told her that Paykseycwu is better than Sansachwun in taste.’
22. TV에서 축구 국가대표 선수들이 게임을 했다.
TV-eyse chwukwul kwukatayphyo senswutul-i keyim-ul hayssta
TV-at soccer nationalTEAM players-NOM game-ACC did
‘In a TV show, the national soccer team played a game.’
카메라가 안정화(박지성)을 먼저 감았다.
khamayla-ka ancenghwan (pakciseng)-ul mence capassta
camera-NOM Ancenghwan (Pakciseng)-ACC first caught
‘The camera caught Ancenghwan (Pakciseng) first.’
안정화이(음) 박지성음(이) 밀어/바닥에/
ancenghwan-i (ul)/pakciseng-ul (i)/mile/patak-ey/
Ancenghwan-NOM (ACC)/Pakciseng-ACC (NOM)/push/ground-LOC
 넘어지는/바람에/모두가 웃었다.
nemecinun/palam-ey/motwu-ka wusessta
falling/moment-LOC/all-NOM laughed
‘Everyone laughed as Ancenghwan pushed Pakciseng to the ground.’

23. 중기는 지난 일요일 시골로 하이킹을 갔다.
cwunki-nun cinan ilyoil sikol-lo haikhing-ul kassta
Cwunki-NOM last Sunday country-toward hiking-ACC went
‘Cwunki went hiking in the countryside last Sunday.’
시골길에 경운기(승용차)가 나타났다.
sikolkil-ey kyengwunki (sungyongcha)-ka nathanassta
country.road-LOC tractor (sungyongcha)-NOM appeared
‘A tractor (sungyongcha) appeared on country road.’
경운기가(음)/승용차음(가) 추월하려는 듯/
kyengwunki-ka (lul)/sungyongcha-lul (ka)/chuwuelhalyenun tus/
tractor-NOM (ACC)/car-ACC (NOM)/catch.up like/
움시/빠른/속도로/달려왔다.
mopsi/ppalun/sokto-lo/tallyewassta
very/fast/speed-INST/came
‘The tractor moved at a fast speed as if it wanted to catch up to a car.’

24. 미영은 인구조사에 관한 뉴스를 보았다.
Miyeng-un inkwucosaey kwanhan nyusu-lul poassta
Miyeng-top sensus about news-ace watched
‘Miyeng watched a news show on the sensus.’
작년에도 출생률(사망률)이 감소했다고 한다.
Caknyeney-to chwulsaynglyul (samanglyul)-i kamsohaysstako hanta
Last.year-also birth.rate (samanglyul)-NOM decreased say
‘It said that the birth rate (death rate) decreased last year too.’
출생률이(음)/사망률음(이)/따라 잡지 못해서/
chwulsaynglyul-i (ul)/samanglyul-ul (i)/ttala capci moshayse/
birth.rate-NOM (ACC)/death.rate-ACC (NOM)/catch.up not.capable/
인구수가/줄었다고/연구원이/말했다.
inkwuswu-ka/cwulesstako/yenkuwwen-i/malhayssta
population.number-NOM/decreased/researcher-NOM/said
‘One researcher said that the population decreased because the birth rate did not
catch up to the death rate.’

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APPENDIX B

TEST SENTENCES FOR EXPERIMENT 2

1. 어제 출판기념회에서 철수는 사진기자 한 명과 담소를 나누었다.
   ecey chulphankinyemhoi-at chelswu-nun sacinkica han myung-kwa tamso-lul nanwuessta.
   yesterday press.celebration-at Chelswu-TOP photographer one person-with story-ACC exchanged
   ‘Yesterday Chelswu chatted with a photographer at the press celebration.’
   철수는 그 사진기자에게 유명한 소설가를 소개해 주었다.
   chelswu-nun ku sacinkica-eykey yumyengan soselka-lul sokayhaycwuessta.
   Chelswu-TOP that photographer-DAT famous novelist-ACC introduced
   ‘Chelswu introduced a famous novelist to the photographer.’

2. 지난 일요일 민정은 외국인 교수 한 명을 집으로 초대했다.
   cinan ilyoil minceng-un oykwukin kyoswu han myeng-ul cip-elo chotayhayssta.
   last Sunday Minceng-TOP foreign professor one person-ACC home-LOC invited
   ‘Last Sunday Minceng invited a foreign professor to her house.’
   민정은 그 외국인 교수에게 친절하게 인사시켰다.
   minceng-un ku oykwukin kyoswu-eykey chinceng emeni-lul insa-sikyessta.
   Minceng-TOP that foreign professor-DAT her mother-ACC say.hello-made
   ‘Minceng had her mother say hello to the foreign professor.’

3. 지난주 선태는 치질 환자 한 명을 방문하였다.
   cinancwu sencay-nun chicil hwanca han myeng-ul pyengmwunanhapssta.
   last.week Sencay-TOP hemorrhoids patient one person-ACC visited
   ‘Last week Sencay visited a patient with hemorroid.’
   선태는 그 치질 환자에게 용한 치료사를 데리고 갔다.
   sencay-nun ku chicil hwanca-eykey yonghan hanuysa-lul teyliko kassta.
   Sencay-TOP that hemorrhoids patient-DAT her mother say hello to the foreign professor.’

4. 영혜는 노처녀 친구 한 명을 구체해 주기로 결심했다.
   yenghyey-nun nochenye chinkwu han myeng-ul kwuceyhaycwukilo kyelsimhapssta.
   Yenghyey-TOP spinster friend one person-ACC save decided
   ‘Yenghyey decided to save her spinster friend.’
   영혜는 그 노처녀 친구에게 남편 친구를 만나보도록 설득했다.
   yenghyey-nun ku nochenye chinkwu-eykey namphyen chinkwu-lul mannapotolok seltukhapssta.
   Yenghyey-TOP that spinster friend-DAT husband friend-ACC meet persuaded
   ‘Yenghyey persuaded her spinster friend to meet one of her husband’s friends.’

5. 선주는 요리실세가 없는 친정올케를 돕고 싶었다.
   sencwu-nun yolismssi-ka epsnun chinceng olkhey-lul topko sipessta.
   Sencwu-TOP cooking.talent-NOM not.have her sister.in.law-ACC help wanted
   ‘Sencwu wanted to help her sister in law who is not good at cooking.’
   선주는 그 친정올케에게 손세좋은 요리선생을 보냈다.
   sencwu-nun ku chinceng olkhey-eykey somssi cohun yoli sensayng-ul ponayssta.
   Sencwu-TOP that her sister.in.law-DAT talent good cooking teacher-ACC sent
   ‘Sencwu sent her sister in law a good cooking teacher.’
6. 민영은 중학생 조카 한 명과 살고 있다.
   minyeng-un cwunghaksayng cokha han myeng-kwa salko ista.
   Minyeng-TOP middle.school.student niece one person-with living existed
   ‘Minyeng lives with her niece, a middle school student.’
   민영은 그 중학생 조카에게 이웃집 여학생을 도와주도록 시켰다.
   minyeng-un ku cwunghaksayng cokha-eykey iwuscip yehaksayng-ul towacwutolok sikhyessta.
   Minyeng-TOP that middle.school.student niece-DAT neighbor girl.student-ACC help made
   ‘Minyeng made her middle school student niece help a neighbor girl.’

7. 창규네 반에 지방에서 예쁜 여학생 한 명이 전학을 왔다.
   changkyuney pan-ey cipang-eyse yepppun yehaksayng han myeng-i cenhak-ul wassta.
   Changkyu’s class-LOC country-from pretty girl.student one person-NOM transfer-ACC came
   ‘A pretty girl student was transferred to Changkyu’s class, from the country.’
   창규는 그 예쁜 여학생에게 청소반장을 놀리도록 부추겼다.
   changkyu-nun ku yepppun yehaksayng-eykey chengsopancang-ul nollitolok pwuchwukyessta.
   Changkyu-TOP that pretty girl.student-DAT cleaning.president-ACC laugh triggered
   ‘Changkyu caused the pretty female student to laugh at the captain of cleaning.’

8. 오늘 아침 영우는 우연히 운전기사 한 명을 보았다.
   onul achim yengwu-nun wuyenhi wuncenkisa han myeng-ul poassta.
   today morning yengwu-TOP by.accident driver one person-ACC saw
   ‘This morning Yengwu happened to bump into another driver.’
   영우는 그 운전기사에게 자동차 세일즈맨을 만나도록 주선했다.
   yengwu-nun ku wuncenkisa-eykey catongcha seyilcumayn-ul mannatolok cwusenhayssta.
   Yengwu-TOP that driver-DAT car salesman-ACC meet arranged
   ‘Yengwu arranged for the other driver to meet a car salesman.’

9. 성재는 정보부에 신입요원이 새로 들어왔음을 알게 되었다.
   sengcay-nun cengpaw-eu sinipyowen-i saylo tulewassumul alkey toyessta.
   Sengcay-TOP information.section-LOC newcomer-NOM newly came know became
   ‘Sengcay found out that a newcomer joined the information department.’
   성재는 그 신입요원에게 유능한 고참요원을 감시하도록 명령했다.
   sengcay-nun ku sinipyowen-eykey yununghan kochamyowen-ul kamsihatolok
   Sengcay-TOP that newcomer-DAT smart senior.agent-ACC watch
   myenglyenghayssta.
   ordered
   ‘Sengcay ordered the newcomer to watch over an able senior agent.’

10. 병수는 매니저면트회사에서 섹시한 여배우 한 명을 접촉았다.
    pyengswu-nun maynicimentuhoysa-eyse seyshihan yepaywu han myeng-ul cemccikessta.
    Pyengswu-TOP management.company-at sexy actress one person-ACC picked
    ‘Pyengswu picked a sexy actress from the management company.’
    병수는 그 섹시한 여배우에게 바람돌이 재범2세를 유혹하도록 시켰다.
    pyengswu-nun ku seyshihan yepaywu-eykey palamtungi caypelisey-lul
    Pyengswu-TOP that sexy actress-DAT playboy millionaire.heir-ACC
    yuhokhatolok sikhyessta.
    tempt made
    ‘Pyengswu made the sexy actress tempt a millionaire’s heir.’
11. 경태는 대머리 검박사와 같은 병원에 근무하고 있다.
   kyengthay-nun taymeli kimpaksa-wa kathun pyengwen-ey kunmwuhako issta.
Kyengthay-TOP bald Dr.Kim-with same hospital-LOC working existed
   ‘Kyengthay works for a hospital with bald Dr. Kim.’
경태는 그 대머리 검박사에게 백발이 성성한 죽박사를 칭찬했다.
kyengthay-nun ku taymeli kimpaksa-eykey paykpal-i sengsenghan
Kyengthay-TOP that bald Dr. Kim-DAT white.hair-NOM much
choy paksa-lul chingchanhayssta.
Dr. Choy-ACC praised
   ‘Kyengthay praised white-haired Dr. Choy to bald Dr. Kim.’

12. 기정은 밤늦게까지 일하고 있던 한인2세 직원 한 명을 보았다.
kiceng-un pamnuckeykkaci ilhako isssten hanin isey cikwen.
Kiceng-TOP till.late.night working existed Korean 2nd generation staff
han myeng-ul poassta
   one person-ACC saw
   ‘Kiceng saw a 2nd generation Korean staff member who was working till late in the night.’
기정은 그 한인2세 직원에게 호주출신사무관을 백치마경하도록 조언했다.
kiceng-un ku hanin isey-eykey hocwuchwulsin samwukwan-ul peychimakhing
Kiceng-TOP that Korean 2nd generation-DAT Australian staff-ACC resemble
hatolok coenhayssta.
do advised
   ‘Kiceng advised the second generation Korean staff member to follow after one of the
Australian staff members.’

13. 영준에게는 조직폭력배인 동창이 한 명 있다.
yengcwun-eykey-nun cockphoklyekpayin tongchang-i han myeng issta.
Yengcwun-DAT-TOP gang friend one person-NOM existed
   ‘Yengcwun has a friend in a gang.’
영준은 그 조직폭력배 동창에게 부패형사인 처남을 혼내주도록 지시했다.
yengcwun-eykey nun cockphoklyekpay tongchang-eykey pwuphay hyengsain
Yengcwun-TOP that gang friend-DAT corrupt detective
chenam-ul honaycwutolok cisihayssta.
brother.in.law-ACC harass told
   ‘Yengcwun asked his gang member friend to harass his brother in law, a corrupt detective.’

14. 경아는 신문사에서 신입정치부기자 한 명을 만났다.
kyenga-nun sinmwunsa-eyse sinpencengchipwukica han myeng-ul mannassta.
Kyenga-TOP newspaper.company-AT new.politics. section.reporter one person-ACC met
   ‘Kyenga bumped into a new politics reporter at the newspaper company.’
경아는 그 신입정치부기자에게 편집국 직원을 잘 도와주도록 부탁했다.
kyenga-nun ku sinpencengchipwukica-eykey phyencipkwuk cikwen-ul
Kyenga-TOP that new.politics.section.reporter-DAT editorial.office staff-ACC
cal towacwutolok pwuthakhayssta.
well help asked
   ‘Kyenga asked the new politics reporter to help a member of the editorial staff.’
15. 해경은 실험실에서 친한 후배 한 명을 보았다.
   하예경-TOP 노출부근의 친한 후배와 함께 실험실에 갔다.
   해경은 그 친한 후배에게 지도교수를 소개했다.

16. 지수는 백화점에서 사촌조카를 만났다.
   지수-/top 노출부근의 백화점에서 조카를 만났다.
   지수는 그 사촌 조카에게 말아이를 인사하였다.

17. 상진은 지갑을 소매치기 당한 아가씨를 보았다.
   상진은 지갑을 잃고 가족에게 알려서 친구를 찾아서 친구를 만났다.
   상진은 그 아가씨에게 방범대원을 데려다 주었다.

18. 현주는 한 베스트셀러 작가와 같은 성당에 다닌다.
   현주는 노출부근의 성당에 다녀와서 작가와 친구를 만났다.
   현주는 그 베스트셀러 작가에게 주임신부님을 만나러 가자고 권유했다.

19. 선아는 최근 미국에서 맘내동생이 돌아왔다.
   선아-/top 노출부근의 미국에서 맘내동생이 돌아왔다.
   선아는 그 맘내동생에게 친절하게 인사를 하고 출장을 떠났다.
20. 은수는 학원에서 한 외국인강사와 친해졌다.
은수-nun hakwen-eyse han oykwiuk kangsa-wa chinhayeyessta.
Unswu-TOP academy-at one foreign instructor-with became.friends
‘Unswu came to be friends with a foreign instructor at the academy.’
은수는 그 외국인강사에게 여동생을 전보일 생각이다.
은수-nun ku oykwiuk kangsa-eykey yetongsayng-ul senpoil sayngkakita.
Unswu-TOP that foreign instructor-DAT sister-ACC introduce think
‘Unswu thought of introducing her sister to the foreign instructor.’

21. 민수는 한국에서 온 조카와 함께 한인성당에 갔다.
민수-nun hankwuk-eyse on cokha-wa hamkkye hanin sengtang-ey kassta.
Minswu-TOP Korea-from came nephew-with together Korean cathedral-LOC went
‘Minswu went to the Korean Catholic church with his nephew who came from Korea.’
민수는 그 조카에게 성가대 지휘자를 소개했다.
민수-nun ku cokha-eykey sengkatay cihwica-lul sokayhayssta.
Minswu-TOP that nephew-DAT choir conductor-ACC introduced
‘Minswu introduced his nephew the Church choir conductor.’

22. 영애는 미국에서 온 바이어와 만나기로 되어 있었다.
영애-nun mikwuk-eyse on paie-wa mannakilo toye issessta.
Yengay-TOP US-from came buyer-with meet arranged existed
‘Yengay was supposed to meet a buyer from the US.’
영애는 그 바이어에게 회사 디자이너를 데리고 갔다.
영애-nun ku paie-eykey hoysa ticaine-lul teylikokassata.
Yengay-TOP that buyer-DAT company designer-ACC took
‘Yengay brought a company designer to meet the buyer.’

23. 현민은 오늘 새로 전학온 남학생을 보았다.
현민-un onul sayl o cenhakon hamhaksayng-ul poassta.
Hyenmin-TOP today newly transferred boy.student-ACC saw
‘Hyenmin saw a male student who was newly transferred today.’
현민은 그 남학생에게 영어회화교사를 따라 가라고 말했다.
현민-un ku nambhaksayng-eykey yengehoyhwakkyosa-lul ttala kalako malhaystssta.
Hyenmin-TOP that boy.student-DAT English.conversation.teacher-ACC follow go told
‘Hyenmin told the male student to go follow an English conversation teacher.’

24. 정민은 스테이크를 잘 만드는 요리사와 친한 친구가 되었다.
정민-un sutheyikhu-lul cal mantunun yolisa-wa cinhan chinkwu-ka toyessta.
Cengmin-TOP steak-ACC well make chef-with close friend-NOM became
‘Cengmin became friends with a chef who is good at cooking steak.’
정민은 그 요리사에게 식당 주인을 잘 도와주라고 부탁했다.
정민-un ku yolisa-eykey siktang cwuin-ul cal towacwu pwuthakhayssta.
Cengmin-TOP that chef-DAT restaurant owner-ACC well help asked
‘Cengmin asked the chef to help a restaurant owner.’
APPENDIX C

TEST SENTENCES FOR EXPERIMENT 3

1. 담임선생님은/지도학생에게(만)/학교장이/어제 오후/
   수상자에게/상장을/수여했다고/말했습니다.
   tamimsensayngnim-un/citohaksayng-eykey (man)/hakkyocang-i/eeey ohwu/
class.teacher-TOP/his.student-DAT (only)/principal-NOM/yesterday afternoon/
swusangca-eykey/sangcang-ul/swuyehaysstako/malhayssupnita
winner-DAT/prize-ACC/gave/said
   ‘The class teacher told (only) his students that the principal gave a prize to the winner
   yesterday afternoon.’

2. 기획실과장은/담당요원에게(만)/경호실장이/비밀리에/
   대통령에게/비밀문서를/전달했다고/전했습니다.
   kihwiksilhwacang-un/tamtangyowen-eykey (man)/kyenghosilcang-i/pimilliey/
information.dept.manager-TOP/agent.in.charge-DAT (only)/bodyguard-NOM/secretly/
taythonglyeng-eykey/pimilmwnuse-lul/centalhaysstako/cenhayssupnita
president-DAT/secret.document-ACC/passed/said
   ‘The information department manager reported (only) to the agent in charge
   that the manager of the bodyguard handed the secret document to the president.’

3. 열심할머니는/막내아들에게(만)/어머니가/서둘러서/
   아버지에게/도서관을/건네주었다고/이야기했습니다.
   yepciphalmeni-nun/maknayatul-eykey (man)/emeni-ka/setullese/
neighbor.grandmother-top/youngest.son-DAT (only)/mother-nom/hurriedly/
apeci-eykey/tosilak-ul/kennaycwuestako/iyakihayssupnita
father-DAT/lunchbox-ACC/handed/chatted
   ‘The neighbor’s grandmother told (only) the youngest son that his mother handed
   a lunchbox to his father in a hurry.’

4. 사장실비서는/신입직원에게(만)/부사장이/비밀리에/
   김대리에게/승진을/약속했다고/설명했습니다.
   sacangsil pise-nun/sinipcikwon-eykey (man)/ememi-ka/setullese/
lab assistant-top/advisor-DAT (only)/graduate-nom/in.detail/
silhemsil cokyo-nun/citokyoswu-eykey (man)/tayhakwensayng-i/caseyhakey/
lab assistant-top/advisor-DAT (only)/graduate-nom/in.detail/
hakpwusayng-eykey/silhemkyelkwa-lul/selmyenghaysstako/malhayssupnita
undergrad-DAT/experiment.results-ACC/explained/said
   ‘The lab assistant told (only) the supervisor that the graduate student explained
   the results of the experiment to the undergrad in detail.’
woman fan-DAT/phone.number-acc/asked/complained
‘The marathon coach complained (only) to the game referee that a famous player asked a lady fan for her phone number at the track.’

7. kanglyekkyey hyengsa-nun/tamtangkemsa-eykey (man)/yonguyca-ka/sakencikhwu/homicide detective-top/prosecutor.in.charge-DAT (only)/suspect-nom/after.accident/phihayca-eykey/pimil-ul/kopaykhaysstako/pokoha yssupnita
victim-DAT/secret-acc/confessed/reported
‘The homicide detective reported (only) to the prosecutor in charge that the suspect confessed his secret to the victim after the accident.’

8. aktanci hwica-nun/chwicaykica-eykey (man)/yencwuca-ka/khongkhul-eyse/orchestra.conductor-top/reporter-DAT (only)/player-nom/contest-loc/pwumonim-eykey/yencwukok-ul/hencenghaysstako/malhayssupnita
parents-DAT/playing-acc/dedicated/said
‘The orchestra conductor told (only) the reporter that the player dedicated his performance to his parents at the contest.’

‘The vice principal told (only) the teacher in charge that the class president gave flowers to the supervisor after the event.’

‘The female pilot told (only) the information bureau manager that the co-pilot gave a lei to passengers on the airplane.’

11. sinmwunsakica-nun/tamtangkyenchal-eykey (man)/phoklyekpay-ka/pwulpepulo/
The newspaper reporter told (only) the policeman in charge that the gang asked the actress for money unlawfully.

The guard in charge told (only) his boss that a visitor sold things to the staff by pressuring them.

The senator assistant testified (only) to the prosecutor in charge that the senator was asked in email to issue a construction permit from the owner.

The store staff in formed (only) the staff from headquarters that the manager introduced the business to an old gentleman last evening.

The store staff informed (only) the staff from headquarters that the manager introduced the business to an old gentleman last evening.
‘The police officer explained (only) to the detective in charge that the suspect yelled at the victim in a loud voice in the car.’

17. 검포매니저는/단골고객에게 (만)/판매원이/최근주말/언예인에게/보석을/팔았다고/말했습니다.
cemphomaynice-nun/tankolkokayk-eykey (man)/phanmaywen-i/cinan cwumal/store.mananger-top/best.customer-DAT (only)/staff-nom/last.weekend/yenyeyin-eykey/posek-ul/phalasstako/malhayssupnita
entertainer-DAT/jewelry-acc/sold/said
‘The store manager told (only) his best customer that the salesman sold an entertainer jewelry last weekend.’

18. 백화점직원은/인터넷사원에게 (만)/여배우가/배정에서/
매니저에게/남자친구를/소개했다고/이야기했습니다.
paykhwacem cikwen-un/intenssawen-eykey (man)/yepaywu-ka/maycang-eyse/department.store.staff-top/intern-DAT (only)/actress-nom/store-at/maynice-eykey/namcachinkwu-lul/sokayhayssstako/iyakahayssupnita
manager-DAT/boyfriend-acc/introduced/chatted
‘The staff of the department store told (only) an intern that an actress introduced her boyfriend to the manager at the store.’

19. 주임목사님은/교회장로에게 (만)/청년회가/교회에서/
노숙자에게/카니를/대접했다고/이야기했습니다.
cwummwoksanim-un/kohoycanglo-eykey (man)/chengnyenhoy-ka/kohoy-eyse/chief.pastor-top/church.senior-DAT (only)/young.men’s.association-nom/church-loc/noswukca-eykey/kkini-lul/taycephayssta-ko/chingchanhayssupnita
homeless-DAT/meal-acc/treated/praised
‘The chief pastor gave praise (only) to a church senior that the young men’s association treated the homeless to food at the church.’

20. 인사부직원은/사무국장에게 (만)/인사부장이/무례하게/
여직원에게/서명을/시켰다고/고소했습니다.
insapwu cikwen-un/samwuhuwkcang-eykey (man)/insapwucang-i/mwulyehakey/HR.staff-top/head.manager-DAT (only)/HR.manager-nom/rudely/yecikwen-eykey/simpwulum-ul/sikhyesstako/kocacilhayssupnita
woman.staff-DAT/errsands-acc/forced/tipped.off
‘The HR staff tipped off (only) to the head manager that the HR manager rudely made a female staff do errands for him.’

21. 실험실조교는/지도학생에게 (만)/교수님이/공손하게/
무학장에게/실험주제를/설명했다고/말했습니다.
cilhemsil cokyo-nun/citohaksayng-eykey (man)/kyoswunim-i/kongsonhaykey/lab.assistant-top/student.in.charge-DAT (only)/professor-nom/politely/pwuhakcang-eykey/silhemcwucey-lul/selmyenghaysssta-ko/malhayssupnita
vice.dean-DAT/experiment.theme-acc/explained/said
‘The lab assistant told (only) the student in his charge that the professor politely explained the theme of the experiment to the vice dean.’
22. 재활의사는/포마환자에게 (만)/재활원장이/범실에서/
봉사자에게/감사패를/증정했다고/말해주었습니다.

cayhwalwen uysa-nun/kkomahwanca-eykey (man)/cayhwalwencang-i/pyengsil-eysy/
rehabilitation.doctor-top/kid.patient-nom/room-loc/
pongsaca-eykey/kamsaphay-lul/cungcenghayssstakomalhaycuessupnita
volunteer-DAT/appreciation.plaque-acc/gave/said
‘The rehabilitation doctor told (only) a child patient that the president of
the rehabilitation gave an appreciation plaque to the volunteers in the room.’

23. 친목회총무는/신입회원에게 (만)/친목회장이/큰소리로/
등록자에게/회비를/요구했다고/말했습니다.

chimokhoy chongmwu-nun/siniphoywen-eykey (man)/chimokhoycang-i/khunsolilo/
get.together secretary-top/new.comer-DAT (only)/get.together.president-nom/loudly/
tunglokca-eykey/hoyipi-lul/yokwuhaysstakaselmyenghayssupnita
member-DAT/dues-acc/requested/explained
‘The secretary of the get-together explained (only) to the newcomer that the president of
the get-together loudly asked the members for the dues.’

24. 소방서대장은/부녀회장에게 (만)/소방관이/채미있게/
여린이에게/화재교육을/실시했다고/알려주었습니다.

sopangsetaycang-un/pwunyehoycang-eykey (man)/sopangkwan-i/caymiisskey/
fire.fighers.chief-top/lady’s.club.president-DAT (only)/fire.fighter-nom/interestingly/
elini-eykey/hwacaykyoyuk-ul/silsihaysssta-ko/allyecwuessupnita
kid-DAT/fire.education-acc/executed/informed
‘The chief of the fire fighters informed (only) the president of lady’s association
that the fire fighters gave to the kids an interesting talk on fire safety fighting.’

25. 구조대대장은/고참대원에게 (만)/조난자가/늦은녁에/
구급대에게/구조를/요청했다고/말했습니다.

kwucotaytaycang-un/kochamtaywen-eykey (man)/conanca-ka/nucun cenyek/
rescue.unit.chief-top/senior.member-DAT (only)/sufferer-nom/late evening/
kwukuptay-eykey/kwuco-lul/yochenghayssstakaselmyhaysssupnita
rescue.unit-DAT/rescue-acc/asked/explained
‘The chief of the rescue unit explained (only) to the senior rescuer that late in the evening a
sufferer asked the rescue unit to rescue him.’

26. 문과대학장은/신입교수에게 (만)/부총장이/
저난학기/신입생에게/특강을/실시했다고/말했습니다.

mwunkwatayhakcang-un/sinimkyoswu-eykey (man)/pwuchongcang-i/
college.of.art.and.science.dean-top/new.professor-DAT (only)/vice president-nom/
last.semester/freshmen-DAT/special.talk-acc/gave/said
‘The dean of the college of arts and sciences told (only) a new professor that the vice
president of the university gave a special talk for freshmen last semester.’

27. 동호회회장은/고참회원에게 (만)/동호회가/지난해에/
장애우에게/무료교육을/실시했다고/보고했습니다.
tonghohoy hoycang-un/kochamhoywen-eykey (man)/tonghohoy-ka/cinanhayey/
‘The president of the club reported (only) to the senior members that the club gave free education to the handicapped last year.’

‘The president of the reunion boasted (only) to the president of the college that the reunion provided a special talk on job searching for senior students this semester.’
APPENDIX D
TEST SENTENCE FRAGMENTS FOR EXPERIMENT 4

1. 담임선생님은 지도학생에게(만) 학교장이 어제 오후
tamimsensayngnim-un citohaksayng-eykey (man) hakkyocang-i ecey ohwu
class.teacher-TOP student.in.charge-DAT (only) principal-NOM yesterday afternoon

2. 열심히 먹는 막내아들에게(만) 어머니가 서둘러서
yeciphalmeni-nun maknayatul-eykey (man) emeni-ka setwullese
neighbor.grandmother-TOP youngest.son-DAT (only) mother-NOM in.a.hurry

3. 실험실조교는 지도교수에게(만) 대학원생이 자세하게
silhemsil cokyo-nun citokyoswu-eykey (man) tayhakwensayng-i caseyhakey
lab.assistant-TOP advisor-DAT (only) graduate.student-NOM in.detail

4. 강력계형사가 담당검사에게(만) 용의자가 사건직후
kanglyekkyey hyengsa-nun tamtang kemsayng-i yonguyca-sakencikhwu
homicide.detective-TOP principal-NOM yesterday afternoon

5. 의원보좌관은 담당검사에게(만) 국회의원이 이메일로
uywenpocwakwan-un tamtangkemsayng-i yongyuca-sakencikhwu
senator-assistant-TOP prosecutor.in.charge-DAT (only) graduate.student-NOM email-INST

6. 작은숙모님은 큰외삼촌에게(만) 할머니가 지난주중
cajunswukmonim-un khunoychasunim-eykey (man) halmeni-ka cinan chwusek
younger.aunt.in.law-TOP eldest.uncle-DAT (only) grandmother-NOM last Chwusek

7. 교통경찰관은 담당형사에게(만) 용의자가 차량에서
kyothongkyengchalkwan-un tamtangkemsayng-i yongyuca-sakencikhwu
traffice.detective-policeman-TOP detective-in.charge-DAT (only) suspect-NOM inside.car

8. 점포매니저는 단골고객에게(만) 판매원이 지난주말
cemphomaynice-nun tankol kokayk-eykey (man) phanmaywen-i cinancwumal
store.manager-TOP best.customer-DAT (only) salesman-NOM last.weekend

9. 백화점직원은 인턴사원에게(만) 여배우가 매장에서
paykhwacemcikwen-un inthensawen-eykey (man) yepaywu-ka maycang-eyse
department.store.staff-TOP intern-DAT (only) actress-NOM store-at

10. 주임복서님은 교회장로에게(만) 청년회가 교회에서
cwuimmoksanim-un kyohoycanglo-eykey (man) chengnyenhoy-ka kyohoy-eyse
church.church.senior-TOP church senior-DAT (only) young.men’s.association-NOM church-at

11. 실험실조교는 지도학생에게(만) 교수님이 공손하게
silhemsil cokyo-nun citohaksayng-eykey (man) kyoswunim-i kongsonhakey
lab.assistant-TOP student.in.charge-DAT (only) professor-NOM politely
12. 재활의사인 후미환자에게 (만) 재활원장이 병실에서
   cayhwalwenysa-nun kkomahwanca-eykey (man) cayhwalwencang-i
   rehabilitation.doctor-TOP kid.patient-DAT (only) president.of.rehabilitation-NOM
   pyengsil-eyse
   room.for.patient-at

13. 소방서대장은 부녀회장에게 (만) 소방관이 재미있게
   sopangse taycang-un pwunyehoycang-eykey (man)
   captain.of fire.fighters-TOP president.of.lady’association-DAT (only)
   sopangkwan-i caymiisskey
   fire.fighers-NOM with.fun

14. 문과대학장은 신임교수에게 (만) 부총장이 지난학기
   mwunkwatayhakcang-un sinimkyoswu-eykey (man) pwichongcang-i
   dean.of.art&science.college-TOP new.professor-DAT (only) vice.president-NOM
   cinan hakki
   last semester

15. 동호회회장은 고참회원에게 (만) 동호회가 지난해에
   tonghohoyhoycang-un kochamhoywen-eykey (man) tonghohoy-ka cinanhayey
   president.of.club-TOP senior.member-DAT (only) club-NOM last.year

16. 총동문회장은 대학총장에게 (만) 동문회가 이번학기
   chongtongmwun hoycang-un tayhakchongcang-eykey (man)
   president.of.reunion-TOP president.of.university-DAT (only)
   tongmwun hoy-ka ipenhakki
   reunion-NOM this semester
BIBLIOGRAPHY


Akatuka and S. Strauss, Stanford, CA: CSLI.
Moltmann, Friederike. 1990. Scrambling in German and the specificity effect. Ms., MIT.


