SCOPE INTERPRETATION IN FIRST AND SECOND LANGUAGE

ACQUISITION: NUMERAL QUANTIFIERS AND NEGATION

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ABSTRACT

The present study investigates the interpretation of scopally ambiguous sentences containing a numeral quantifier and negation, such as (1) and (2), with a view to examining the interpretive preferences for Korean manifested by Korean-speaking children and adults, and the interpretive preferences for English manifested by Korean-speaking second language learners.

(1) Korean
Dora-ka cokay-lul twu kay an cwu-wess-ta.
Dora-NOM seashell-ACC two CL NEG pick up-PST-DECL
‘Dora didn’t pick up two seashells.’

(2) English
a. Tom didn’t cut down two apple trees.
b. Two cooks didn’t taste the soup.

The results from experiments on L1 Korean reveal that Korean-speaking children strongly prefer to assign the wide scope reading (i.e., the two > not interpretation) to numerically quantified NP patterns in object position in sentences containing short-form negation. Korean-speaking adults also display a preference for the two > not interpretation, but they tend to access the narrow scope reading of the NP patterns (i.e., the not > two interpretation) more frequently than children do. The results also show that Korean-speaking children do not simply lack the not > two interpretation but accept the interpretation more frequently when the test sentences are preceded by affirmative sentences carrying contrastive information that creates a context for denial.

The results from experiments on L2 English show that in interpreting negative sentences containing numerically quantified subject NPs, second language learners resemble native adult speakers of English in preferring the two > not interpretation.
interpretation. However, in the case of numerically quantified object NPs, they tend to accept the \textit{two} > \textit{not} interpretation more frequently, in contrast to English native speakers, who do not show clear preferences. The results also show that in neither case do low and high proficiency groups show any differences in their interpretive preferences in English.

The interpretive preferences manifested in L1 Korean and L2 English are discussed in the framework of O’Grady’s (2006, 2008) processor-based approach, which accounts for scope phenomena by reference to the importance of minimizing the burden on working memory in the courses of processing.
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CHAPTER 1. INTRODUCTION

This dissertation investigates the interpretation of a scopally ambiguous sentence containing a numeral quantifier and negation as in (1).

(1) a. Korean
    Dora-ka  cokay-lul  twu  kay  an  cwu-wess-ta.
    Dora-NOM seashell-ACC two  CL  NEG  pick up-PST-DECL
    ‘Dora didn’t pick up two seashells.’

    b. English
    Tom didn’t cut down two apples trees.

With the help of a series of experiments, I examine the interpretive preferences for Korean manifested by Korean-speaking children and adults and the interpretive preferences for English manifested by Korean-speaking second language learners. I also explore several factors which may have an influence on those interpretive preferences and make attempts to explain the preference patterns manifested in Korean and English by considering the role of processing in scope interpretation.

This dissertation is organized as follows: In the following sections, I provide background information on scope in general, facts about the types of numeral constructions and negation found in Korean, and a brief survey of theoretical accounts of scope ambiguity. Chapter 2 explores the interpretation of numerically quantified noun phrase (NP) patterns in negated sentences by Korean-speaking children and adults. In Chapter 3, I compare the interpretations of numerically quantified NP patterns in negated sentences with those of bare NPs, another type of indefinite NPs in Korean, in order to better understand the interpretation of our target construction. In Chapter 4, I explore the interpretive preferences for English manifested by second language learners whose first
language is Korean. Finally, Chapter 5 considers several issues pertaining to the findings of the studies and seeks to interpret those findings from a processing perspective.

1.1 Scope phenomenon

The term *scope* refers to the structural and semantic relationship between and among operators, including quantifiers and negatives. This relationship results in ambiguity in certain sentence types. For example, sentence (2) can mean either ‘every boy cleaned some room, but not necessarily the same room’ or ‘there is a particular room which every boy cleaned.’

(2) Every boy cleaned some room.
   a. Interpretation 1
      \[ \forall x \ [\text{boy}(x) \rightarrow \exists y \ [\text{room}(y) \rightarrow \text{cleaned}(x, y)]] \]
      ‘For every x there is some y such that it is the case that x cleaned y.’
      (‘Every boy cleaned some possibly different room.’)

   b. Interpretation 2
      \[ \exists y \ [\text{room}(y) \& \forall x \ [\text{boy}(x) \rightarrow \text{cleaned}(x, y)]] \]
      ‘There is some y, such that for every x it is the case that x cleaned y.’
      (‘There exists a particular room which every boy cleaned.’)

On the first interpretation, the universally quantified NP *every boy* has scope over the existentially quantified NP *some room* and is said to have “wide scope.” (Alternatively, *some room* is said to have “narrow scope.”) On the second interpretation, however, *some room* takes scope over *every boy* and therefore has wide scope.

Scopal ambiguity is also possible in sentences containing a negative and a numeral quantifier such as *two*.

(3) John didn’t read two books.
   a. Interpretation 1
      \[ \neg \exists 2x \ [\text{book}(x) \& \text{read}(\text{John}, x)] \]
      ‘It's not the case that there exists a set of two x's such that the x's are books and John read them.’ (‘It is not the case that John read two books.’)
b. Interpretation 2

\[ \exists x \ [\text{book}(x) \land \neg \text{read}(\text{John}, x)] \]

‘There exists a set of two x's such that the x's are books and John didn’t read them.’ (‘There are two (particular) books that John didn’t read.’)

In (3a), the negative can affect the interpretation of a numerically quantified NP in direct object position, giving the interpretation ‘John read fewer (or more) than two books.’ In such cases, the negative is said to have scope over *two books*, or, alternatively, *two books* is said to have narrow scope (often abbreviated as the *not > two* interpretation). In contrast, it is also possible to interpret the numerically quantified NP independent of negation, which gives the sentence a meaning that can be paraphrased as ‘There are two books that John didn’t read.’ In this case, *two books* is said to have scope over the negative)—i.e., to have wide scope (the *two > not* interpretation).

Let us now consider in more detail the precise nature of the interaction between negation and numerals in sentences such as (3). Following the widely adopted tradition, I assume that a transitive verb denotes a relation between an agent and a patient (*John read two books* denotes a reading relation between *John* and *two books*) and that *not* has the effect of negating that relation. There are two circumstances under which such a sentence can be true. On the one hand, the sentence could be true if there is no reading relation between John and any set of two books. That is, the sentence can be true so long as John reads some number of books other than two (the *not > two* interpretation).¹

On the other hand, corresponding to the *two > not* interpretation, it is possible that the speaker has in mind a particular set of two books, both of which went unread—in which case there is no reading relation between John and those particular books.

¹ A scalar implicature, which need not concern us here has the effect of ensuring that the sentence will normally be taken to mean that John read fewer than two books.
1.2 Background facts on numerically quantified NP patterns and negation in Korean

In comparison to English, in which numerals occur right before a head noun, the position of numerals in Korean varies with respect to its head noun. In addition, there are several types of negation. In this section, I briefly introduce the types of numeral construction as well as the types of negation, and provide a short summary of the literature on the scope of negation.

1.2.1 Types of numeral construction

In Korean, a numeral usually occurs with a classifier (or counter) which indicates the general quality of the items which are being counted (Sohn 1999). For example, kay is a default classifier which is usually associated with 3-D objects, while mali is used as a classifier for animals (Choo & Kwak 2008:170). The numeral construction consisting of a numeral and its relevant classifier occurs in either prenominal or postnominal position as in the following.

(4) Prenominal: [Numeral + Classifier] + Genitive case particle + Noun
    twu  kay-uy  cokay
    two  CL-GEN seashell
   ‘two seashells’

    twu  mali-uy  mal
    two  CL-GEN horse
   ‘two horses’

(5) Postnominal: Noun + [Numeral + Classifier]
    cokay twu  kay
    seashell two  CL
   ‘two seashells’

    mal twu  mali
    horse two  CL
   ‘two horses’
When a numeral construction occurs in a prenominal position as in (4), a genitive case particle is attached at the classifier. In contrast, in the cases such as (5), where a numeral construction appears in a postnominal position, the genitive case is impossible. Both types of numeral constructions can occur with an NP in either subject or object position. For NPs containing a prenominal numeral, a nominative or accusative case particle, if present, occurs at the end of the head noun. For NPs containing a postnominal numeral, in contrast, case particles can be attached to either or both the head noun and the classifier. The following examples show the distributional pattern of the accusative markers -ul/lul.

(6) On the classifier
Hannah-ka Pizza twu kay-lul an mek-ess-e.
Hannah-NOM Pizza two CL-ACC NEG eat-PST-DECL
‘Hannah didn’t eat two slices of pizza.’

(7) On the head noun
Hannah-ka Pizza-lul twu kay an mek-ess-e.
Hannah-NOM Pizza-ACC two CL NEG eat-PST-DECL
‘Hannah didn’t eat two slices of pizza.’

(8) On both the head noun and the classifier
Hannah-ka Pizza-lul twu kay-lul an mek-ess-e.
Hannah-NOM Pizza-ACC two CL-ACC NEG eat-PST-DECL
‘Hannah didn’t eat two slices of pizza.’

(9) No accusative marker
Hannah-ka Pizza twu kay an mek-ess-e.
Hannah-NOM Pizza two CL NEG eat-PST-DECL
‘Hannah didn’t eat two slices of pizza.’

The studies in this dissertation focus on noun phrase patterns such as those in (7) which contain a postnominal numeral with case marked on the head noun because these constructions are considered more natural and common than their prenominal counterpart (Choo & Kwak 2008:172, Sohn 1999:352) and because based on preliminary results of a
pilot study, the sentence type containing the accusative marker on the head noun was regarded as being most compatible with both the not > two and two > not interpretations (see Chapter 2 for more details on the pilot study).

1.2.2 Types of negation and its scope

There are two ways to negate a sentence in Korean. In the case of so-called short-form negation (SFN) the negator an(i) ‘not’ or mos ‘cannot, unable’ is placed in front of a verb. In long-form negation (LFN), in contrast, the main verb takes the suffix -ci, which is followed by ani or mos in combination with the light verb ha ‘do, be in the state of.’ As illustrated below, short-form negation is preverbal and long-form negation postverbal.

Sample sentences are given below.

(10) a. Short form: type 1
Hannah-ka  hakkyo-ey  an  ka-ss-ta.
Hannah -NOM school-to  NEG  go-PST-DECL
‘Hannah didn’t go to school.’

b. Short form: type 2
Hannah-ka  hakkyo-ey  mos  ka-ss-ta.
Hannah -NOM school-to  NEG  go-PST-DECL
‘Hannah couldn’t go to school.’

c. Long form: type 1\(^2\)
Hannah -NOM school-to  go-ci  NEG-PST-DECL
‘Hannah didn’t go to school.’

d. Long form: type 2
Hannah-ka  hakkyo-ey  ka-ci  mos-ha-yess-ta.
Hannah -NOM school-to  go-ci  NEG-do-PST-DECL
‘Hannah couldn’t go to school.’

The literature on Korean points to apparent scopal differences depending on the type of negation and the syntactic position of noun phrases associated with quantifiers.

---

\(^2\) This type of long-form negation is usually used in the contracted form -ci anh.
In the case of sentences containing long-form negation and quantified NPs in object position, it has been reported that negation can take wide or narrow scope with respect to the quantified NPs as in (11a) and (12a) (Baek 1998, Cho 1975, Hagstrom 2000, Lee 2009, Song 1982, Suh 1989, among others).

(11) Universal quantifier motun ‘all/every’ in a prenominal position
   a. Long-form negation
      Hannah-NOM all/every apple-ACC eat-ci NEG-PST-DECL
      ‘Hannah didn’t eat all the apples/every apple.’
   
      b. Short-form negation
      Hannah-ka motun sakwa-lul an mek-ess-ta.
      Hannah-NOM all/every apple-ACC NEG eat-PST-DECL
      ‘Hannah didn’t eat all the apples/every apple.’

   Not > all/every interpretation
   ‘It is not the case that Hannah ate all the apples/every apple.’

   All/every > not interpretation
   ‘Hannah ate none of the apples.’

(12) Numeral quantifier twu ‘two’ in a postnominal position
   a. Long-form negation
      Hannah-NOM apple-ACC two CL eat-ci NEG-PST-DECL
      ‘Hannah didn’t eat two apples.’
   
      b. Short-form negation
      Hannah-ka sakwa-lul twu kay an mek-ess-ta.
      Hannah-NOM apple-ACC two CL NEG eat-PST-DECL
      ‘Hannah didn’t eat two apples.’

   Not > two interpretation
   ‘It is not the case that Hannah ate two apples.’

   Two > not interpretation
   ‘There are two apples that Hannah didn’t eat.’

In contrast, in the case of short-form negation an as in (11b) and (12b), the literature shows conflicting results. One group of researchers report that the short-form

Based on the experimental data, Han et al. (2007) report a bimodal distribution in the acceptance of the target readings for sentences with both types of negation and a universally quantified NP in object position. They make the innovative claim that regardless of the type of negation, one group of the Korean speakers allows only the interpretation in which negation has scope over a quantified NP in object position while the other group allows only the interpretation where negation has narrow scope.

Now, let us look at negative sentences containing quantifiers associated with NPs in subject position such as (13) and (14).

(13) Universal quantifier *motun* ‘all/every’ in a prenominal position
   a. Long-form negation
      all/every student-NOM park-to go-ci NEG-PST-DECL
      ‘All the students/every student didn’t go to the park.’

   b. Short-form negation
   Motun haksayng-i kongwen-ey an ka-ss-ta.
      all/every student-NOM park-to NEG go-PST-DECL
      ‘All the students/every student didn’t go to the park.’

(14) Universal quantifier *ta* ‘all’ as a subject-oriented adverb
   a. Long-form negation
   Ta kongwen-ey ka-ci anh-ass-ta.
      all park-to go-ci NEG-PST-DECL
      ‘All (the students) didn’t go to the park.’

   b. Short-form negation
   Ta kongwen-ey an ka-ss-ta.
      all park-to NEG go-PST-DECL
      ‘All (the students) didn’t go to the park.’
\( \textit{not} > \textit{all/every} \) interpretation

‘It is not the case that all the students went to the park.’

\( \textit{all/every} > \textit{not} \) interpretation

‘Nobody went to the park.’

Some researchers report that both types of negation can have wide and narrow scope with respect to the quantified phrases (Baek 1998, Kim 2000, Lee 2009). Other researchers report that in comparison to long-form negation, which allows either wide or narrow scope, short-form negation can have only narrow scope (Hagstrom 2000, Park 1998). Unlike these researchers, Han et al. (2007) and Suh (1989) report that neither short-form negation nor long-form negation can take wide scope with respect to quantified NPs in subject position.

The summary of the results from the literature is presented in Table 1.1.
The literature shows mixed results for scope interpretation in sentences containing both types of negation. Some of the studies drew their conclusions based on the data collected from a large sample of subjects, but the basis for the claims made by other studies is unclear. The differences found across studies may be also due to use of different experimental materials including context or due to use of different experimental design (i.e., within-participants design versus between-participants design). Moreover, even though two scope interpretations are possible in Korean, it may be that a less preferred

<table>
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<td></td>
<td>Result 3: bimodal distribution (only negation wide scope interpretation for one group of Korean speakers; only negation narrow scope interpretation for the other group of Korean speakers)</td>
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interpretation does not appear when a relevant supporting context is not available or when such a context is not well-constructed.

In this dissertation, I focus on the scope of short-form negation with respect to numerically quantified NP patterns since the primary data will be collected from Korean-speaking children, who are believed to acquire long-form negation much later than short-form negation (Kim 1997). By collecting data from a relatively large number of participants, the studies in the dissertation seek to provide a clearer picture of the scope of short-form negation with respect to numerically quantified NPs.

1.3 Theoretical accounts of scope interpretation


1.3.1 Structure-based approaches

Structure-based approaches to scope ambiguity are based on the assumption that the relative scope of operators is determined by their c-command relations at Logical Form (LF), which represents the grammatically determined aspects of a sentence’s interpretation. May (1977) proposes that quantified NPs are raised and adjoined to S (=IP) through an operation of Quantifier Raising at LF and that the relative scope of operators is determined by their c-command relations at that level of representation. According to this idea, an ambiguous sentence containing two quantified NPs such as (15a) has two LF representations.
(15) a. Every student admires some professor.
   b. LF representation for the universal wide scope interpretation
      \[s'[s\text{ every studenti } [s\text{ some professorj } [s\text{ e}_1 \text{ admires e}_j]]]]
   c. LF representation for the existential wide scope interpretation
      \[s'[s\text{ some professorj } [s\text{ every studenti } [s\text{ e}_1 \text{ admires e}_j]]]]

When the sentence has the interpretation in which the universally quantified NP has wide scope, its LF representation corresponds to (15b), in which \textit{every student} c-commands \textit{some professor}. In contrast, when it has the interpretation in which the existentially quantified NP has wide scope, it has the LF representation (15c), in which \textit{some professor} c-commands \textit{every student}.

Extending on his early work, May (1985) proposes that an ambiguous sentence such as (15a) has only the LF representation in (15c) thanks to the Empty Category Principle (ECP) and the Scope Principle as in the following.

(16) The Empty Category Principle (ECP): Traces must be properly governed.
   Proper government means
   a. A trace in complement position is properly governed by the lexical head.
   b. A trace in subject position is properly governed by its ‘antecedent’ provided that there is no intervening operator.

(17) The Scope Principle
   Members of \(\Sigma\)-sequences (i.e., a set of operators in A-bar position that c-command each other at LF) are free to take on any type of relative scope relation (May 1985: 34).

   Following Aoun and Sportiche (1983), c-command is defined in such a way that \(\alpha\) c-commands \(\beta\) if every maximal projection dominating \(\alpha\) dominates \(\beta\), and \(\alpha\) does not dominate \(\beta\).

According to the ECP, the LF representation (15b) for the sentence \textit{Every student admires some professor} is not a licit representation since the trace of \textit{every student} in subject position is not properly governed by its antecedent due to the intervening
quantified NP *some professor*. Therefore, the sentence must have the following LF representation.

(18) \[s[s \text{ some professor}j \[s \text{ every student}i \[s e_i \text{ admires e}_j]]]]

According to the Scope Principle, *some professor* and *every student* c-command each other because S’, the maximal projection for both NPs, dominates them, allowing either NP to take wide scope, thereby creating ambiguity.

As in May (1977, 1985), Aoun and Li (1993) assume that quantified phrases are raised at LF and adjoined to a non-argument Ā position by Quantifier Raising. However, they propose that Quantifier Raising operates at LF in two steps: NP-adjunction and Q-adjunction. According to their proposal, NP-adjunction raises the whole nominal phrase whose specifier is quantificational to an Ā position. This process applies optionally to a quantificational phrase in a non-θ position and obligatorily to such a phrase in a θ-position.\(^3\) Q-adjunction raises the bare quantifier and adjoins it to an Ā position governing the whole NP whose specifier is quantificational.

Furthermore, they propose two universal principles regarding scope assignment as follows:

(19) The Minimal Binding Requirement (henceforth, MBR)
Variables must be bound by the most local potential Ā-binder.
‘Locality’ is defined as follows:
\(A\) locally binds \(B\) if \(A\) and \(B\) are coindexed, \(A\) c-commands \(B\), and there is no \(C\) coindexed with \(A\) that is c-commanded by \(A\) and c-commands \(B\).

---

\(^3\) The assumption that NP-adjunction optionally applies to the whole QP in a non-θ position allows us not to refer to NP-traces in the determination of relative scope. The authors try to get rid of a discrepancy in the role of NP-traces between quantifier-quantifier interaction and quantifier and wh-phrase interaction.
(20) The Scope Principle
An operator \( A \) may have scope over an operator \( B \) iff \( A \) c-commands \( B \) or an \( \bar{A} \)-element in the chain headed by \( B \). The elements of the chain include the operator itself and intermediate traces in non-argument positions (i.e., non-argument element coindexed with \( B \)).

If we take the sentence *Every boy cleaned some room* for example, its S-Structure representation\(^4\) is as in (21a).

(21) a. S-Structure

\[
[\text{IP every boy}_i [\text{VP}_1 t_i [\text{VP}_2 \text{cleaned some room}]])
\]

b. LF representation for the universal wide scope interpretation

\[
[\text{IP [NP every}_m [\text{NP } \chi_m \text{ boy}]] [\text{IP } \chi_i [\text{VP}_1 t_i [\text{VP}_2 [\text{NP some}_n [\text{NP } \chi_n \text{ room}]] [\text{VP}_2 \text{cleaned } \chi_j]]]]]
\]

c. LF representation for the existential wide scope interpretation.

\[
[\text{IP [NP some}_n [\text{NP } \chi_n \text{ room}]] [\text{IP [NP every}_m [\text{NP } \chi_m \text{ boy}]] [\text{VP}_1 t_i [\text{VP}_2 \text{cleaned } \chi_j]]]]
\]

As the quantified phrase *every boy* in subject position is in a non-\( \bar{E} \) position, NP-adjunction as part of Quantifier Raising can optionally apply to the phrase. The LF representation after NP-adjunction and Q-adjunction apply to *every boy* and *some room* is as in (21b). Here, *some room* cannot be adjoined to higher position than VP2 because of the MBR: If it is adjoined to IP, *every boy* c-commands \( \chi_j \), resulting in the MBR violation. In (21b), *every boy* c-commands *some room*, thereby allowing the universal wide scope meaning, ‘for every boy, there is some room that he cleaned.’ The trace of *every boy*, \( t_i \) is not considered for scope assignment because it is not in an \( \bar{A} \)-position according to the Scope Principle.

In contrast, if NP-adjunction is not applied to the subject *every boy*, and it stays in the Spec of IP position, the object NP *some room* can be adjoined to IP without violating MBR as in (21c). In this configuration, *some room* c-commands *every boy* so that the

\(^4\) Aoun and Li assume that in English subjects are base-generated in Spec, VP and raised to Spec, IP following the VP-internal subject hypothesis.
existential wide scope meaning ‘there is a particular room that every boy cleaned’ is possible.

Hornstein (1995) accounts for scope ambiguity in the minimalist framework. Eliminating the notion of Quantifier Raising, he proposes that scope ambiguity arises as a by-product of A-movement for feature checking. According to his proposal, argument NPs in English begin in the VP internal positions and move out of the VP shell to the Spec of Agr positions for case checking: Objects move to the Spec of AgrO position and subjects to the Spec of AgrS position at LF. This movement involves the process of copying and deletion. Let us take the sentence Someone cleaned every room for example. After case checking has applied, the LF phrase marker for the sentence is (22).

(22) \[\text{AgrSP Someone} \text{ TP Tns} \text{ AgrOP every room} \text{ VP someone} \text{ VP cleaned every room}\] 

In this framework, an A-chain has only one lexical link at the Conceptual-Intentional (CI) interface. Therefore, one member of each chain must be deleted, resulting in the following possible representations where deleted members are marked in round brackets.

(23)a. \[\text{AgrSP Someone} \text{ TP Tns} \text{ AgrOP every room} \text{ VP (someone)} \text{ VP cleaned (every room)}\]

b. \[\text{AgrSP Someone} \text{ TP Tns} \text{ AgrOP (every room)} \text{ VP (someone)} \text{ VP cleaned every room}\]

c. \[\text{AgrSP (Someone)} \text{ TP Tns} \text{ AgrOP (every room)} \text{ VP someone} \text{ VP cleaned every room}\]

d. \[\text{AgrSP (Someone)} \text{ TP Tns} \text{ AgrOP every room} \text{ VP someone} \text{ VP cleaned (every room)}\]

Of these, (23b) and (23c) are not licit representations because they violate Diesing’s (1992) mapping principle in which definite arguments including universally quantified NPs must be outside the VP shell at the CI interface. Hornstein assumes that a quantified argument Q1 takes scope over a quantified argument Q2 iff Q1 c-commands Q2 and Q2
doesn’t c-command Q1. Among the remaining two representations, (23a) corresponds to the existential wide scope interpretation where someone c-commands every room. (23d) corresponds to the universal wide scope interpretation in which every room c-commands someone.

Pre-minimalist approaches treat all quantifiers in the same way in that they have the same landing sites at LF. However, Beghelli and Stowell (1997) propose that different quantified phrases have different LF scope positions. Similar to the previous approaches, they assume that scope is determined by c-command relations between operators at LF. According to their idea, quantified phrases are divided into five types: interrogative QPs (WhQPs) such as what and which man, negative QPs (NQPs) such as nobody and no man, distributive-universal QPs (DQPs) such as QPs headed by every and each, counting QPs (CQPs) such as QPs occurring with few, fewer than five and at most six, and group-denoting QPs (GQPs) such as indefinite QPs headed by a and some, and bare-numeral QPs such as three students. The relative scope positions of the five types in LF are shown in (24) (Beghelli & Stowell 1997:76).
In this structure, DQPs such as QPs headed by *every* and *each* move to the Spec of the DistP position. GQPs such as QPs headed by *a* and *some* or *three students* can have one of several scope positions: the Spec of RefP position, the Spec of ShareP position or the Case positions (i.e., Spec of AgrS-P for subjects and Spec of AgrO-P for objects). The movement of DQPs and GQPs to their scope positions is driven by the need to check features that are associated with their QP types. DQPs move to the Spec position of the DistP to check a \ [+distributive\] feature via Spec-head agreement with a distributive operator located in DistP while GQPs move to either the Spec of RefP or the Spec of ShareP to check a \ [+group referent\] feature with an existential operator occurring in both the RefP and ShareP.

According to Beghelli and Stowell, the ambiguity of the following sentence (25) is captured by the different landing sites for different QPs.

(25) Two students read *every/each* book.
The existential wide scope interpretation (‘there are two students such that they read every/each book’) corresponds to the LF representation where two students in the Spec of RefP position c-commands every/each book in the Spec of DistP. The universal wide scope interpretation (‘for every/each book, there are two students who read it’) is captured by the LF representation in which two students reconstructs from the Spec of AgrS-P position to the Spec of ShareP and is c-commanded by every/each book in the Spec of DistP.

How about the ambiguity of negative sentences containing bare-QPs as in (26)?

(26) The students didn’t read two books.

According to Beghelli and Stowell’s framework, the wide scope interpretation for a numerically quantified NP is captured by the LF representation in which two books raised to the Spec of RefP or the Spec of ShareP c-commands clausal negation not in the Spec of NegP. The narrow scope interpretation for the numerically quantified NP is represented by a structure in which two books remains in its case position, the Spec of AgrO-P position and is c-commanded by not in the Spec of NegP.

Even though there are slight differences in the mechanisms for deriving the relevant LF representations, all the approaches I have reviewed to this point emphasize a structural relationship between two operators as a crucial factor in scope ambiguity.

1.3.2 Non-structural approaches

In comparison to the structure-based approaches, the processor-based account proposed by O’Grady (2006, 2008) doesn’t account for scope ambiguity by referring to a grammatical operation such as Quantifier Raising or a grammatical representation such as LF. Instead, this account holds that scope phenomena can be explained largely in terms of
processing considerations related to minimizing the burden on working memory. In particular, O’Grady’s account of scope phenomena is based on the following two widely held assumptions (2008:13, Grodner & Gibson 2005:262-63):

(27) As the processor works its way through a sentence, it assigns NPs tentative initial interpretations, based on clues such as position, determiner type, case marker, context, and so forth.

(28) The revision of a previously assigned interpretation is computationally costly since it disrupts the normal linear operation of the processor, which forms and interprets sentences in real time under conditions that value quickness.

The scenario envisioned in (28) can be represented as follows (O’Grady 2008:13):

(29) a. An NP is encountered and assigned an interpretation “x,” based on clues including position:

```
NP
[x]
```

b. Based on the properties of a subsequently encountered element, the NP’s interpretation is recomputed:

```
NP.........Z......
[x] → [y]
```

Let us take the sentence Someone cleaned every room as an example. O’Grady (2006) assumes that the ambiguity of the sentence results from the possible two interpretations of the subject NP: The existential wide scope interpretation corresponds to the interpretation where the NP denotes a single referent while the universal wide scope interpretation refers to the situation where it denotes multiple referents. He also assumes
that the denotation of multiple referents by an NP can multiply the denotation of the consecutive verb, thereby resulting in the interpretation in which there are multiple events.

The derivation of the single-referent interpretation is as follows:

(30) a. Combination of the verb with the first argument someone, and assignment of a single-referent interpretation to the NP

Someone cleaned
[Sg]

b. Combination of the verb with its second argument every room and assignment of a multiple-referent interpretation to the NP (represented below as ‘m’), followed by multiplication of the verb’s denotation (creating the interpretation in which there are multiple cleaning events) with no change to the interpretation of the subject NP

Someone cleaned every room
[Sg] [m] ← [m]

Now, let us consider the multiple-referent interpretation.

(31) a. Combination of the verb with the first argument someone, and assignment of a single-referent interpretation to the NP

Someone cleaned
[Sg]

b. Combination of the verb with its second argument every room and assignment of a multiple-referent interpretation to the NP, followed by multiplication of the verb’s denotation (creating an interpretation in which there are multiple cleaning events)

Someone cleaned every room
[Sg] [m] ← [m]

c. Multiplication of the denotation of the subject NP, so that there is (potentially) a separate agent for each cleaning event

Someone cleaned every room
[Sg] ← [m] ← [m]
[m]
According to O’Grady’s framework, the initially assigned interpretation of the subject NP can be revised after the object NP is encountered, but this recomputation process adds burden on working memory. It is therefore predicted that the multiple referent interpretation will cause a higher processing cost than the single referent interpretation.

Let us take another sentence *Two girls didn’t taste the soup* as an example. This sentence can be interpreted in two ways: (Following the common practice, O’Grady uses the term ‘specific’ to refer to the *two > not* interpretation and the term ‘non-specific’ to refer to the *not > two* interpretation.)

(32)  

a. Specific interpretation (i.e., *two > not* interpretation)  
‘There is a specific set of two girls who didn’t taste the soup.’  

b. Non-specific interpretation (i.e., *not > two* interpretation)  
‘It is not the case that any set of two girls tasted the soup.’

Upon encountering the subject NP *two girls*, the processor assigns the specific interpretation based on a universal tendency for subject NPs to be specific (Aissen 2003), as in (33a).

(33) Assignment of the specific interpretation  

a. Formation and interpretation of the phrase *two girls*  

   *Two girls*  
   [specific]

b. Formation and interpretation of the rest of the sentence  

   *Two girls didn’t taste the soup.*  
   ‘There is a specific set of two girls that didn’t taste the soup.’

Since the initial specific interpretation of the subject NP is maintained in the case of the *two > not* interpretation, it creates no special burden for working memory.

In contrast, when the negative takes wide scope, the processor goes through an additional step that involves recomputing the initially assigned interpretation of *two girls*, and assigns the non-specific interpretation as illustrated below.
(34) Assignment of the non-specific interpretation
   a. Formation and interpretation of the phrase \textit{two girls}
      \begin{itemize}
         \item \textit{Two girls}
         \begin{itemize}
            \item [specific]
         \end{itemize}
      \end{itemize}
   
   b. Addition of the negative, which is then allowed to have wide scope, forcing
      reinterpretation of the subject NP
      \begin{itemize}
         \item \textit{Two girls + didn’t}
         \begin{itemize}
            \item [specific] → [non-specific]
         \end{itemize}
      \end{itemize}
   
   c. Formation and interpretation of the rest of the sentence
      \begin{itemize}
         \item \textit{Two girls didn’t taste the soup.}
         \begin{itemize}
            \item [specific] → [non-specific]
         \end{itemize}
      \end{itemize}

The reinterpretation process required in (34b) increases the burden on working memory
and therefore adds to the processing cost for the sentence.

In this dissertation, I adopt O’Grady’s processor-based approach in order to
account for the role of processing in interpretive preferences for Korean manifested by
Korean-speaking children and adults as well as the interpretive preferences for English
manifested by Korean-speaking second language learners. We will return to a detailed
discussion of this idea in Chapter 5.
CHAPTER 2. SCOPE INTERPRETATION IN L1 KOREAN

2.1 Previous research

Musolino (1998) was the first to investigate how English-speaking children interpret sentences containing a quantified NP and negation in comparison to English-speaking adults. As part of his study, he examined negated sentences containing a numerically quantified NP in object position as in *Cookie Monster didn’t eat two slices of pizza*. The example sentence is ambiguous. One of its two interpretations can be paraphrased as ‘it is not the case that Cookie Monster ate two slices of pizza,’ where negation takes wide scope over the quantified NP (i.e., the *not > two* interpretation). The other interpretation can be paraphrased as ‘there are two slices of pizza that Donald didn’t eat,’ in which a quantifier takes wide scope over negation (i.e., the *two > not* interpretation). The former interpretation is often said to be isomorphic in English, as it corresponds to the surface syntactic relation (c-command or linear precedence) that holds between the two elements—the first and structurally higher element has scope over the other. As illustrated in (1), negative *not* c-commands (or precedes) the numerically quantified NP *two slices of pizza*.

(1)

```
  IP
  / \                           / \  
 NP  I'                         VP  NP
   / \                        /    
  I   VP                     NP    
   / \                      /     
  NEG  V                    Cookie Monster
   / \    
  didn’t  eat  two slices of pizza.
```
Musolino tested 20 English speaking children whose age ranged between 3;11 and 6;1 (mean age 4;10) and 20 adult native speakers of English. Using a Truth Value Judgment Task (Crain & Thornton 1998; TVJT), he provided four context stories in which the \textit{two > not} interpretation is true while the \textit{not > two} interpretation is false, followed by the relevant test sentences which were of the form ‘Subject didn’t Verb two Noun.’ For example, in the case of \textit{Cookie Monster didn’t eat two slices of pizza}, Cookie monster was challenged to eat four slices of pizza and ended up eating only two of the four slices. In that story, the \textit{two > not} interpretation is true because there are two slices of pizza that Cookie Monster didn’t eat. In contrast, the \textit{not > two} interpretation is false because Cookie Monster did in fact eat two slices of pizza.

Musolino’s data showed that the child group accepted the \textit{two > not} interpretation only 50\% of the time in comparison to the adult group, who accepted the interpretation 100\% of the time. In his data, the age of the children had a statistically significant effect on the acceptance of the \textit{two > not} interpretation. That is, a group of older children between 4;8-6;11 (mean age 5;5) accessed the interpretation just 72.5\% of the time while a group of younger children between 3;11-4;5 (mean age: 4;3) accepted it 27.5\% of the time. Based on the results, Musolino made a descriptive generalization that in interpreting scopally ambiguous sentences containing a quantified NP in object position and negation, children (unlike adults) tend to have a strong preference for the interpretation which corresponds to overt syntactic scope – the interpretation in which wide scope is assigned to the element that c-commands (or precedes) its counterpart.

Expanding on Musolino’s observation that children’s interpretive preferences differ from those of adults, several studies have investigated how children’s
interpretations of scopally ambiguous sentences containing negation and a numerically quantified or singular indefinite NP compare to those of adults (Krämer 2000, Lidz & Musolino 2002, Miller & Schmitt 2003, Su 2008, among others). Lidz and Musolino (2002) investigated how children and adult speakers of English and Kannada interpret sentences of this type with the numerically quantified NPs in object position (e.g., *Donald didn’t find two friends*). They recruited 24 children and 24 adults for each language group. Children’s mean age in this study was 4;4 for the English group and 4;5 for the Kannada group. Lidz and Musolino employed the TVJT as in Musolino’s 1998 study. Each participant was given a total of nine items which included two pretest items, four experimental items and three control items. Each item was accompanied by one of two contexts. In addition to the context which Musolino (1998) used (in which the *two > not* interpretation is true), Lidz and Musolino used another context where the *not > two* interpretation is true and the *two > not* interpretation is false. For example, in the case of the target sentence *Donald didn’t find two friends*, the story favoring the *two > not* interpretation was constructed in such a way that Donald played hide-and-seek with four of his friends and ended up finding only two of them. The *two > not* interpretation is true in this case because there are two friends whom Donald didn’t find whereas the *not > two* interpretation is false given that he did find two friends. In contrast, in the story supporting the *not > two* interpretation, Donald found only one of two friends. In this situation, the *not > two* interpretation is true because the number of the friends that Donald found is not two: He found only one. However, the *two > not* interpretation is false because there is just one friend that he didn’t find.
Independent of the language they spoke, four-year-old children showed a preference for the *not > two* reading, while adults easily accessed either scope interpretation. Pointing out that English and Kannada have different word orders (i.e., SVO for English and SOV for Kannada) and that the position of negation with respect to numerically quantified object NPs is the opposite in the two languages, Lidz and Musolino proposed that children’s interpretations of scope relations are constrained by the c-command relation holding between numerically quantified NPs and negation, not by linear order. As is seen in (2), negation c-commands a numerically quantified NP in both languages even though its relative order with respect to the quantified NP is the opposite (Lidz & Musolino 2002:137).

(2) Kannada                                                       English

\[
\text{IP} \quad \text{NP} \quad \text{I'} \quad \text{VP} \quad \text{NP} \quad \text{V} \quad \text{NEG} \\
\text{2 books} \quad \text{read} \quad \text{NEG} \quad \text{V} \quad \text{NP} \\
\text{Naanu eradu pustaka ood-al-illa} \quad \text{I didn’t read two books.} \\
\text{I-NOM two book read-inf-NEG} \\
\]

However, contrary to Lidz and Musolino’s claim, several studies have shown that children do not always prefer the interpretation which corresponds to the hierarchical surface structure (Krämer 2000, Miller & Schmitt 2003, Musolino & Gualmini 2004, Su 2003, 2008, among others). For example, Su (2003, 2008) tested Chinese-speaking children and adults on how they interpreted scopally ambiguous sentences such as the following:
She conducted two TVJT experiments. Experiment 1, which tested whether Chinese-speaking children allow the *not > two* reading for sentences like (3), involved 25 children (mean age 4;10) and a control group of 40 adults. Experiment 2 used 19 children (mean age 5;1) and 26 adults to test whether the *two > not* reading for the same type of sentences is available. In each experiment, Su provided three experimental items interspersed among four filler items. She found that children preferred the *two > not* reading (63% vs. 35%), while adults exhibited the opposite preference (the *not > two* reading). Based on her results, Su suggested that c-command does not seem to account for Chinese-speaking children’s interpretive preferences unlike the cases of English or Kannada-speaking children. Instead, she proposed that Chinese-speaking children’s preference for the *two > not* reading may be due to language specific factors such as the structure of numerically quantified NPs and negation in Chinese: She conjectured that, unlike adults, children might have treated numerically quantified NPs containing classifiers as scope-independent quantity-denoting expressions and might have treated the negative morpheme used in the test sentences as forming an immediate constituent with the head verb thereby disallowing the *not>two* reading, since the negative morpheme would not c-command the direct object. She proposed that cross-linguistic differences in interpretative preference patterns found between Chinese and English/Kannada may result from differences in the structure of quantified noun phrases and/or the structure of negative sentences in the various languages.
Krämer (2000) showed that Dutch-speaking children prefer the interpretation which does not align with surface syntactic scope in the case of negated sentences containing indefinite NPs. She examined how Dutch-speaking children interpret sentences such as (4) in comparison to adult controls.

(4) a. De jongen heeft geen vis gevangen.
    the boy has no fish caught
    ‘The boy did not catch any fish.’ (i.e., not > a reading)

    b. De jongen heeft een vis niet gevangen.
    the boy has a fish not caught
    ‘The boy did not catch a (particular) fish.’ (i.e., a > not reading)

In adult Dutch, when an indefinite NP occurs to the left of negation as in (4b), the sentence is assigned the a > not reading while in the cases where it occurs in a lower position to the right as in (4a), it receives the not > a reading. Krämer tested 50 children between 4;0 and 7;7 years old and 10 adults with the help of a TVJT in which six experimental items were presented mixed with four warm-up items and six filler items. Each participant was tested in one of the two experimental conditions: Condition 1 in which a target sentence such as (4a) is provided and Condition 2 where a target sentence such as (4b) is tested. For both conditions, the same context stories were used. In each context story, three objects were introduced and one of them ended up not being affected while the other two were acted upon. The target response for Condition 1 was false whereas the target response for Condition 2 was true. For example, in the story followed by the sentence (4), a boy caught two of three fish, leaving the other one in the water. In this case, the sentence (4a) *De jongen heeft geen vis gevangen* ‘the boy did not catch any fish’ is false given that the boy did catch two fish. In contrast, (4b) *De jongen heeft een*
vis niet gevangen ‘the boy did not catch a (particular) fish’ is true because it is true that there is a fish that the boy didn’t catch.

The results showed that like adults, children correctly assigned the \( \text{not} > a \) reading to target sentences when indefinite NPs occur in a lower position as in (4a) (i.e., 100% of the time). But unlike adults, they tended to access the \( \text{not} > a \) reading more frequently when indefinite NPs appear to the left of negation as in (4b) (i.e., 84% for the \( \text{not} > a \) reading and 16% for the \( a > \text{not} \) reading). Krämer proposed that children’s non-adultlike preference for the \( \text{not} > a \) reading may be due not to a tendency by children to assign a reading based on overt syntactic scope but rather to their inability to integrate discourse which is required for the assignment of the \( a > \text{not} \) reading. According to her proposal, children acquire the wide scope reading of the NPs later than the narrow scope reading of the NPs because they are required to link some elements in prior discourse to the referents of the indefinite NPs to get at the wide scope reading and this process may be difficult to children when the NPs do not contain any obvious marking indicating that discourse information should be integrated (Krämer 2000:82).

Miller and Schmitt (2003) have provided counterevidence for the claim that children’s initial interpretation is restricted to the interpretation which corresponds to the overt syntactic scope by showing that in certain contexts, children can easily access the interpretation which does not correspond to surface structure. Miller and Schmitt tested English-speaking children on their interpretation of sentences containing indefinites and negation such as the following.
Twenty children (mean age 4;7) and 10 adult controls participated in their study. Miller and Schmitt employed a computerized version of the TVJT task with four experimental items mixed with 19 filler items. They constructed a context story in such a way that the $a > \text{not}$ interpretation is true while the not $\text{a}$ interpretation is false. In the context story for each experimental item, objects were presented as part of a pre-established set which were connected together. The main character was required to perform an action on all of the objects in the set and s/he ended up not carrying out an action on only one object. For example, in the context story followed by the sentence (5), Peter was told to close all of the drawers before going outside to play but ended up not closing one of the drawers. The results revealed that like adults the children overwhelmingly accepted the $a > \text{not}$ interpretation, which does not correspond to the surface syntactic scope (i.e., 91% for children, 100% for adults).

In line with current acquisition research on children’s interpretation of scopally ambiguous sentences, this study explores Korean-speaking children’s interpretation of negated sentences containing numerically quantified NP patterns in direct object position compared to adult controls. Few studies have been conducted regarding the scope interaction between a numerically quantified NP pattern and negation in Korean, and children’s acquisition of scope interaction between these two elements. In an early account of these patterns, Song (1982) stated that the following sentence is ambiguous in Korean:

\begin{align*}
(5) \text{Peter didn’t close a drawer.} \\
&\text{a. Indefinite NP narrow scope reading (i.e., not} a \text{ reading) } \\
&\quad \text{ ‘Peter didn’t close any drawers.’} \\
&\text{b. Indefinite NP wide scope reading (i.e., a} > \text{not reading) } \\
&\quad \text{ ‘Peter didn’t close one of the drawers.’}
\end{align*}
However, it is not clear whether the statement was made based on Song’s intuition or on experimental studies. In any case, experimental studies must be conducted in order to provide a better picture of scope interpretation involving a numerically quantified NP pattern and negation in Korean.

Furthermore, Korean has unique properties in terms of the structure of numeral constructions in direct object position with respect to the role of classifiers and case marking. As observed earlier, there is variation in the position of a numeral and in the position of the accusative case particle with respect to the head noun. From a typological point of view, it would be informative to explore scope in a language that allows this sort of variation in target constructions in order to broaden our understanding in how universal and language-specific properties interact in this phenomenon.

2.2 Research questions

The goal of this chapter is to investigate whether Korean sentences containing a numerically quantified NP pattern and preverbal, short-form negation allow both the $two > not$ interpretation and the $not > two$ interpretation. It also explores how Korean-speaking children interpret those sentences compared to Korean-speaking adults. As an attempt to provide a complete picture of scope interpretation in Korean, this study also investigates how Korean-speaking children and adults express the $two > not$ meaning and the $not > two$ meaning in propositions involving a numerically quantified NP pattern and negation interaction.
More precisely, this study explores the following research questions.

2.2.1 **Experiment 1: Production**

1. What type of sentences do Korean-speaking children and adults use to express the *two > not* interpretation and the *not > two* interpretation?

2.2.2 **Experiment 2: Comprehension (1)**

1. Are the *two > not* meaning and the *not > two* meaning possible in Korean sentences containing numerically quantified NP patterns in object position and preverbal, short-form negation?

2. How do the scope judgments of Korean-speaking children compare to those of Korean-speaking adults? Do Korean-speaking children have a preference for a particular interpretation?

2.2.3 **Experiment 3: Comprehension (2)**

1. Do the contextual factors such as the presence of an affirmative sentence carrying contrastive information and/or the existence of an expectation which is not fulfilled play a role in the interpretation of the sentences containing numerals and short-form negation?

2.3 **Experiment 1**

2.3.1 **Method**

2.3.1.1 **Participants**

The participants in this study included 29 children, recruited from a kindergarten in Korea, and a control group of 26 native Korean speakers. Among the kindergarten children there were 15 girls and 14 boys—nine four-year-olds and 20 five-year-olds.
(mean age 5;2). The control group included 15 females and 11 males, ranging in age from 17 to 30 (mean age 21).

2.3.1.2 Procedure

An Elicited Production task (Crain & Thornton 1998, McDaniel, McKee, & Cairns 1998) was employed by means of a laptop computer, on which each participant was presented with illustrated stories for the context favoring the wide scope interpretation of a numerically quantified NP pattern (henceforth, the two > not context) and the context favoring the narrow scope interpretation of the numerically quantified NP pattern (henceforth, the not > two context) via Microsoft Office PowerPoint slides. In the two > not context, the wide scope interpretation of the numerically quantified NP pattern was the target reading while in the not > two context, the narrow scope interpretation of the numerically quantified NP pattern was intended. At the end of each story, an experimenter5 asked one or two puppets to describe what happened in the story. Participants were then asked to identify any incorrect statements made by the puppet and to provide a correction. Each participant participated in all the activities, while half of the participants were given the not > two context first and the other half were given the two > not context first.

As part of the experiment, each child was asked to name the objects shown on the screen before being told each story. This exercise helped ensure that the children had full comprehension of the words used in each story. Additionally, to check whether s/he was able to count up to 10, each child was given a set of stickers and asked to count the stickers aloud. Every child successfully completed these tasks. The whole experiment

5 The experimenter in this study narrated each story presented on the screen and also acted as puppets.
took approximately 30 minutes for the children to complete, while the control group took from 15 to 20 minutes.

2.3.1.3 Materials

For both two > not and not > two contexts, three stories were included, with each story followed by two fillers and one experimental trial. An example for each context is as follows:

Two > not context (English translation)

A woman comes to a market. There are four tomatoes and a large number of cherries on the table. The owner tells the woman that he has fresh tomatoes and cherries. The woman buys three tomatoes, because she really likes them. She also wants to buy cherries to make cherry juice for her son’s birthday party. But when she examines them, she realizes that three cherries are rotten. Therefore, she buys only the other cherries (see Figure 2.1).

Figure 2.1. Two > Not Context (final scene)
Target meaning: ‘There are three cherries that the woman didn’t buy.’

<Protocol>

Experimenter: This is a story about a woman buying fruit and vegetables in a market. Let’s ask Puppet what happened in the story.

Puppet: (filler)
Kakey-ey thomatho-ka ney kay iss-ess-e.
market-in tomato-NOM four CL be-PST-DECL
‘There were four tomatoes in the market.’

Experimenter: Is it true or not? (Expected answer: ‘true’)

Child: (If the child says ‘false’, the experimenter asks him/her to correct the statement.)
Experimenter: What else happened?

Puppet: (experimental trial)

Akowumeni-ka cheyli-lul motwu sa-ss-e.
woman-NOM cherry-ACC all buy-PST-DECL
‘The woman bought all of the cherries.’

Experimenter: Is it true or not? (Expected answer: ‘false’)
(If the child says ‘false’, the experimenter asks him/her to correct the statement.)

<table>
<thead>
<tr>
<th>Expected answer: Akowumeni-nun cheyli-lul sey kay an sa-ss-e.</th>
</tr>
</thead>
<tbody>
<tr>
<td>woman-TOP cherry-ACC three CL NEG buy-PST-DECL</td>
</tr>
<tr>
<td>‘The woman didn’t buy three cherries.’</td>
</tr>
<tr>
<td>(‘There are three cherries that the woman didn’t buy.’)</td>
</tr>
</tbody>
</table>

Experimenter: What else happened?

Puppet: (filler)

Akowumeni-ka thomato-lul sey kay sa-ss-e.
woman-NOM tomato-ACC three CL buy-PST-DECL
‘The woman bought three tomatoes.’

Experimenter: Is it true or not? (Expected answer: ‘true’)

Child: (If the child says ‘false’, the experimenter asks him/her to correct the statement.)

Not > two context (English translation)

Goofy and Mickey play, drawing with crayons. Goofy draws two big stars and then draws a circle. He shows his drawing to Mickey. Mickey says that he can draw much bigger stars than the ones that Goofy has drawn. He first draws two big stars. Then, to impress Goofy further, he draws one more big star (see Figure 2.2).
Figure 2.2. Not > Two Context (final scene)
Target meaning: ‘It is not the case that Mickey drew two stars.’

<Protocol>
Experimenter: This is a story about Goofy and Mickey drawing things. Puppet 1 describes what happened in the story and Puppet 2 says whether Puppet 1’s statement is true or not. Sometimes, Puppet 2 speaks incorrectly. So listen carefully to what he says and if he says incorrectly, tell him the truth about the story.

Puppet 1: (filler)
Goofy-ka wen-ul kuli-ess-e.
Goofy-NOM circle-ACC draw-PST-DECL
‘Goofy drew a circle.’

Puppet 2: Ung, mac-a.
yes, true-DECL
‘Yes, it is true.’

Puppet 1: (experimental trial)
Goofy-wa Mickey-ka pyel-ul twu kay-ssik kuli-ess-e.
Goofy-and Mickey-NOM star-ACC two CL-each draw-PST-DECL
‘Goofy and Mickey drew two stars each.’

Puppet 2: Ung, mac-a.
yes, true-DECL
‘Yes, it is true.’
Puppet 1: (filler)
Mickey-ka wen-ul kuli-ess-e.
Mickey-NOM circle-ACC draw-PST-DECL
‘Mickey drew a circle.’

Puppet 2: Ung, mac-a.
yes, true-DECL
‘Yes, it is true.’

Expected answer:
no-DECL Mickey-TOP circle-ACC NEG draw-PST-DECL
‘No. Mickey didn’t draw a circle.’

2.3.1.4 Data coding
For the data coding requirements of the experiment, sentences containing any combination of a numerically quantified NP pattern and negation were considered target sentences. Both short-form negation and long-form negation were counted as instances of negation.

(7) Preverbal, short-form negation an
Dora-nun tongmwul suthikhe-lul sey kay an pwuth-i-ess-e.
Dora-TOP animal sticker -ACC three CL NEG stick-AF-PST-DECL
‘Dora didn’t put three animal stickers anywhere.’

(8) Preverbal, short-form negation mos
Dora-nun tongmwul suthikhe-lul sey kay mos pwuth-i-ess-e.
Dora-TOP animal sticker -ACC three CL NEG stick-AF-PST-DECL
‘Dora couldn’t put three animal stickers anywhere.’

It should be noted that the target sentence might have sounded better if Mickey had drawn just one star rather than three because the not > two meaning of the sentence is pragmatically more felicitous in a situation where Mickey draws fewer than two stars.
(9) Postverbal, long-form negation -ci anh
Dora-nun tongmwul suthikhe-lul sey kay pwuth-i-ci anh-ass-e.
Dora-TOP animal sticker-ACC three CL stick-AF-ci NEG-PST DECL
‘Dora didn’t put three animal stickers anywhere.’

(10) Postverbal, long-form negation -ci mos-ha
Dora-nun tongmwul suthikhe-lul sey kay pwuth-i-ci mos-hay-ss-e.
Dora-TOP animal sticker-ACC three CL stick-AF-ci NEG-do-PST-DECL
‘Dora couldn’t put three animal stickers anywhere.’

Furthermore, all responses that included both a numerically quantified NP pattern and negation were counted regardless of the types of particles attached to the NP, as in the following examples.

(11) Use of an accusative case particle -ul/lul
Sathang ney kay-lul mos kacyeka-ss-e.
candy four CL-ACC NEG take-PST-DECL
‘Goofy couldn’t take four candies.’
(‘There are four candies that he couldn’t take.’)

(12) Use of the topic/contrast particle -un/nun ‘as for’
Sathang ney kay-nun neh-ci mos-hay-ss-e.
candy four CL-TOP put-ci NEG-do-PST-DECL
‘As for four candies, Goofy couldn’t put them in his bag.’

(13) Use of the delimiter particle -man ‘only’
Sathang ney kay-man an neh-ess-e.
candy four CL-only NEG put-PST-DECL
‘Goofy didn’t put only four candies in his bag.’

2.3.2 Results

Overall, participants produced few target sentences containing a numerically quantified NP pattern and negation. The mean percentage of use of the target sentences in the not > two and two > not contexts is displayed in Table 2.1. The control group used target sentences in the not > two context and in the two > not context 4% and 23% of the time, respectively. On the other hand, children produced target sentences in the not > two context 5% of the time, compared to 22% of the time in the two > not context. For both
groups, target sentences were produced with more frequency in the \(\text{two} > \text{not}\) context than in the \(\text{not} > \text{two}\) context.

<table>
<thead>
<tr>
<th>Group</th>
<th>(\text{not} &gt; \text{two}) context ((k = 3))</th>
<th>(\text{two} &gt; \text{not}) context ((k = 3))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group ((n = 26))</td>
<td>4%</td>
<td>23%</td>
</tr>
<tr>
<td>Children ((n = 29))</td>
<td>5%</td>
<td>22%</td>
</tr>
</tbody>
</table>

Note. \(k\) refers to the number of experimental trials per context.

The participants in both groups tended to create affirmative sentences with numerically quantified NP patterns more often than negative counterpart sentences, as in examples (14) and (15) below.

(14) \(\text{Not} > \text{two}\) context

\[
\begin{align*}
\text{Mickey-nun} & \quad \text{pyel-ul} \\
\text{Mickey-TOP} & \quad \text{star-ACC} \\
\text{sey} & \quad \text{three CL} \\
\text{kay} & \quad \text{draw-PST-DECL} \\
\text{kuli-ess-e}.
\end{align*}
\]

‘Mickey drew three stars.’

(This implies ‘it is not the case that Mickey drew two stars.’)

(15) \(\text{Two} > \text{not}\) context

a. \(\text{Ney kay-man namki-ess-e}.
\)

\[
\begin{align*}
\text{four} & \quad \text{CL-only} \\
\text{leave-PST-DECL}
\end{align*}
\]

‘Goofy left only four candies behind.’

(This implies ‘there are only four candies that Goofy didn’t put in his bag.’)

b. \(\text{Sey kay-man ppayko ta sa-ss-e}.
\)

\[
\begin{align*}
\text{three CL-only} & \quad \text{except} \\
\text{all buy-PST-DECL}
\end{align*}
\]

‘The woman bought all of the cherries except for three.’

(This implies ‘there are three cherries that the woman didn’t buy.’)

As summarized in Table 2.2, in the adult control group, only one of the 26 participants used the target sentences in the \(\text{not} > \text{two}\) context, while 12 participants used target sentences in the \(\text{two} > \text{not}\) context. On the other hand, four out of the 29 children produced target sentences in the \(\text{not} > \text{two}\) context, while 14 children used various combinations of numerically quantified NP patterns and negation in the \(\text{two} > \text{not}\) context.
Table 2.2. Number of Participants who Produced the Target Sentences

<table>
<thead>
<tr>
<th>Group</th>
<th>not &gt; two context</th>
<th>two &gt; not context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Controls</td>
<td>1/26</td>
<td>12/26</td>
</tr>
<tr>
<td>Children</td>
<td>4/29</td>
<td>14/29</td>
</tr>
</tbody>
</table>

The results further revealed that children used only preverbal, short-form negation in combination with numerals in the two contexts. This finding is consistent with the claim that Korean-speaking children acquire short-form negation earlier than long-form negation (Kim 1997). Some sample responses in the not > two context are as follows:

(16) Mickey-ka pyel-ul sey kay kuli-ese twu kay-lul
     Mickey-NOM star-ACC three CL draw-because two CL-ACC

     an kuli-ess-e.
     NEG draw-PST-DECL

     ‘Because Mickey drew three stars, he didn’t draw two stars.’

(17) Mickey-nun twu kay-lul an kuli-ess-ko
     Mickey-TOP two CL-ACC NEG draw-PST-and

     Mickey-nun sey kay-lul kuli-ess-e.
     Mickey-TOP three CL-ACC draw-PST-DECL

     ‘Mickey didn’t draw two stars and drew three stars.’

(18) Sey kay an pwuth-i-ess-e
     three CL NEG stick-AF-PST-DECL
     ‘Piglet didn’t put three stickers on his notebook.’

Two out of the four children who produced target sentences in the not > two context used the target sentences accompanied by relevant affirmative clauses, as in (16) and (17).

In the two > not context, the children produced a variety of sentences containing numerals and negation. In contrast to the not > two context, both instances of the short-form negators an ‘not’ and mos ‘can’t’ were used, as seen in the following examples:
(19) *an*

\[
\text{an} \quad \text{Sathang-ul ney kay-lul an neh-ess-e.}
\]
\[
candy-ACC four CL-ACC NEG put-PST-DECL
\]
\[
\text{‘Goofy didn’t put four candies into his bag.’}
\]

(20) *mos*

\[
\text{mos} \quad \text{Sathang ney kay-lul mos kacyeka-ss-e.}
\]
\[
candy four CL-ACC NEG take-PST-DECL
\]
\[
\text{‘Goofy couldn’t take four candies with him.’}
\]

However, among the 19 occurrences of the target sentences, *an* was selected in 18 cases and *mos* only once.

Also worthy of note is that six children used particles other than the accusative marker -ul/lul in target sentences. These included -nun, the topic/contrast particle, and -man ‘only’ as in the following examples:

(21) *Sey*

\[
\text{Sey} \quad \text{kay-nun an sa-ss-e.}
\]
\[
\text{three CL-TOP NEG buy-PST-DECL}
\]
\[
\text{‘As for three cherries, the woman didn’t buy them.’}
\]

(22) *Sey*

\[
\text{Sey} \quad \text{kay-man an sa-ss-e.}
\]
\[
\text{three CL-only NEG buy-PST-DECL}
\]
\[
\text{‘The woman didn’t buy only three cherries.’}
\]

It seems that the children were able to make the *three > not* meaning of the target sentences clearer with the help of those markers, since they make the referent of the quantified NP to which they are attached salient or contrastive in relation to the remaining objects in the context, thereby allowing the quantified NP to take wider scope.

Three children used a combination of numerals and negation in complex sentences, as in (23) and (24).

(23) *Sey*

\[
\text{Sey} \quad \text{kay-nun ssek-ese an sa-ss-e.}
\]
\[
\text{three CL-TOP rotten-because NEG buy-PST-DECL}
\]
\[
\text{‘Because the three cherries were rotten, the woman didn’t buy them.’}
\]
(24) Sey kay-nun ssek-e-kaciko ku ke-n an sa-ss-e.
three CL-TOP rotten-AF-because the thing-TOP NEG buy-PST-DECL
‘Because the three cherries were rotten, the woman didn’t buy them.’

With the help of topic/contrast markers in these complex sentences, the children seemed to put numerically quantified NPs in the wide scope position.

The results from the control group showed that postverbal, long-form negation was used more frequently than short-form negation in target sentences. The short-form negation an was used by one participant in three of 18 occurrences in the quantified NP wide scope sense. As in the children’s responses, the data collected from the control group showed a variety of sentences containing numerals and negation. Some sample responses are as follows:

(25) Numeral-classifier-topic marker and short-form negation an
Sey kay-nun an pwuth-i-ess-e.
three CL-TOP NEG stick-AF-PST-DECL
‘As for three stickers, Dora didn’t put them anywhere.’

(26) Numeral-classifier-accusative case marker and long-form negation -ci anh
Dora-nun tongmwul suthikhe sey kay-lul pwuth-i-ci anh-ass-e.
Dora-TOP animal sticker three CL-ACC stick-AF-ci NEG-PST-DECL
‘Dora didn’t put three animal stickers anywhere.’

(27) Numeral-classifier-topic marker and long-form negation -ci anh
Ssekun cheyli sey kay-nun sa-ci anh-ass-e.
rotten cherry three CL-TOP buy-ci NEG-PST-DECL
‘The woman didn’t buy the three cherries which were rotten.’

(28) Numeral-classifier- accusative case marker and long-form negation -ci mos-ha
Sathang-ul ney kay-l chayngki-ci mos-hay-ss-e.
candy-ACC four CL-ACC get-ci NEG-do-PST-DECL
‘Goofy couldn’t get four candies together.’

(29) Numeral-classifier-topic marker and long-form negation -ci mos-ha
Kongkan-i hyepshay-se sey kay-nun pwuth-i-ci mos-hay-ss-e.
space-NOM small-because three CL-TOP stick-AF-ci NEG-do-PST-DECL
‘Because the space on the pencil case was small, Dora couldn’t put three animal stickers on it.’
In 14 out of the 18 target sentences in the \textit{two > not} context, the topic/contrast marker \textit{-nun} was used instead of the accusative marker \textit{-ul/lul}.

As in the children’s data, three participants in the control group produced numerals and negation by using complex sentences such as the following:

(30) \textbf{Sey} kay-nun cali-ka eps-es\-e pwuth-i-ci \textbf{mos}-hay-ss-e.  
three CL-TOP room-NOM lack-because stick-AF-ci NEG-do-PST-DECL  
‘As for three animal stickers, because there is no room for them, Dora couldn’t put them on the pencil case.’

(31) \textbf{Ney} kay-nun kkampak ic-ko neh-ci \textbf{mos}-hay-ss-e.  
four CL-TOP completely forget-and put-ci NEG-do-PST-DECL  
‘As for four candies, Goofy forgot about them completely and couldn’t put them into his bag.’

2.3.3 Discussion

In the production experiment, children and the control group produced few negative sentences containing numerically quantified NP patterns (5% and 4% for the \textit{not > two} context versus 22% and 23% for the \textit{two > not} context). Rather than employing negative sentences, they preferred corresponding affirmative sentences such as \textit{Mikey-nun pyel-ul sey kay kuli-ess-e} ‘Mickey drew three stars’ to express the \textit{not > two} meaning (i.e., ‘it is not the case that Mickey drew two stars’) and \textit{Ney kay-man namki-ess-e} ‘Goofy left only four candies behind’ to express the \textit{two > not} meaning (i.e., ‘there are four candies that Goofy didn’t put in the bag’). Even though the overall frequency of the target sentences was low, both groups produced target sentences in the \textit{two > not} context more frequently than in the \textit{not > two} context.

The results of the production study confirmed that affirmative sentences are preferred to the corresponding negative sentences. Consistent with Horn’s (1989:168) observation that negatives are marked and relatively difficult to produce as well as to
comprehend, the data revealed that participants tended to opt for a variety of affirmative patterns to express the \textit{not > two or two > not} meaning. The data also showed that co-occurrence of negation and quantified NPs is rare. This seems to be true for English as well, as shown by Gennari and MacDonald (2005/6). In their study, English-speaking adults were asked to read stories in the same format as the ones used in Lidz and Musolino’s 2002 study, which were accompanied by supporting pictures and then were asked to describe the gist of each story in one sentence. Gennari and MacDonald found that the participants preferred using positive sentences over negative sentences containing quantified NPs. Sample sentences are given below (2005/6:139).

(32) Sentences for the \textit{two > not} interpretation
Plot of the story: A girl playing hide-and-seek with four friends and ending up finding two of her friends
Preferred descriptions:
\begin{itemize}
  \item a. She (only) found two friends.
  \item b. She found two of the friends.
  \item c. She only found the first and second friend.
\end{itemize}

(33) Sentences for the \textit{not > two} interpretation
Plot of the story: A girl playing hide-and-seek with two friends and ending up finding one of her friends
Preferred descriptions:
\begin{itemize}
  \item a. She (only) found one friend.
  \item b. She found the first friend.
  \item c. She (only) found one of the friends.
\end{itemize}

As seen in (32) and (33), the adult participants tended to use definite NPs or indefinite partitive NPs to refer to the direct object of the verbs. This tendency was also found in negative sentences that were elicited, as in \textit{She didn’t find all/two of the friends} and \textit{She didn’t find the second friend}.

The low incidence of target negative sentences containing numerically quantified NP patterns in the current study is consistent with the results of a separate corpus study,
in which I examined both the Sejong corpus and Korean Newswire corpus, which together include approximately 39,735,964 words of spoken and written adult data. The results of the corpus analysis show that the construction containing both the numeral *twu* ‘two’ and negation (i.e., both short-form negation *an* and long-form negation *-ci anh*) occur at a very low rate: A total of 191 instances of the target construction containing the numeral *twu* and negation were found. Of these, 64% involved a numerically quantified subject and 11% included a direct object of this type. The numerically quantified NPs in subject position comprised 23 ambiguous and 99 unambiguous sentences, whereas the numerically quantified NPs in object position included 13 potentially ambiguous sentences and 8 unambiguous sentences. In parallel with the findings from the current study, the potentially ambiguous constructions containing a numeral in subject and object position show a preference for the *two > not* interpretation (i.e., 87% in subject position, 62% in object position). Sample sentences are given below.

(34) Numerically quantified NPs in subject position

a. *Two > not* interpretation
   
   **Twu** atul-i kwuntay-lul an ka-ss-ta.
   
   two son-NOM army-ACC NEG go-PST-DECL
   
   ‘Two sons didn’t serve in the army.’

b. *Not > two* interpretation
   
   Han salam-man-i kukes-ul tulyetapo-l su iss-ko
   one person-only-NOM it-ACC look in-can-and

   **twu** salam-i po-ase-nun an toy-n-ta.
   
   two person-NOM look-AF-TOP NEG should-IN-DECL
   
   ‘Only one person can look in it and two people should not look in it.’

(35) Numerically quantified NPs in object position

a. *Two > not* interpretation
   
   **Twu** cencik taythonglyeng-ul saepcheliha-ci **anh**-ko,
   
   two former president-ACC bring to justice-ci NEG-and,
   
   ‘They didn’t bring two former presidents to justice and…’
b. *Not > two* interpretation

Chwungs-in-un **twu** imkum-ul **an** semki-n-ta.
loyalist-TOP two master-ACC NEG serve-PRS-DECL

‘A loyalist doesn’t serve two masters.’

The higher frequency of affirmative sentences compared to their negative counterparts may be due to the restrictive felicity conditions on the use of negation. Negative statements are generally used to describe discrepancies between what was expected and what actually happened (De Villiers & Tager Flusberg 1975, Givon 1978, Wason 1965). It might be the case that the current study failed to provide the participants with felicitous context stories to elicit negative statements more naturally. For example, in the context story where Mickey drew three stars and Goofy drew two stars, if the expectation that Mickey and Goofy would draw two stars each had been built up more clearly in the story, the participants might have provided more negative statements when they heard the puppet’s statement ‘Goofy and Mickey drew two stars each.’ A sample context story is provided below.

**(36) Sample context**

<table>
<thead>
<tr>
<th><em>Not &gt; two context (English translation)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Goofy and Mickey play, drawing with crayons. Their friend Minnie visits them and asks who can draw stars better. Goofy and Mickey decide to compete to see who can draw two stars better. Goofy draws two big stars quickly. To impress Minnie, Mickey draws one big star. Then he grabs his crayon to draw the second star. When he is about to draw it, he accidentally breaks the crayon because he is holding it too strongly. He doesn’t draw the second star.</td>
</tr>
</tbody>
</table>

Puppet 1: Goofy-wa Mickey-ka pyel-ul twu kay-ssik kuli-ess-e.
Goofy-and Mickey-NOM star-ACC two CL-each draw-PST-DECL

‘Goofy and Mickey drew two stars each.’

Puppet 2: Ung, mac-a.
yes, true-DECL

‘Yes, it is true.’
It would be interesting to explore whether this type of modification to the story makes a difference in the elicitation of target negative sentences.

The fact that participants in both groups produced target sentences in the $two > not$ context with more frequency than the $not > two$ context could be explained in terms of Grice’s Cooperative Principle. One of the maxims associated with this principle is the “Quantity” maxim, which says that conversational participants are expected to make their contribution as informative as required for the current purpose of the exchange (Grice 1989:26). Thus according to this maxim, expressing the $not > two$ meaning with the help of negative sentences containing numerically quantified NPs is not as informative as expressing the meaning with the affirmative counterparts. For example, in the situation where Goofy and Mickey drew two and three stars, respectively, it is more informative to say ‘Mickey drew three stars’ than to say ‘Mickey didn’t draw two stars.’ The use of numerically quantified NPs and negation seems to make sentences less informative, thereby violating the “Quantity” maxim when there is a corresponding affirmative sentence.

It is noteworthy that the use of Korean particles other than the accusative case marker was found frequently in the $two > not$ context in the adult data. The elicitation protocol used in the context stories for the $two > not$ meaning was that a character acted on all of the objects in the scene. For example, in the story in which a woman bought all

<table>
<thead>
<tr>
<th>Expected answer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ani-ya. Mickey-nun pyel-ul twu kay an kuli-ess-e. no-DECL Mickey-TOP star-ACC two CL NEG draw-PST-DECL</td>
</tr>
<tr>
<td>‘No. Mickey didn’t draw two stars.’</td>
</tr>
</tbody>
</table>
of the cherries except for three rotten ones, the puppet’s statement that was used to elicit a target sentence was as follows:

(37) Acwumeni-ka cheyli-lul motwu sa-ss-e.
    woman-NOM cherry-ACC all buy-PST-DECL
‘The woman bought all of the cherries.’

In fourteen of the eighteen cases, negative responses included the topic/contrast marker, -un/nun instead of the accusative marker, -ul/lul, as shown in (38).

(38) Acwumeni-ka cheyli sey kay-nun an sa-ss-e.
    woman-NOM cherry three CL-TOP NEG buy-PST-DECL
‘As for three cherries, the woman didn’t buy them.’

The particle plays a role as a topic/contrast marker in Korean, which makes the referent of the NP to which it is attached contrast with the rest of the objects in the context. With the help of this topic/contrast marker, participants were able to emphasize that there were three cherries that the woman did not buy in contrast to the other cherries that she bought. Moreover, by using the topic/contrast marker instead of the accusative case marker, the participants were able to make their statements unambiguous since the topic-marked NP obligatorily takes wide scope.

2.4 Experiment 2: Comprehension (1)

2.4.1 Method

2.4.1.1 Participants

The 29 children from the production experiment participated in the comprehension experiment. The control group consisted of the original 26 participants from the production experiment, plus an additional 14 adult subjects. The children participated in the two experiments with an interval of one to four days, while the control group took part in the experiments consecutively.
2.4.1.2 Procedure

A TVJT was used in order to test subjects’ interpretation of the target sentences. Each participant was presented with illustrated stories for the not > two and two > not contexts via Microsoft Office PowerPoint slides as in the elicited production task. At the end of each story, a puppet made a statement about what he thought happened in the story. The puppet’s statements were pre-recorded so as to reduce the possibility of variation in prosody as a confounding factor. Participants were then asked to determine whether the statement made by the puppet was right or wrong, and to justify their answers by explaining why they thought so. Each participant was tested individually.

The participants were presented with all the test sentences in two contexts (i.e., the not > two and two > not contexts). While half of the participants were given test sentences in the not > two context first, the other half were given test sentences in the two > not context first. Test sentences were presented in a pseudo-random order; the whole task took between 40 and 50 minutes for the children to complete, and approximately 30 minutes for the control group.

2.4.1.3 Materials

Ten experimental items were included along with two practice items and 12 fillers, for a total of 24 items7 (see Tables 2.3 and 2.4 for the test sentences in each context). The filler sentences included 10 unambiguous sentences and two ambiguous sentences. The unambiguous sentences consisted of either affirmative sentences containing numerals or negated sentences without any quantifiers, while the ambiguous

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7 Among the 10 experimental sentences, two sentences were adapted from Su (2003), and three from Lidz and Musolino (2002). In addition, two practice stories and three sentences out of the 12 filler sentences were adapted from Su’s study, and one filler sentence was adapted from Lidz and Musolino’s study.
sentences contained a floated universal quantifier and negation (see Appendix A for a full list of test and filler sentences in Korean).

Table 2.3. Test Sentences in the Two > Not Context

<table>
<thead>
<tr>
<th>Korean sentences</th>
<th>English translations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acwumeni-ka kapang-ul twu kay an sa-ss-e.</td>
<td>‘The woman didn’t buy two bags.’</td>
</tr>
<tr>
<td>Goofy-ka Pizza-lul twu kay an mek-ess-e.</td>
<td>‘Goofy didn’t eat two slices of pizza.’</td>
</tr>
<tr>
<td>Dora-ka wuywu-lul twu kay an neh-ess-e.</td>
<td>‘Dora didn’t put two pints of milk into the refrigerator.’</td>
</tr>
<tr>
<td>Namca ai-ka mal-ul twu mali an tha-ss-e.</td>
<td>‘The boy didn’t ride two horses.’</td>
</tr>
<tr>
<td>Dora-ka cokay-lul twu kay an cwu-wess-e.</td>
<td>‘Dora didn’t pick up two seashells.’</td>
</tr>
</tbody>
</table>

Table 2.4. Test Sentences in the Not > Two Context

<table>
<thead>
<tr>
<th>Korean sentences</th>
<th>English translations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yeca ai-ka kwaca-lul twu kay an mek-ess-e.</td>
<td>‘The girl didn’t eat two cookies.’</td>
</tr>
<tr>
<td>Namca ai-ka kay-lul twu mali an manc-yess-e.</td>
<td>‘The boy didn’t pat two dogs.’</td>
</tr>
<tr>
<td>Piglet-i chayk-ul twu kay an ilk-ess-e.</td>
<td>‘Piglet didn’t read two books.’</td>
</tr>
<tr>
<td>Donald Duck-i phwungsen ul twu-kay an thettul-yess-e.</td>
<td>‘Donald Duck didn’t burst two balloons.’</td>
</tr>
<tr>
<td>Dora-ka wuywu-lul twu kay an mas-yess-e.</td>
<td>‘Dora didn’t drink two pints of milk.’</td>
</tr>
</tbody>
</table>

The plots of the context stories were developed in the same way as in the studies by Lidz and Musolino (2002) and Su (2003). In the not > two context, the stories were constructed in such a way that a character acts on one of two objects or animals, while nothing is done to the second, as exemplified in the following:

**Not > two context** (English translation)

Donald Duck sees two balloons in Mickey’s room. The balloons look so great. He wants to ask Mickey to give him one of them. But Mickey is not at home, so he decides to wait. While he is waiting, he wants to touch them. He first touches a red balloon, but he bursts the balloon by accident. So, he doesn’t touch the second balloon (see Figure 2.3).

Test sentence:

Donald Duck-i phwungsen-ul twu kay an thettul-yess-e.
Donald Duck-NOM balloon-ACC two CL NEG burst-PST-DECL
‘Donald Duck didn’t burst two balloons.’

**Not > two reading:** ‘It is not the case that Donald Duck burst two balloons.’ (True)

**Two > not reading:** ‘There are two balloons that Donald Duck didn’t burst.’ (False)
Here, the *not > two* reading is true because he burst one balloon, not two while the *two > not* reading is false because there is only one balloon that he didn’t burst, not two.

In contrast, in the stories for the *two > not* context, a character performs an action on only two out of four objects or animals. An example is given below.

**Two > not context** (English translation)

Dora and Boots are playing on the beach. They see four seashells on the sand. Dora says that she wants to keep the seashells in her room. She first picks up two of them. She really likes them. Then, she tries to pick up the rest. But Boots says that they don’t look good. Dora decides not to pick them up (see Figure 2.4).

Test sentence:

Dora-ka cokay-lul twu kay an cwu-wess-e.
Dora-NOM seashell-ACC two CL NEG pick up-PST-DECL
‘Dora didn’t pick up two seashells.’

*Not > two* reading: ‘It is not the case that Dora picked up two seashells.’ (False)
*Two > not* reading: ‘There are two seashells that Dora didn’t pick up.’ (True)
In contrast to the *not > two* context, the *two > not* reading is true because there are two seashells that Dora didn’t pick up, while the *not > two* reading is false given the fact that Dora picked up exactly two seashells.

All of the test sentences contained numerically quantified objects and the short-form negation *an*, with accusative markers -ul/lul on head nouns associated with the postnominal quantifiers, as in the following example:

(39) Noun-Accusative marker Quantifier-Classifier

Goofy-ka Pizza-lul twu kay an mek-ess-e.
Goofy-NOM Pizza-ACC two CL NEG eat-PST-DECL

‘Goofy didn’t eat two slices of pizza.’

In this experiment, the position of the accusative marker in the test sentences was chosen based on a small-scale pilot study involving six native Korean speakers. In that study, the participants were given illustrated stories for both the *not > two* and *two > not* contexts via Microsoft Office PowerPoint slides. Then they read target sentences on a questionnaire and marked the truth values by choosing between ‘true’ and ‘false.’ Based on the placement of the accusative case marker *ul/lul*, three types of target sentences were created: (1) a target sentence without an accusative marker, (2) a target sentence with the accusative marker on the head noun, and (3) a target sentence with the accusative marker on the classifier. There were three tokens for each type, creating a total of 18
experimental items for both contexts. Along with these, two practice items and 19 fillers were included. The results are given in Table 2.5.

<table>
<thead>
<tr>
<th>Sentence type</th>
<th>Context favoring the not &gt; two reading</th>
<th>Context favoring the two &gt; not reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>No accusative marker</td>
<td>0.44</td>
<td>0.67</td>
</tr>
<tr>
<td>((k = 3))</td>
<td>((SD = 0.46))</td>
<td>((SD = 0.42))</td>
</tr>
<tr>
<td>Accusative marker on the head noun ((k = 3))</td>
<td>0.56</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>((SD = 0.27))</td>
<td>((SD = 0.18))</td>
</tr>
<tr>
<td>Accusative marker on the classifier ((k = 3))</td>
<td>0.28</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>((SD = 0.39))</td>
<td>((SD = 0.00))</td>
</tr>
</tbody>
</table>

Note. \(k\) represents the number of items per sentence type.

In the not > two context, the participants selected the target interpretation 56% of the time when presented with the sentences where the accusative marker occurs on the head noun, while accepting the target interpretation in the other sentence types less than 50% of the time. In the two > not context, they selected the target interpretation 84% of the time in the sentences with the accusative marker on the head noun, while accepting the target interpretation at a perfect rate of 100% in the sentence type containing the accusative marker on the classifier and at the rate of 67% in the sentence type without the accusative marker.

Based on the preliminary results of the pilot study, the sentence type containing the accusative marker on the head noun was chosen for the current experiment, as it was regarded as the best candidate to provide both the not > two and two > not interpretations.

2.4.2 Results

In the data analysis, the dependent variable was the proportion of “yes/true” responses to the puppet’s statements. T-tests were conducted with context (i.e., the not > two and two > not contexts) as a within-participant factor (\(t1\)) and a between-item factor.
and a repeated measures ANOVA was conducted with context as a within-participant ($F_1$) between-item factor ($F_2$) and group as a between-participant ($F_1$)/within-item factor ($F_2$).

The results revealed that both the $two > not$ reading and the $not > two$ reading are possible in Korean sentences containing a numeral quantifier and short-form negation $an$. The control group selected the $two > not$ interpretation 92% of the time and the $not > two$ interpretation 58% of the time. The difference between the two interpretations was statistically significant ($t1(39) = 4.77, p < .05; t2(8) = -6.32, p < .05$).

Children gave “yes” responses to test sentences in the context favoring the $two > not$ interpretation 70% of the time, and “yes” responses to test sentences in the context favoring the $not > two$ interpretation 12% of the time. This difference was statistically significant ($t1(28) = 8.62, p < .05; t2(8) = -7.29, p < .05$). Table 2.6 shows the mean proportion of “yes” responses to test sentences for the children and control group in both contexts.

<table>
<thead>
<tr>
<th>Group</th>
<th>Context favoring the $two &gt; not$ reading ($k = 5$)</th>
<th>Context favoring the $not &gt; two$ reading ($k = 5$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>0.92 ($SD = 0.16$)</td>
<td>0.58 ($SD = 0.38$)</td>
</tr>
<tr>
<td>(n = 40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>0.70 ($SD = 0.31$)</td>
<td>0.12 ($SD = 0.29$)</td>
</tr>
<tr>
<td>(n = 29)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $k$ represents the number of items per context.

The ANOVA revealed a statistically significant difference between the $not > two$ and the $two > not$ contexts ($F1(1, 67) = 82.16, p < .05; F2(1, 8) = 87.42, p < .05$), as well as between the children and control group ($F1(1, 67) = 42.03, p < .05; F2(1, 8) = 53.38, p < .05$). Moreover, there is a statistically significant interaction effect between contexts and groups ($F1(1, 67) = 5.62, p < .05; F2(1, 8) = 6.66, p < .05$). This indicates that
regardless of group, the participants accepted the $two > not$ reading more frequently than the $not > two$ reading, and that regardless of the types of context, the control group accepted the target interpretations more frequently than did the children. The interaction effects reveal that the difference between the children’s acceptance rates and those of the control group was bigger in the context favoring the $not > two$ reading than in the context favoring the $two > not$ reading.

As just noted, children showed a strong preference for the $two > not$ reading. The justifications that children provided in the $not > two$ context also showed this preference. When they were asked why they thought what the puppet said was wrong, most of them said that a particular character in the story had acted on one of the two objects or animals. For example, in the story where Piglet read only one out of the two books, in response to the puppet saying “Piglet didn’t read two books,” children stated that the puppet’s statement was not true because Piglet had read one book. These responses suggest that they interpreted the statement in the $two > not$ sense. In other words, they interpreted it as ‘there are two books that Piglet did not read,’ thereby rejecting it on the grounds that there was just one book that Piglet hadn’t read.

It is also worth noting that the proportion of children’s “yes” responses in the $two > not$ context was lower than that of the control group. Nine out of the 29 children gave “yes” responses to one or two out of the five test sentences in this context. When asked why they thought the puppet’s statements were wrong, they said that a particular character in the story had acted on two out of the four objects or animals. For example, in the story about a woman buying two of four bags, they said that the puppet’s statement (‘the woman didn’t buy two bags.’) was wrong because the woman had bought two bags.
This suggests that they paid more attention to what the character did than to what she did not do.

The control group also showed a preference for the \( \text{two} > \text{not} \) reading. In contrast to the children’s responses, however, they accepted the \( \text{not} > \text{two} \) interpretation 58% of the time. In fact, 20 out of the 40 participants in the control group accepted the \( \text{not} > \text{two} \) interpretation at a rate higher than 80%, and five participants selected the interpretation 60% of the time.

Among the 20 adult participants who selected the target interpretation in the \( \text{not} > \text{two} \) context with a high degree of success, seven accepted both the \( \text{not} > \text{two} \) and \( \text{two} > \text{not} \) interpretations 100% of the time. Two participants who accepted the \( \text{not} > \text{two} \) interpretation all the time accepted the opposite interpretation 80% of the time. Eight participants who accepted the \( \text{not} > \text{two} \) reading 80% of the time accepted the opposite reading at a rate equal to or higher than 80% of the time. Just three accepted the \( \text{two} > \text{not} \) reading equal to or lower than 60% of the time (see Table 2.7).

Table 2.7. Performance of the 20 Participants who Accepted the Target Interpretation in the \( \text{Not} > \text{Two} \) context

<table>
<thead>
<tr>
<th>Number of participants</th>
<th>Acceptance rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \text{not} &gt; \text{two} )</td>
</tr>
<tr>
<td>Seven participants</td>
<td>100%</td>
</tr>
<tr>
<td>Two participants</td>
<td>100%</td>
</tr>
<tr>
<td>One participant</td>
<td>100%</td>
</tr>
<tr>
<td>One participant</td>
<td>100%</td>
</tr>
<tr>
<td>Six participants</td>
<td>80%</td>
</tr>
<tr>
<td>Two participants</td>
<td>80%</td>
</tr>
<tr>
<td>One participant</td>
<td>80%</td>
</tr>
</tbody>
</table>

This result indicates that unlike children, approximately half of the control group could access both the \( \text{not} > \text{two} \) and \( \text{two} > \text{not} \) interpretations quite successfully, providing strong evidence that both interpretations are possible in Korean sentences.
containing numerically quantified NP patterns in direct object position and short-form negation.

2.4.3 Discussion

In the comprehension experiment, both children and adults displayed a preference for the two > not reading even though there was a difference in the acceptance rate of the not > two reading between the two groups.

This result corresponds to the findings from recent studies on scope ambiguity involving the universal quantifier motun ‘every/all’ and negation in Korean (Han et al. 2007, Lee 2009, O’Grady et al. 2009). It has been found that native speakers of Korean accept the quantified NP wide scope interpretation (i.e., every/all > not interpretation) more frequently in sentences such as the following:

(40) Mary-ka motun cepsi-lul an takk-ass-ta.
Mary-NOM every/all plate-ACC NEG wash-PST-DECL
‘Mary didn’t wash every plate/all the plates.’

a. every/all > not interpretation
   ‘Mary washed none of the plates.’

b. not > every/all interpretation
   ‘It is not the case that Mary washed all the plates.’

Regardless of the type of quantifier, it seems that there is a preference for quantifier > not interpretation, which aligns with the word order since a quantified NP in direct object position precedes negation.

The findings from recent studies on scope ambiguity involving quantifiers suggest that adults find it easier to process the interpretation in which leftward phrases have wide scope as compared to the reverse interpretation (Anderson 2004, Kurtzman & MacDonald 1993, Lee 2009, among others). In their study on active scopally ambiguous
sentences containing *every*-phrases and *a*-phrases, Kurtzman and MacDonald (2003) found that the interpretation in which the leftward quantified phrases have wide scope was preferred, consistent with most views of processing. For example, in the sentence *Every kid climbed a tree*, the preferred interpretation was that there may be more than one tree with different kids climbing each tree, in which the leftward phrase *every kid* has wide scope over *a tree*. On the other hand, in the sentence *A kid climbed every tree*, the preferred interpretation was the one in which there is one particular kid who climbed all the trees.

In line with Kurtzman and MacDonald’s findings, Anderson’s (2004) self-paced word-by-word reading task showed that assigning the less preferred inverse scope interpretation (which doesn’t correspond to the surface word order) to ambiguous English sentences containing *a* and *every* such as (41) may cause processing difficulty.

(41) An experienced climber scaled every cliff.
   a. Surface scope interpretation
      ‘There is one experienced climber who scaled all the cliffs.’
   b. Inverse scope interpretation
      ‘Every cliff was scaled by some possibly different climbers.’

Similarly, Lee (2009) reported that it took longer for adult native speakers of Korean to assign the less preferred *not > every* interpretation to negated sentences such as (42), which contains the universal quantifier *motun* ‘every’ in direct object position.

(42) Ecey pam-ey Yuna-ka motun chospwul-ul khye-ci anh-ass-ta-ko
    last night Yuna-NOM every candle-ACC light-ci NEG-PST-DECL-COMP
    iyaki-nun malha-n-ta.
    story-TOP say-IN-DECL

    ‘The story says that Yuna didn’t light every candle last night.’
a. *Every > not* interpretation  
   ‘Yuna lit none of the candles.’

b. *Not > every* interpretation  
   ‘It is not the case that Yuna lit all of the candles.’

Along with insights from the adult sentence processing studies, the findings of the current study make plausible the claim that preferences for the *two > not* interpretation found in Korean may be due to processing considerations and that in interpreting sentences containing *twu* ‘two’ and negation *an* ‘not’ it may be easier to assign the *two > not* interpretation, in which the leftward numerically quantified NP pattern has wide scope.

In addition to processing-based accounts, another possible explanation for children’s and adults’ preference for the *two > not* interpretation has to do with felicity conditions on negative sentences. It has been observed that negative sentences tend to be processed more correctly or faster in felicitous contexts than in infelicitous contexts (De Villiers & Tager Flusberg 1975, Gualmini 2004, Musolino & Lidz 2006, Wason 1965). In other words, the difficulty of negative sentences can be mitigated when they are preceded by affirmative sentences representing contrastive information or when they are introduced in contexts where a listener’s expectations are not fulfilled. In the stories for the *not > two* contexts used in the current experiment, the felicity conditions for the negative sentences might not have been fully satisfied. For example, the *not > two* reading of the sentence *Piglet-un chayk-ul twu kwen an ilk-ess-e* ‘Piglet did not read two books’ would be more felicitous in contexts such as the following:
(43) Sample context 1

**Not > two context** (English translation)

Pooh and Piglet have two books apiece. Pooh reads the two books because they are so interesting. Piglet reads one of the two books first. When he is about to read the second book, he realizes that he borrowed the wrong book. So, he decides not to read it. He ends up reading one book.

Test sentence: Pooh-nun chayk-ul twu kwen ilk-ess-ciman
Pooh-TOP book-ACC two CL read-PST-but

Piglet-un chayk-ul twu kwen an ilk-ess-e
Piglet-TOP book-ACC two CL NEG read-PST-DECL

‘Pooh read two books but Piglet did not read two books.’

The presence of the contrastive affirmative sentence *Pooh read two books* might facilitate the acceptance of the reading ‘it is not the case that Piglet read two books.’

The *not > two* reading of the sentence could be also felicitous when a listener’s expectations are not fulfilled, as in the following context:

(44) Sample context 2

**Not > two context** (English translation)

The teacher told Piglet to read two books as homework. Piglet borrowed two books from a library. He reads one of the two books first. When he is about to read the second book, he realizes that he borrowed the wrong book. So, he decides not to read it. He ends up reading one book.

Test sentence: Piglet-un chayk-ul twu kwen an ilk-ess-e.
Piglet-TOP book-ACC two CL NEG read-PST-DECL

‘Piglet did not read two books.’

The context might lead listeners to build up the expectations that Piglet would read two books to complete his homework. When the ending of the story unfolds, however, the expectations are not fulfilled. Therefore, the reading ‘it is not the case that Piglet read two books’ would be felicitous.
Experiment 3 was conducted in order to investigate whether the role of these contextual factors, which fulfill felicity conditions on negative sentences, could play a role in the interpretations of ambiguous sentences containing numerals and short-form negation.

2.5 Experiment 3: Comprehension (2)

2.5.1 Method

2.5.1.1 Participants

Twenty-four new Korean-speaking children (mean age 4;11) and 20 adult controls (mean age 26) participated in the experiment. Among the children, there were 11 girls and 13 boys—nine four-year-olds and 15 five-year olds. Eight children (three four-year-olds and five five-year-olds) were excluded for the purposes of data analysis because their accuracy on filler items was below 75%.

2.5.1.2 Procedure

As in the experiment 2, the TVJT was conducted with materials presented via E-Prime software. Participants took part in a practice session that consisted of two items, and then continued on to the main session. They were presented with a set of four pictures forming a story. When provided with each picture, they listened to the experimenter’s narration of the events depicted in the picture, and at the end of each story, they heard a pre-recorded test sentence presented with the picture of a puppet on the screen. They were asked to press one of the two buttons (i.e., T for ‘true’ and F for ‘false’) depending on whether they thought the puppet’s statement was true or false. Whenever necessary, they were asked to justify their answers by explaining why they thought that the puppet was right or wrong. The responses were audio-recorded.
The whole task took approximately one hour for the children to complete, and approximately 30 minutes for the control group. The children were tested in two separate sessions with an interval of one day so that they would be able to remain attentive.

2.5.1.3 Materials

Four conditions were created based on two independent variables (i.e., the presence of a preceding affirmative sentence carrying contrastive information and introducing an expectation that is not fulfilled). A total of 12 experimental items (i.e., three items per condition) were included along with two practice items and 16 filler items.

The experimental items contained negation and the numeral quantifiers twu ‘two’ or sey ‘three’ associated with NPs in direct object position (see Tables 2.8 & 2.9 for a list of test sentences). The filler items consisted of affirmative sentences containing numeral or universal quantifiers, unambiguous negated sentences, or a combination of affirmative and negated sentences (see Appendix B for a full list of test and filler sentences in Korean). The target answers for the experimental items were true on the narrow scope reading of a numerically quantified NP pattern (i.e., not > two/three reading\(^8\)), while the answers for the filler items were counterbalanced between true and false descriptions of the situation. Four lists of the materials were created using a Latin Square design. Every participant received all the conditions in such a way that s/he was tested in only one condition for each item.

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\(^8\) In this study, two types of numerals (i.e., twu ‘two’ and sey ‘three’) were used with NPs in direct object position. For the sake of convenience, the not > two/three reading will be used to refer to the interpretation ‘it is not the case that Subject didn’t Verb two/three NPs.’
<table>
<thead>
<tr>
<th>Korean sentences (English translations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tigger-nun chayk-ul twu kwen an ilk-ess-e.</td>
</tr>
<tr>
<td>('Tigger didn’t read two books.')</td>
</tr>
<tr>
<td>Dora-nun sakwa-lul twu kay an mek-ess-e.</td>
</tr>
<tr>
<td>('Dora didn’t eat two apples.')</td>
</tr>
<tr>
<td>Tom-un kwutwu-lul twu khyelley an takk-ass-e.</td>
</tr>
<tr>
<td>('Tom didn’t shine two pairs of shoes.')</td>
</tr>
<tr>
<td>Boots-nun wuywu-lul twu kay an sa-ss-e.</td>
</tr>
<tr>
<td>('Boots didn’t buy two pints of milk.')</td>
</tr>
<tr>
<td>Dora-nun pizza-lul twu kay an mek-ess-e.</td>
</tr>
<tr>
<td>('Dora didn’t eat two slices of pizza.')</td>
</tr>
<tr>
<td>Mary-nun mal-ul twu mali an mek-yess-e.</td>
</tr>
<tr>
<td>('Mary didn’t feed two horses.')</td>
</tr>
<tr>
<td>Tigger-nun phwungsen-ul sey kay an pwul-ess-e.</td>
</tr>
<tr>
<td>('Tigger didn’t blow up three balloons.')</td>
</tr>
<tr>
<td>Pooh-nun pyel-ul sey saykchil an hay-ss-e.</td>
</tr>
<tr>
<td>('Pooh didn’t color three stars.')</td>
</tr>
<tr>
<td>Tom-un kulimcokak-ul sey kay an chac-ass-e.</td>
</tr>
<tr>
<td>('Tom didn’t find three pieces of a jigsaw puzzle.')</td>
</tr>
<tr>
<td>Tom-un mwulkoki-lul sey mali an sa-ss-e.</td>
</tr>
<tr>
<td>('Tom didn’t buy three fish.')</td>
</tr>
<tr>
<td>Dora-nun cepsi-lul sey kay an chi-wess-e.</td>
</tr>
<tr>
<td>('Dora didn’t clear away three plates.')</td>
</tr>
<tr>
<td>Tigger-nun cokay-lul sey kay an chac-ass-e.</td>
</tr>
<tr>
<td>('Tigger didn’t find three seashells.')</td>
</tr>
</tbody>
</table>
Table 2.9. Test Sentences in Condition 3 & Condition 4

Korean sentences (English translations)

('Pooh read two books but Tigger didn’t read two books."

Boots-nun sakwa-lul twu kay mek-ess-ciman Dora-nun sakwa-lul twu kay an mek-ess-e.
('Boots ate two apples but Dora didn’t eat two apples.

Mary-nun kwutwu-lul twu khyelley takk-ass-ciman Tom-un kwutwu-lul twu khyelley an takk-ass-e.
('Mary shone two pairs of shoes but Tom didn’t shine two pairs of shoes.’)

Dora-nun wuywu-lul twu kay sa-ss-ciman Boots-nun wuywu-lul twu kay an sa-ss-e.
('Dora bought two pints of milk but Boots didn’t buy two pints of milk.’)

Boots-nun pizza-lul twu kay mek-ess-ciman Dora-nun pizza-lul twu kay an mek-ess-e.
('Boots ate two slices of Pizza but Dora didn’t eat two slices of pizza.

Tom-un mal-ul twu mali mek-yess-ciman Mary-nun mal-ul twu mali an mek-yess-e.
('Tom fed two horses but Mary didn’t feed two horses.’)

Piglet-un phwungsen-ul sey kay pwul-ess-ciman Tigger-nun phwungsen-ul sey kay an pwul-ess-e.
('Piglet blew up three balloons but Tigger didn’t blow up three balloons.’)

Tigger-nun pyel-ul sey kay saykchilhay-ss-ciman Pooh-nun pyel-ul sey kay saykchil an hay-ss-e.
('Tigger colored three stars but Pooh didn’t color three stars.’)

Mary-nun kulimcokak-ul sey kay chac-ass-ciman Tom-un kulimcokak-ul sey kay an chac-ass-e.
('Mary found three pieces of a jigsaw puzzle but Tom didn’t find three pieces of a jigsaw puzzle.’)

Mary-nun mwulkoki-lul sey mali sa-ss-ciman Tom-un mwulkoki-lul sey mali an sa-ss-e.
('Mary bought three fish but Tom didn’t buy three fish.’)

Boots-nun cepsi-lul sey kay chi-wess-ciman Dora-nun cepsi-lul sey kay an chi-wess-e.
('Boots cleared away three plates but Dora didn’t clear away three plates.’)

('Pooh found three seashells but Tigger didn’t find three seashells.’)

A sample experimental item is given below. In Condition 1, a neutral context was provided; in Condition 2, an expectation which was not met was introduced in the context story; in Condition 3, a preceding affirmative sentence carrying contrast information was included in the test sentence; and in Condition 4, both were present.
**Condition 1: Neutral**

<Context story> (English translation)

Piglet and Tigger find three balloons. Tigger asks Piglet whether he is interested in playing with them. Piglet says “No” and instead draws stars. Tigger decides to blow up balloons on his own. Tigger first blows up one balloon. He is so happy, and blows up the second balloon. However, he decides not to blow up the other balloon because his mouth starts to hurt from blowing up the balloons so quickly. He ends up blowing up two balloons (see Figure 2.5).

Test sentence:

Tigger-nun phwungsen-ul sey kay an pwul-ess-e.
Tigger-TOP balloon-ACC three CL NEG blow up-PST-DECL

‘Tigger didn’t blow up three balloons.’

In this condition, the puppet’s statement is true on the *not > three* interpretation ‘it is not the case that Tigger blew up three balloons’ because Tigger blew up two balloons. In contrast, it is false on the *three > not* interpretation ‘there are three balloons that Tigger didn’t blow up’ given that there is just one balloon that Tigger didn’t blow up.
**Condition 2: Expectation**

<table>
<thead>
<tr>
<th>&lt;Context story&gt; (English translation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bunny, Piglet and Tigger are preparing for their friend’s birthday party. Bunny tells Piglet to go get a birthday cake and Piglet says that he will do so. Then, Bunny tells Tigger to blow up three balloons and put them on the table. Tigger promises that he will blow up three balloons. To keep his promise, Tigger first blows up one balloon. He is so happy, and blows up the second balloon. However, he decides not to blow up the other balloon because his mouth starts to hurt from blowing up the balloons so quickly. He ends up blowing up two balloons (see Figure 2.6).</td>
</tr>
</tbody>
</table>

Test sentence:

Tigger-nun phwungsen-ul sey kay an pwul-ess-e.
Tigger-TOP balloon-ACC three CL NEG blow up-PST-DECL
‘Tigger didn’t blow up three balloons.’

In this condition, the underlined part in the story is designed to set up the expectation that the main character, Tigger, will perform an action on all of the target objects. However, as the story unfolds, it turns out that the expectation is not fulfilled as Tigger ends up...
blowing up just two of the three balloons. As in Condition 1, the puppet’s statement is true on the \( \text{not} > \text{three} \) interpretation whereas it is false on the \( \text{three} > \text{not} \) interpretation.

**Condition 3: Contrast**

<Context story> (English translation)

Piglet and Tigger find three balloons each. Piglet blows up the three balloons quickly. Tigger first blows up one balloon. He is so happy, and blows up the second balloon. However, he decides not to blow up the other balloon because his mouth starts to hurt from blowing up the balloons quickly. He ends up blowing up two balloons (see Figure 2.7).

Test sentence:

Piglet-un phwungsen-ul sey kay pwul-ess-ciman
Piglet-TOP balloon-ACC three CL blow up-PST-but

Tigger-nun phwungsen-ul sey kay an pwul-ess-e.
Tigger-TOP balloon-ACC three CL NEG blow up-PST-DECL

‘Piglet blew up three balloons, but Tigger didn’t blow up three balloons.’

Scene 1

Scene 2

Scene 3

Scene 4

Figure 2.7. Contrast Context
In this condition, the affirmative sentence carrying the contrastive information ‘Piglet blew up three balloons’ has been added to the puppet’s statement. The puppet’s statement is true in that Piglet blew up three balloons and it is not the case that Tigger blew up three balloons. In contrast, the second part of the statement (i.e., ‘Tigger didn’t blow up three balloons.’) is false on the $three > not$ interpretation.

**Condition 4: Expectation & Contrast**

<context story> (English translation)

Bunny, Piglet and Tigger are preparing for a party. Bunny tells Piglet and Tigger to blow up three balloons each and put them on the table. Piglet and Tigger promise to do so. Piglet blows up the three balloons quickly. To keep the promise to Bunny, Tigger first blows up one balloon. He is so happy, and blows up the second balloon. However, he decides not to blow up the other balloon because his mouth starts to hurt from blowing up the balloons so quickly. He ends up blowing up two balloons (see Figure 2.8).

Test sentence:

Piglet-un phwungsen-ul sey kay pwul-ess-ciman
Piglet-TOP balloon-ACC three CL blow up-PST-but

Tigger-nun phwungsen-ul sey kay an pwul-ess-e.
Tigger-TOP balloon-ACC three CL NEG blow up-PST-DECL

‘Piglet blew up three balloons, but Tigger didn’t blow up three balloons.’
In this condition, an expectation that is not fulfilled has been introduced in the story and an affirmative sentence containing contrastive information has been added to the puppet’s statement. As in Condition 3, the puppet’s statement is true on the $\text{not} > \text{three}$ interpretation and false on the $\text{three} > \text{not}$ interpretation.

2.5.2 Results

In the data analysis, the mean proportion of “true” responses to the puppet’s statements was calculated and reaction times (RTs)—measured from sentence offset to button press—were compared across conditions. These dependent measures were analyzed by participants and by items. For both adult and child groups, RTs which were above or below 2.5 standard deviations from the mean calculated for each participant and each item were removed, and replaced with the mean of the participant mean and the
item mean. This procedure affected 8.3% and 10% of the data for children and 3.3% and 3.75% of the data for adults. Repeated measures ANOVAs were conducted with the two independent variables (i.e., the presence of contrastive affirmative sentences and unfulfilled expectation) as within-participant factors ($F_1$) and within-item factors ($F_2$).

For the adult group, the participants’ mean proportion of “true” responses reveals that there was no significant effect of the preceding affirmative sentence carrying contrastive information ($F_1(1, 19) = 3.10, p > .05$), whereas the item analysis revealed a statistically significant effect of the variable ($F_2(1, 11) = 5.21, p < .05$). The results of both participant and item analyses revealed neither an effect of the expectation factor nor an interaction effect ($F_1(1, 19) = 0.10, p > .05, F_2(1,11) = 0.02, p > .05; F_1(1, 19) = 0.52, p > .05, F_2(1, 11) = 0.26, p > .05$).

In contrast, the children accepted the not > two/three interpretation at a higher rate in Condition 3 and Condition 4 than in Condition 1 and Condition 2 (see Table 2.10). The ANOVA results revealed a statistically significant effect of the preceding affirmative sentence carrying contrastive information ($F_1(1, 15) = 6.37, p < .05, F_2(1, 11) = 12.83, p < .05$) but neither an effect of expectation nor an interaction effect ($F_1(1, 15) = 0.23, p > .05, F_2(1, 11) = 0.01, p > .05; F_1(1, 15) = 0.24, p > .05, F_2(1, 11) = 0.20, p > .05$).
Table 2.10. Mean Proportion of “True” Responses

<table>
<thead>
<tr>
<th>Condition</th>
<th>Children ($n = 16$)</th>
<th>Adults ($n = 20$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition 1 (Neutral)</td>
<td>0.67 ($SD = 0.39$)</td>
<td>0.87 ($SD = 0.20$)</td>
</tr>
<tr>
<td>(k = 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition 2 (Expectation)</td>
<td>0.67 ($SD = 0.40$)</td>
<td>0.85 ($SD = 0.23$)</td>
</tr>
<tr>
<td>(k = 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition 3 (Contrast)</td>
<td>0.83 ($SD = 0.27$)</td>
<td>0.92 ($SD = 0.15$)</td>
</tr>
<tr>
<td>(k = 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition 4 (Expectation &amp; Contrast)</td>
<td>0.88 ($SD = 0.27$)</td>
<td>0.95 ($SD = 0.12$)</td>
</tr>
<tr>
<td>(k = 3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $k$ represents the number of items per condition.

The results of RTs independent of the participants’ truth-value judgments are summarized in Table 2.11. For the adult group, there was neither a main effect nor an interaction effect of the two factors ($F_{1}(1, 19) = 3.36, p > .05, F_{2}(1, 11) = 3.21, p > .05$; $F_{1}(1, 19) = 1.07, p > .05, F_{2}(1, 11) = 0.20, p > .05$; $F_{1}(1, 19) = 0.80, p > .05, F_{2}(1, 11) = 0.01, p > .05$). For the child group, however, there was a significant effect on RTs of the preceding affirmative sentence carrying contrastive information ($F_{1}(1, 15) = 48.03, p < .05, F_{2}(1, 11) = 15.47, p < .05$), but neither an effect of the presence of an unfulfilled expectation nor an interaction effect between the two factors was found ($F_{1}(1, 15) = 0.10, p > .05, F_{2}(1, 11) = 0.00, p > .05$; $F_{1}(1, 15) = 0.37, p > .05, F_{2}(1, 11) = 0.35, p > .05$).
Table 2.11. Mean RTs in Four Conditions (ms)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Children ((n = 16))</th>
<th>Adults ((n = 20))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition 1 (Neutral) ((k = 3))</td>
<td>3395 ((SD = 1235))</td>
<td>1641 ((SD = 1359))</td>
</tr>
<tr>
<td>Condition 2 (Expectation) ((k = 3))</td>
<td>3166 ((SD = 1390))</td>
<td>2031 ((SD = 2131))</td>
</tr>
<tr>
<td>Condition 3 (Contrast) ((k = 3))</td>
<td>2043 ((SD = 1211))</td>
<td>1430 ((SD = 1545))</td>
</tr>
<tr>
<td>Condition 4 (Expectation &amp; Contrast) ((k = 3))</td>
<td>2060 ((SD = 743))</td>
<td>1400 ((SD = 1520))</td>
</tr>
</tbody>
</table>

Note. \(k\) represents the number of items per condition.

A further analysis was conducted in order to examine how RTs on “true” responses varied across conditions.\(^9\) The results are provided in Table 2.12.

Table 2.12. Mean RTs in “True” Responses (ms)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Children ((n = 12))</th>
<th>Adults ((n = 20))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition 1 (Neutral) ((k = 3))</td>
<td>3457 ((SD = 1004))</td>
<td>1912 ((SD = 2216))</td>
</tr>
<tr>
<td>Condition 2 (Expectation) ((k = 3))</td>
<td>2663 ((SD = 1183))</td>
<td>1722 ((SD = 1954))</td>
</tr>
<tr>
<td>Condition 3 (Contrast) ((k = 3))</td>
<td>1910 ((SD = 1210))</td>
<td>1347 ((SD = 1574))</td>
</tr>
<tr>
<td>Condition 4 (Expectation &amp; Contrast) ((k = 3))</td>
<td>1862 ((SD = 638))</td>
<td>1323 ((SD = 1308))</td>
</tr>
</tbody>
</table>

\(^9\) In this analysis, four children were excluded because they didn’t provide true responses at all at least in one of the four conditions. In addition, we didn’t compare the participants’ mean RTs on true responses with those on false responses due to asymmetry between the numbers of both responses across conditions.
For the adult group, neither a main effect nor an interaction effect of the two factors was found in the case of the participants’ true responses ($F_1(1, 19) = 2.58, p > .05, F_2(1, 11) = 3.23, p > .05; F_1(1, 19) = 0.29, p > .05, F_2(1, 11) = 0.45, p > .05; F_1(1, 19) = 0.08, p > .05, F_2(1, 11) = 0.04, p > .05$). For the child group, there was a significant effect on RTs of the preceding affirmative sentence carrying contrastive information when they provided true responses ($F_1(1, 11) = 24.79, p < .05, F_2(1, 11) = 14.42, p < .05$). However, neither an effect of the presence of an unfulfilled expectation nor an interaction effect between the two factors was found ($F_1(1, 11) = 1.11, p > .05, F_2(1, 11) = 1.46, p > .05; F_1(1, 11) = 4.59, p > .05, F_2(1, 11) = 2.11, p > .05$).

2.5.3 Discussion

The findings of Experiment 3 reveal that the child participants in the current study accepted the not > two/three interpretation more frequently when a preceding affirmative sentence carrying the contrastive information was present than when such a contextual factor was not provided. The children also spent less time in choosing the target interpretation when the contrastive affirmative sentences preceded the target sentences. However, the existence of an unfulfilled expectation was found to have no effect on the children’s acceptance rate of the target interpretation or on the time they spent in choosing it. The results for the adult control group show that the contrastive information expressed in the preceding affirmative sentences had a marginal effect on the acceptance rate of the not > two/three interpretation but that the existence of unfulfilled expectation did not play a role in the acceptance rate. Furthermore, neither the presence of contrastive information nor the existence of unfulfilled expectation had an effect on the time needed to judge the truth of the target sentences.
The results suggest that like adults Korean-speaking children can access the dispreferred \textit{not} $>$ \textit{two} interpretation of ambiguous sentences containing numerals and negation when certain contextual conditions are satisfied, as reported in previous studies involving other languages (Gualmini 2004, Musolino & Lidz 2006). Musolino and Lidz (2006) found that English-speaking 5-year-olds could access the \textit{not} $>$ \textit{every} reading when the sentence is preceded by the affirmative utterance, as in the following example.

\begin{equation}
\text{(45) Every horse jumped over the log but every horse didn’t jump over the fence.}
\end{equation}

The children’s acceptance rate for the \textit{not} $>$ \textit{every} interpretation increased dramatically when the target sentence occurred in the contrastive context exemplified above compared to when there is no such contrast (60\% versus 15\%). These findings support the idea that negative sentences are easier to process when the affirmative sentence is presented as a context for denial (Wason 1965).

The RT data from the present study indicate that the children chose the \textit{not} $>$ \textit{two/three} interpretation faster when given contrastive information is provided in the preceding sentence. Combined with the acceptance rates for the \textit{not} $>$ \textit{two/three} interpretation, this implies that contextual factors such as a preceding affirmative sentence carrying contrastive information mitigate the processing difficulty associated with the less accessible \textit{not} $>$ \textit{two/three} interpretation.

In the present study, the expectation factor didn’t facilitate the children’s acceptance of the \textit{not} $>$ \textit{two/three} interpretation as strongly as the presence of the preceding affirmative sentence conveying contrastive information. This might have happened because this information was less explicitly provided in the story in comparison to the contrastive information, which was provided explicitly in the preceding sentence of
a target sentence. The difference in the degree of explicitness between these two types of contextual factors may play a role in discrepancy in facilitating the access to the target interpretation.

Interestingly, the child participants accepted the \textit{not} > \textit{two/three} interpretation in Condition 1, where a neutral context story was presented, at the same rate as in Condition 2, where an unfulfilled expectation factor was introduced. It might be the case that the story line in Condition 1 led the participants to implicitly build up the expectation that the main character would perform an action on all target objects, contrary to the author’s intention. For example, in the story of Tigger blowing up three balloons, Piglet and Tigger find three balloons and Tigger decides to blow up the balloons on his own because Piglet doesn’t want to do it together. The existence of three balloons in the scene might have led the participants to presuppose that Tigger would blow up all of the three balloons. At the end of the story, where Tigger ended up blowing up two of the three balloons, the gap between what was presupposed and what actually happened might have facilitated the access to the \textit{not} > \textit{two/three} interpretation.

For the adult controls, the \textit{not} > \textit{two/three} interpretation was accepted almost always—even in Condition 1, where no contextual factors were manipulated. Because they could access the interpretation in the first place, the two factors under consideration did not show any distinctive effect on the acceptance rate or on reaction times. This finding also confirms the fact that in addition to the wide scope reading (i.e., \textit{two} > \textit{not} interpretation), the narrow scope reading of numerically quantified NP patterns (i.e., \textit{not} > \textit{two} interpretation) is allowed in Korean sentences containing negation and numerically quantified NP patterns in object position.
It is noteworthy that when we compare the acceptance rate of the $not > two/three$ interpretation in Condition 1, where no contextual factors were manipulated, with the results from Experiment 2 of the preceding section, there was an increase from 12% to 67%. The most noticeable difference between the two experiments involved how the context stories accompanying the test sentences ended. In Experiment 2, the story ended in such a way that the main character didn’t act upon one of the two target objects, whereas in the present study the story ended with a summary sentence of how many target objects were affected by the main character. For example, for the story involving reading books, Experiment 2 described an event in which the main character didn’t read one of the two books at the end of the story. In contrast, the present study introduced the same last event followed by a summary sentence that the main character ended up reading one book. The existence of such a summary sentence might have helped the participants take the target sentence to mean ‘the main character didn’t read two books’ in the $not > two$ sense by allowing them to focus on the number of target objects affected by the main character rather than the number of unaffected target objects. It may be easier to access the $not > two$ interpretation when the participants check that the number of the target objects affected is not two but the number other than two.

The results of the current study suggest that Korean-speaking children don’t simply lack the $not > two$ interpretation; rather, they can access the interpretation only when a certain contextual factor is present. In order to provide stronger evidence for this conclusion, further studies should be conducted by increasing the number of test items as well as the sample size. In addition, it will be necessary to include test items where the
two > not interpretation is the target interpretation. In the current study, the participants were given only stories in which the target interpretation was the not > two interpretation. It could well be worthwhile to explore how frequently the same participants assign the two > not interpretation to target sentences preceded by contexts that support this interpretation.

The results for reaction times suggest that contextual factors such as the presence of a preceding affirmative sentence carrying contrastive information may mitigate the processing difficulty associated with the less accessible not > two interpretation. However, further studies involving on-line measures should be conducted to explore how and when such contextual information affects scope ambiguity resolution in processing ambiguous sentences in real time. Furthermore, to gather baseline data, it is necessary to explore how the interpretation of the target sentences evolves online in neutral contexts where contextual factors such as the preceding affirmative sentence carrying contrastive information are not present.

2.6 General Discussion

This study has attempted to describe the scope interaction between numeral quantifiers and negation in Korean and to investigate Korean-speaking children’s production and comprehension of numeral quantifiers and negation compared to that of Korean-speaking adults. The production experiments revealed that the frequency of numerically quantified negative sentences is very low in the speech of both children and adults. The comprehension experiments support the conclusion that children and adults have a preference for the two > not interpretation of sentences containing numeral
quantifiers and negation, although adults have access to the \textit{not > two} interpretation more frequently than children. In addition, the results show that children could access the \textit{not > two} interpretation like adults when certain contextual conditions are satisfied.

As a possible explanation for the results of production experiments, I have offered a pragmatic account based on Grice’s Cooperative Principle. For the results of comprehension experiments, I provided a processing-based account and discussed the role of contextual factors pertaining to felicity conditions of negative statements.

The findings of the current study underline the mystery underlying children’s acquisition of the interaction between numeral quantifiers and negation in light of the fact that the two elements are rarely used together in real life. In addition, the results of the study show that there are several factors to consider in order to better understand the acquisition of scope interactions. Further studies should be conducted with more fine-grained materials so as to provide answers to the various questions raised in this first round of studies.
CHAPTER 3. THE INTERPRETATIONS OF NUMERICALLY QUANTIFIED NOUN PHRASE PATTERNS AND BARE NOUN PHRASES IN KOREAN

3.1 Introduction

In the preceding chapter, we saw that both children and adults manifest preferences for the wide scope (two > not) interpretation of numerically quantified direct object NP patterns in negated sentences. This raises the question of whether this scopal preference arises because of the presence of a numeral quantifier in particular, or whether it is found in all negated sentences with an indefinite direct object.

There is a widely accepted view that NPs in object position tend to have referents that are indefinite, inanimate, and non-specific, while NPs in subject position are more likely to have as their least marked referents that are definite, animate, and specific (Aissen 2003). If this is so, then why do Korean-speaking children prefer the wide scope reading of a numerically quantified NP pattern—which corresponds to the specific interpretation of an indefinite NP? In this chapter, I will explore the possible role of numerals and/or classifiers in interpretive preferences in Korean. As a preliminary investigation, I will compare the interpretation of numerically quantified NP patterns in object position with that of bare NPs in the same position.

It is well known that bare NPs in Korean can be interpreted as either indefinites or definites (Lee 1989, Martin 1992). Because Korean doesn’t have definite/indefinite articles, which are obligatory in languages such as English, the referent of a bare NP can be interpreted several ways. For example, in sentence (1), the bare NP chayk ‘book’ in object position can have either an indefinite or a definite referent.
(1) Susan-i chayk-ul ilk-ess-ta.
   Susan-NOM book-ACC read-PST-DECL
   ‘Susan read an/the book.’

This sentence can mean ‘Susan read a book,’ or if the referent of the NP is familiar to both speaker and hearer, it can mean ‘Susan read the book.’

Korean demonstratives such as ku ‘that’\(^{10}\) are used to mark the definiteness of NPs more clearly or to stress the referent of the NP as in the following.

(2) Susan-i ku chayk-ul ilk-ess-ta.
    Susan-NOM that book-ACC read-PST-DECL
    ‘Susan read that book.’

Bare NPs in Korean can also be ambiguous with respect to the number of referents due to the fact that the plural marker -\(tul\) is frequently omitted except when the co-occurring NP is preceded by a demonstrative such as ku (Sohn 1999:349). For example, the NP chayk in the sentence (1) can be interpreted as ‘some books’ or ‘the books’ in addition to ‘a/the book.’

Lee (1995) proposes that bare NPs in Korean can be interpreted as generic NPs when they are used with a topic-marker -\(un/nun\) or are marked by a nominative case particle, which is associated with focus and exhaustive listing as in the following examples.

(3) Denotation of generic referents
   a. With a topic-marker
      Haksayng-un cengcikha-ta.
      student-TOP honest-DECL
      ‘As for students, they are honest.’

\(^{10}\) This demonstrative is also a deictic that contrasts with \(i\) ‘this’ and \(ce\) ‘that (over there)’ to express spatial distinction.
b. With a nominative case particle (focus/exhaustive listing)
Haksayng-i cengcikha-ta.
student-NOM honest-DECL
‘It is students that are honest.’

In (3a) and (3b), haksayng ‘student’ can denote a generic class instead of referring to a specific individual.

3.2 Research questions

This study (Experiment 4) explores the following research questions:

1. How do Korean-speaking children and adults interpret a numerically quantified NP pattern in comparison to a bare NP in object position of negated sentences?

2. How do children’s interpretations compare to those of adults?

Given that bare NPs in Korean have complications with respect to definiteness and number-marking, I predict that interpretive preferences in negative sentences containing bare NPs will be different from those of sentences containing numerically quantified NP patterns.

3.3 Method

3.3.1 Participants

Thirty-two monolingual children (13 boys and 19 girls) and 20 adult controls participated in the experiment. The children, who were recruited from a kindergarten in Korea, included 14 four-year-olds and 18 five-year-olds (mean age 5;0). Two children (one four-year-old and one five-year-old) were excluded for data analysis because their accuracy on filler items which required unambiguously true or false responses was below 75%.
3.3.2 Procedure

A Truth Value Judgment Task (TVJT) was employed. The participants watched illustrated stories via Microsoft Office PowerPoint slides. At the end of each story, they listened to and judged the truth of pre-recorded statements containing target scopal patterns, delivered by a puppet. The participants were systematically asked to provide a reason why they thought the statement was true or false. The child participants were tested individually in two separate sessions with an interval of a week while the adult participants were tested in a single session in a group of five people. The children took approximately one hour in total to complete the two sessions while the entire session took approximately 35 minutes for the adult controls.

3.3.3 Materials

Four conditions were created based on two independent variables: the type of NP (i.e., bare NP and numerically quantified NP) and the type of a context (i.e., \( \text{not} > \text{two} \) context and \( \text{two} > \text{not} \) context). As seen in Table 3.1, target sentences in Conditions 1 and 3 contained bare NPs in object position with no numerals or classifiers. In contrast, in Conditions 2 and 4, numerically quantified NP patterns were used in object position (see Table 3.2).

<table>
<thead>
<tr>
<th>Korean sentences</th>
<th>English translations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holangi-nun moca-lul an kul-yess-e.</td>
<td>‘Tigger didn’t draw a cap.’</td>
</tr>
<tr>
<td>Kom-un yachay-lul an ssel-ess-e.</td>
<td>‘Pooh didn’t slice a vegetable.’</td>
</tr>
<tr>
<td>Oli-nun cepsi-lul an takk-ass-e.</td>
<td>‘Donald didn’t wash a plate.’</td>
</tr>
<tr>
<td>Mary-nun cho-lul an khye-ss-e.</td>
<td>‘Mary didn’t light a candle.’</td>
</tr>
<tr>
<td>Tom-un yokwuluthu-lul an mas-yess-e.</td>
<td>‘Tom didn’t drink a yogurt drink.’</td>
</tr>
<tr>
<td>Dora-nun panana-lul an mek-ess-e.</td>
<td>‘Dora didn’t eat a banana.’</td>
</tr>
<tr>
<td>Dora-nun phwungsen-ul an thettul-yess-e.</td>
<td>‘Dora didn’t burst a balloon.’</td>
</tr>
<tr>
<td>Mary-nun mal-ul an tha-ss-e.</td>
<td>‘Mary didn’t ride a horse.’</td>
</tr>
</tbody>
</table>
Table 3.1. (Continued) A List of Test Sentences Containing Bare NPs in Object Position

<table>
<thead>
<tr>
<th>Korean sentences</th>
<th>English translations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tom-un mwulkoki-lul an sa-ss-e.</td>
<td>‘Tom didn’t buy fish.’</td>
</tr>
<tr>
<td>Dora-nun cokay-lul an cwu-wess-e.</td>
<td>‘Dora didn’t pick up a seashell.’</td>
</tr>
<tr>
<td>Tom-un kay-lul an manc-yess-e.</td>
<td>‘Tom didn’t pat a dog.’</td>
</tr>
<tr>
<td>Holangi-nun pihayngki-lul an nall-yess-e.</td>
<td>‘Tigger didn’t fly an airplane.’</td>
</tr>
<tr>
<td>Kom-un yenphil-ul an kkakk-ass-e.</td>
<td>‘Pooh didn’t sharpen a pencil.’</td>
</tr>
<tr>
<td>Tom-un sinpal-ul an takk-ass-e.</td>
<td>‘Tom didn’t shine a pair of shoes.’</td>
</tr>
<tr>
<td>Tom-un kulimcokak-ul an chac-ass-e.</td>
<td>‘Tom didn’t find a picture piece.’</td>
</tr>
<tr>
<td>Holangi-nun chayk-ul an ilk-ess-e.</td>
<td>‘Tigger didn’t read a book.’</td>
</tr>
</tbody>
</table>

Table 3.2. A List of Test Sentences Containing Numerically Quantified NP Patterns in Object Position

<table>
<thead>
<tr>
<th>Korean sentences</th>
<th>English translations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holangi-nun moc-a-lul twu kay an kul-yess-e.</td>
<td>‘Tigger didn’t draw two caps.’</td>
</tr>
<tr>
<td>Kom-un yachay-lul twu kay an ssel-ess-e.</td>
<td>‘Pooh didn’t slice two vegetables.’</td>
</tr>
<tr>
<td>Oli-nun cepsi-lul twu kay an takk-ass-e.</td>
<td>‘Donald didn’t wash two plates.’</td>
</tr>
<tr>
<td>Mary-nun cho-lul twu kay an khye-ss-e.</td>
<td>‘Mary didn’t light two candles.’</td>
</tr>
<tr>
<td>Tom-un yokwuluthu-lul twu kay an mas-yess-e.</td>
<td>‘Tom didn’t drink two yogurt drinks.’</td>
</tr>
<tr>
<td>Dora-nun panana-lul twu kay an mek-ess-e.</td>
<td>‘Dora didn’t eat two bananas.’</td>
</tr>
<tr>
<td>Dora-nun phwungsen-ul twu kay an thettul-yess-e.</td>
<td>‘Dora didn’t burst two balloons.’</td>
</tr>
<tr>
<td>Mary-nun mal-ul twu mali an tha-ss-e.</td>
<td>‘Mary didn’t ride two horses.’</td>
</tr>
<tr>
<td>Tom-un mwulkoki-lul twu mali an sa-ss-e.</td>
<td>‘Tom didn’t buy two balloons.’</td>
</tr>
<tr>
<td>Dora-nun cokay-lul twu mali an cwu-wess-e.</td>
<td>‘Dora didn’t pick up two seashells.’</td>
</tr>
<tr>
<td>Tom-un kay-lul twu mali an manc-yess-e.</td>
<td>‘Tom didn’t pat two dogs.’</td>
</tr>
<tr>
<td>Holangi-nun pihayngki-lul twu kaw an nall-yess-e.</td>
<td>‘Tigger didn’t fly two airplanes.’</td>
</tr>
<tr>
<td>Kom-un yenphil-ul twu kaw an kkakk-ass-e.</td>
<td>‘Pooh didn’t sharpen two pencils.’</td>
</tr>
<tr>
<td>Tom-un sinpal-ul twu kaw an takk-ass-e.</td>
<td>‘Tom didn’t shine two pairs of shoes.’</td>
</tr>
<tr>
<td>Tom-un kulimcokak-ul twu kaw an chac-ass-e.</td>
<td>‘Tom didn’t find two picture pieces.’</td>
</tr>
<tr>
<td>Holangi-nun chayk-ul twu kaw an ilk-ess-e.</td>
<td>‘Tigger didn’t read two books.’</td>
</tr>
</tbody>
</table>

Note. In Korean, the noun sinpal ‘shoe’ is usually associated with the classifier khyelley. However, in this study, the more general classifier kay was used because khyelley was regarded as difficult for 4- or 5-year-old children.

The type of NP was manipulated across experimental items in order to explore the possible role of numerals and/or classifiers in the interpretive preferences reported in the preceding chapter.
The type of context was manipulated as another independent variable for two purposes. First, this variable was designed to examine whether the interpretive preferences found in the experiment on numerically quantified NP patterns reported in the preceding chapter are repeated in the present experiment. Even though there is a slight difference in the plot of the stories between the present experiment and the experiment reported in the preceding chapter, the number of unaffected target object(s) in the two types of contexts remains consistent. In one context (i.e., not > two context), one of two objects was unaffected while in the other context (i.e., two > not context), two of four objects were unaffected. Second, by varying the number of unaffected target objects in the two contexts we hoped to uncover insights into how Korean speakers interpret the singular form of a bare NP. For example, in the not > two context, the main character performed an action on one of the two objects. By contrast, in the two > not context, the main character acted on two of the four objects leaving two objects unaffected. By comparing the participants’ responses in these two contexts, it is possible to examine whether the singular form of a bare NP can denote a singular referent and/or plural referents, as claimed in the literature.

In the context stories for Conditions 1 and 2, the main character ends up performing the target action on only one of two objects, either in a situation where s/he was expected to perform the action on both objects or in a situation where another character succeeded in performing the action on both objects. By contrast, the context stories for Conditions 3 and 4 were constructed in such a way that the main character ends up not performing the intended action on two of four objects. A sample item is given below.
Conditions 1 and 2

Pooh and Tigger make paper airplanes in class together. The teacher tells them to fly two airplanes each so that they can check whether the airplanes are well made. They are very excited and tell the teacher that they will. Pooh flies two airplanes. They fly very well. Tigger first flies one airplane. It flies well. Then, he grabs another airplane. But when he is about to fly it, he finds that it has a big hole in it. So he doesn’t fly it (see Figure 3.1).

Experiment: This is a story about Pooh and Tigger. Now, let’s ask the Puppet to tell us anything that he remembers about the story. Please listen to the Puppet’s statement carefully and tell me whether it is true or false.

Condition 1: Bare NP

Test sentence:
Holangi-nun pihayngki-lul an nall-yess-e.
Tigger-TOP airplane-ACC NEG fly-PST-DECL
‘Tigger didn’t fly an airplane.’

‘Any’ reading of the NP (the not > a reading)\(^1\):
‘Tigger didn’t fly any airplane.’ (False)
‘Particular’ reading of the NP (the a > not reading):
‘There is a (particular) airplane that Tigger didn’t fly.’ (True)

\(^1\)To compare the interpretations of bare NPs and numerically quantified NP patterns, the not > a and not > two interpretations are referred to as the ‘any’ interpretation, while the a > not and two > not interpretations are called the ‘particular’ interpretation.
Condition 2: Numerically quantified NP

Test sentence:
Holangi-nun pihayngki-lul twu kay an nall-yess-e.
Tigger-TOP airplane-ACC two CL NEG fly-PST-DECL
‘Tigger didn’t fly two airplanes.’

‘Any two’ reading of the NP (the not > two reading):
‘It is not the case that Tigger flew (any) two airplanes.’ (True)
‘Particular two’ reading of the NP (the two > not reading):
‘There are two (particular) airplanes that Tigger didn’t fly.’ (False)

In this context story, Tigger is expected to fly two airplanes because the teacher tells him to do so. However, he ends up flying only one airplane whereas his friend Pooh flies two airplanes. In Condition 1, the sentence Holangi-nun pihayngki-lul an nall-yess-e ‘Tigger didn’t fly an airplane’ is false on the ‘any’ reading of the NP because Tigger did fly one airplane. However, the sentence is true on the ‘particular’ reading of the NP because there is an airplane which Tigger didn’t fly. In Condition 2, the sentence Holangi-nun pihayngki-lul twu kay an nall-yess-e ‘Tigger didn’t fly two airplanes’ is true on the ‘any two’ reading of the NP because it is not the case that Tigger flew two airplanes: He flew just one airplane. In contrast, the sentence is false on the ‘particular two’ reading of the NP because it is not the case that there are two particular airplanes that Tigger didn’t fly: There is only one airplane that Tigger didn’t fly.

As illustrated below, Conditions 3 and 4 used a different context story from the one for Conditions 1 and 2:
**Conditions 3 and 4**

*<Context story> (English translation)*

Pooh and Tigger make things with paper in class together. Pooh makes a circle and triangles. Tigger makes four paper airplanes with a lot of excitement. He wants to fly them. He flies one of them. It flies well. Then, he flies the second airplane. It flies well too. Then, he grabs the other two airplanes. When he is about to fly them, it occurs to him that his friend loves flying paper airplanes. He decides to give the airplanes to his friend. So he doesn’t fly them (see Figure 3.2).

<table>
<thead>
<tr>
<th>Scene 1</th>
<th>Scene 2</th>
<th>Scene 3</th>
<th>Scene 4</th>
</tr>
</thead>
</table>

FIGURE 3.2. Context for Conditions 3 & 4

Experimenter: same as the one used in Conditions 1 & 2

**Condition 3: Bare NP**

Test sentence:

Holangi -nun pihayngki-lul an nall-yess-e.

Tigger-TOP airplane-ACC NEG fly-PST-DECL

‘Tigger didn’t fly an airplane.’

‘Any’ reading of the NP (the not > a reading):

‘Tigger didn’t fly any airplane.’ (False)

‘Particular’ reading of the NP (the a > not reading):

‘There are (particular) airplanes that Tigger didn’t fly.’ (True)

---

12 In Korean, the plural marker *tul* is usually omitted. Therefore, the singular form of the NP *pihayngki* may be interpreted as a plural.
**Condition 4: Numerically quantified NP**

Test sentence:

Holangi-nun pihayngki-lul twu kay an nall-yess-e.
Tigger-TOP airplane-ACC two CL NEG fly-PST-DECL
‘Tigger didn’t fly two airplanes.’

‘Any two’ reading of the NP (the not > two reading):
‘It is not the case that Tigger flew (any) two airplanes.’ (False)

‘Particular two’ reading of the NP (the two > not reading):
‘There are two (particular) airplanes that Tigger didn’t fly.’ (True)

In this story, Tigger flies only two of the four airplanes that he has made. In Condition 3, the target sentence containing a bare NP is false on the ‘any’ reading of the NP because Tigger flew two of the airplanes. In contrast, the sentence could be true on the ‘particular’ reading of the NP if the noun pihayngki ‘airplane’ is interpreted as a plural noun.

As in Condition 3, the target sentence containing a numerically quantified NP pattern in Condition 4 is false on the ‘any two’ reading of the NP because Tigger did in fact fly two airplanes. However, it is true on the ‘particular two’ reading of the NP because there are two particular airplanes that Tigger didn’t fly.

For each condition, four items were created. In total, 16 experimental items were included along with two warm-up and 17 filler items. Fillers consisted of affirmative sentences containing either quantifiers or bare nominals, and negated sentences containing universal quantifiers (see Appendix C for a full list of test and filler sentences in Korean). Each participant was tested on all of the conditions and was given all of the items in such a way that each item was provided only in one of the conditions.
3.4 Results

To compare the interpretations of numerically quantified NP patterns and bare NPs, the proportions of responses accepting the ‘any’ reading (i.e., the not > two and not > a readings) and of responses accepting the ‘particular’ reading (i.e., the two > not and a > not readings) were calculated. The results from the adults for numerically quantified NP patterns and bare NPs will be presented first and the results from the child participants for numerically quantified NP patterns and bare NPs will follow.

As shown in Table 3.3, the adult group assigned the ‘particular two’ reading to numerically quantified NP patterns in the object position of negated sentences 45% of the time in Condition 2 while accepting it 83% of the time in Condition 4. In the case of bare NPs, the adult participants tended to assign the ‘particular’ reading far less frequently: They accessed this reading of the NP 21% of the time in Condition 1 and 8% of the time in Condition 3 (see Table 3.4). For statistical analysis, the proportions of responses accepting the ‘particular’ reading of the NP were entered in a repeated-measures ANOVA with the type of NP and the type of context as within-participant factors ($F_1$) and within-item factors ($F_2$). The analysis revealed a significant main effect of the NP type on the proportion of responses accepting the ‘particular’ interpretation ($F_1(1,19) = 46.70, p < .05; F_2(1,15) = 65.79, p < .05$). In addition, a significant main effect of context on the proportion of responses accepting the ‘particular’ interpretation ($F_1(1,19) = 7.63, p < .05; F_2(1,15) = 13.85, p < .05$) and a significant interaction effect between NP type and context ($F_1(1,19) = 22.51, p < .05; F_2(1,15) = 34.31, p < .05$) were found.
Table 3.3. Mean Proportion of Responses to Target Interpretations for Numerically Quantified NP Patterns for Adult Controls

<table>
<thead>
<tr>
<th>Condition</th>
<th>Context</th>
<th>Interpretations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>‘Particular two’ interpretation (two &gt; not reading)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Any two’ interpretation (not &gt; two reading)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(e.g., ‘There are two particular airplanes that Tigger didn’t fly.’)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(e.g., ‘It is not the case that Tigger flew any two airplanes.’)</td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>1 affected object &amp; 1 unaffected object</td>
<td>0.45 (SD = 0.31)</td>
<td>0.55 (SD = 0.31)</td>
</tr>
<tr>
<td>(k = 4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>2 affected objects &amp; 2 unaffected objects</td>
<td>0.83 (SD = 0.27)</td>
<td>0.17 (SD = 0.27)</td>
</tr>
<tr>
<td>(k = 4)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. \( k \) represents the number of experimental items per condition.

Table 3.4. Mean Proportion of Responses to Target Interpretations for Bare NPs for Adult Controls

<table>
<thead>
<tr>
<th>Condition</th>
<th>Context</th>
<th>Interpretations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>‘Particular’ interpretation (a &gt; not reading)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Any’ interpretation (not &gt; a reading)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(e.g., ‘There’s a particular airplane/particular airplanes that Tigger didn’t fly.’)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(e.g., ‘Tigger didn’t fly any airplane.’)</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>1 affected object &amp; 1 unaffected object</td>
<td>0.21 (SD = 0.26)</td>
<td>0.79 (SD = 0.26)</td>
</tr>
<tr>
<td>(k = 4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>2 affected objects &amp; 2 unaffected objects</td>
<td>0.08 (SD = 0.12)</td>
<td>0.92 (SD = 0.12)</td>
</tr>
<tr>
<td>(k = 4)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. \( k \) represents the number of experimental items per condition.
Now let us consider the performance of the child participants. The child participants preferred the ‘particular two’ reading for numerically quantified NP patterns, accepting it 68% and 69% of the time in Conditions 2 and 4, respectively (see Table 3.5). On the other hand, as seen in Table 3.6, the child participants accepted the ‘particular’ reading 47% of the time in both Condition 1 and Condition 3, where the NPs were bare. Statistical analysis revealed a significant main effect of the NP type on the proportion of responses accepting the ‘particular’ interpretation \( (F_1(1, 29) = 9.58, p < .05; F_2(1, 15) = 19.42, p < .05) \). However, neither a main effect of context nor an interaction effect was found \( (F_1(1, 29) = 0.01, p > .05; F_2(1, 15) = 0.01, p > .05; F_1(1, 29) = 0.01, p > .05; F_2(1, 15) = 0.01, p > .05) \).

### Table 3.5. Mean Proportion of Responses to Target Interpretations for Numerically Quantified NP Patterns for Children

<table>
<thead>
<tr>
<th>Condition</th>
<th>Context</th>
<th>Interpretations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>‘Particular two’ interpretation ( (two &gt; not ) reading) (e.g., ‘There are two particular airplanes that Tigger didn’t fly.’)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Any two’ interpretation ( (not &gt; two ) reading) (e.g., ‘It is not the case that Tigger flew any two airplanes.’)</td>
<td></td>
</tr>
<tr>
<td>C2 ( (k = 4) )</td>
<td>1 affected object &amp; 1 unaffected object</td>
<td>0.68 ( (SD = 0.34) )</td>
<td>0.32 ( (SD = 0.34) )</td>
</tr>
<tr>
<td>C4 ( (k = 4) )</td>
<td>2 affected objects &amp; 2 unaffected objects</td>
<td>0.69 ( (SD = 0.28) )</td>
<td>0.31 ( (SD = 0.28) )</td>
</tr>
</tbody>
</table>

Note. \( k \) represents the number of experimental items per condition.
Table 3.6. Mean Proportion of Responses Accepting Target Interpretations for Bare NPs for Children

<table>
<thead>
<tr>
<th>Condition</th>
<th>Context</th>
<th>Interpretations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>‘Particular’ interpretation</td>
<td>‘Any’ interpretation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(a &gt; \text{not reading})</td>
<td>(\text{not} &gt; a) reading</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(e.g., ‘There’s a particular airplane/particular airplanes that Tigger didn’t fly.’)</td>
<td>(e.g., ‘Tigger didn’t fly any airplane.’)</td>
</tr>
<tr>
<td>C1 ((k = 4))</td>
<td>1 affected object &amp; 1 unaffected object</td>
<td>0.47 ((SD = 0.31)) &amp; 0.53 ((SD = 0.31))</td>
<td>1.00</td>
</tr>
<tr>
<td>C3 ((k = 4))</td>
<td>2 affected objects &amp; 2 unaffected objects</td>
<td>0.47 ((SD = 0.37)) &amp; 0.53 ((SD = 0.37))</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. \(k\) represents the number of experimental items per condition.

The analysis of the justifications for responses provided by the participants revealed that they provided ‘true’ and ‘false’ responses in each of the four conditions for the right reasons.

In sum, the Korean adults and children manifested similarities and differences in their interpretive patterns for numerically quantified NP patterns and bare NPs in negative sentences. The results are summarized in Table 3.7.
Table 3.7. Interpretive Patterns for Numerically Quantified NP Patterns and Bare NPs in Negative Sentences: Adults and Children

<table>
<thead>
<tr>
<th>Interpretation of numerically quantified NP patterns &amp; bare NPs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Similarities between two groups</strong></td>
</tr>
<tr>
<td><strong>Differences between two groups</strong></td>
</tr>
</tbody>
</table>

Both groups tended to assign the ‘particular’ reading to numerically quantified NP patterns more frequently than to bare NPs in negative sentences. However, the results revealed differences between the two groups in their interpretive patterns for bare NPs: The adult group accepted the ‘particular’ reading far less frequently than the child group,\(^\text{13}\) demonstrating a preference for the ‘any’ reading of bare NPs in negative sentences.

### 3.5 Discussion

The results revealed that both children and adults tended to assign the ‘particular’ reading to numerically quantified NPs more frequently than to bare NPs in object position in negative sentences. The adult group made a particularly clear distinction between the two types of NPs: They preferred the ‘particular’ reading for numerically quantified NP patterns and they strongly favored the ‘any’ reading for bare NPs. Like the adult group, the child group assigned the ‘particular’ reading more

\(^\text{13}\) The results from a separate repeated-measures ANOVA with two within-participant factors (i.e., the type of NP and the type of context) and one between-participant factor (i.e., group: children vs. adults) revealed a significant interaction effect between the type of NP and group on the proportion of responses accepting the ‘particular’ interpretation ($F(1, 48) = 6.69, p < .05$).
frequently to numerically quantified NP patterns, but assigned both readings to bare NPs at approximately equal rates.

Our findings seem to support the idea that numerals and/or classifiers play a role in Korean speakers’ preference for the ‘particular’ interpretation (i.e., the \(\text{two} > \text{not}\) interpretation) in negative sentences containing numerically quantified NP patterns. This interpretation seems to be the default interpretation when there are no special contextual factors such as a preceding affirmative sentence carrying contrastive information, as reported in the preceding chapter.

This leads to an obvious question: Why is the ‘particular’ interpretation the default for numerically quantified NP patterns occurring in object position? It may be that the particular type of numeral construction (i.e., noun-accusative case numeral-classifier) included in our target sentences interacts with accompanying contexts to contribute to this interpretive preference. The type of a numeral construction is repeated in (4).

(4) Holangi-nun pihayngki-lul twu kay an nall-yess-e.
    Tigger-TOP airplane-ACC two CL NEG fly-PST-DECL
    ‘Tigger didn’t fly two airplanes.’

As I will explain in more detail in Chapter 5, the presence of a numeral and/or classifier preceded by an accusative-marked NP may encourage an interpretation in which the referents of the NP are taken to be members of a set of objects. Moreover, the particular contexts used for target sentences in our experiments, which highlight individual entities, may make it easier for the referents of the NP to be associated with a pre-established set of objects available in the discourse. Thus, the accusative-marked NP pattern in (4) may be taken to denote the two particular airplanes established in the discourse. More details of this idea will be discussed in Chapter 5.
As for the interpretation of bare NPs, it is not clear why the children differed from the adult group in accepting the ‘particular’ reading and ‘any’ reading at similar rates. One possible factor might be the frequency of mapping between form and meaning in the input. In order to examine the distribution and frequency of bare NPs in the input with respect to interpretive preferences in L1 Korean, I conducted a small-scale analysis of adult-to-adult speech from the Sejong corpus. The main goal of this analysis was to investigate which scopal interpretation adult native speakers of Korean assign to bare NPs in object position. Although adult-to-adult speech obviously differs in significant ways from adult-to-child speech, it may nonetheless be worthwhile to consider the use of scope in that database with a view to at least estimating the likely input for children, given the absence of child-directed speech corpora for Korean.

The spoken data in the Sejong corpus consists of transcripts of TV talk shows, soap operas and interviews from newspaper articles, containing a total of approximately 885,297 words. For the purposes of my analysis, bare NPs were defined as accusative-marked common nouns which do not occur with modifier phrases or clauses. For the sake of convenience, ten nouns were selected from the ones used in the experimental materials for this dissertation and their distributional patterns were analyzed.

The NPs were first classified into definites and indefinites. The indefinite cases were then coded as having either the ‘particular’ interpretation or the ‘any’ interpretation based on the following criteria.
(5) Definite use of bare NPs

An NP is coded as being used in a definite sense if the referent denoted by the NP is accessible to speaker and addressee: The referent of the NP has been introduced in the previous discourse.

(6) Indefinite use of bare NPs

a. ‘Particular’ interpretation

An NP is coded as having the ‘particular’ interpretation if the referent denoted by the NP is not pre-established in the discourse for the addressee and if the identity of the referent denoted by the NP could be determinable in principle from the context and/or background information.

b. ‘Any’ interpretation

An NP is coded as having the ‘any’ interpretation if the referent denoted by the NP is not pre-established in the discourse for the addressee and if the identity of the potential referent denoted by the NP is in principle indeterminable.

I found a total of 77 bare NPs, 76 cases of which appeared in affirmative sentences. Among these, 20 cases were classified as definites and 57 cases as indefinites. As summarized in Table 3.8, for the indefinite cases, the ‘any’ interpretation was used more frequently than the ‘particular’ interpretation (65% for ‘any’ interpretation and 35% for ‘particular’ interpretation).

<table>
<thead>
<tr>
<th>Table 3.8. The Proportion of the ‘Particular’ and ‘Any’ Interpretations for Indefinite Bare NPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Particular’ interpretation</td>
</tr>
<tr>
<td>Indefinite bare NPs</td>
</tr>
</tbody>
</table>
Example sentences illustrating the definite and indefinite cases and the interpretations for the indefinite cases are given below.

(7) Bare NPs

a. Definite use of bare NPs

Ku cwuin-i chayk-ul tasi ppop-te-la-kwu-yo.
that owner-NOM book-ACC again pick out-RT-DECL
‘The owner of the bookstore picked out a book again.’

Na-hantey chayk-ul cwu-myense,
me- to book-ACC give-while
‘While he was giving the book to me,’

Ne ike kacyeka-se po-la-ko malh-ayss-eyo.
you this take-and read-IM-QT say-PST-DECL
‘He told me to take this book and read it.’

b. Indefinite use of bare NPs: ‘Particular’ interpretation

this time book-ACC publish-AH-PST-APP-DECL Kim Hye-Ja-GEN low voice
‘This time, you have published a book. Kim Hye-Ja’s low voice.’

Cey-ka i chayk-ul ilk-ko myech kaci nukki-n-key iss-eyo.
I-NOM this book-ACC read-and several kind feel-RL-thing have-DECL
‘I read this book and have several things to experience.’

c. Indefinite use of bare NPs: ‘Any’ interpretation

Cenyek-ey-nun enni-tul-kwa hamkkey TV-lul po-kena
evening-in sister-PL-with together TV-ACC watch-or
‘In the evening, I watch TV with my sisters or…’

chayk-ul ilk-sup-ni-ta.
book-ACC read-DECL
‘… read a book.’

Now let us consider whether the frequency of these interpretations in the input can be related to the interpretive preferences found in L1 Korean. The analysis of the adult-directed speech reveals that indefinite bare NPs in object position in affirmative sentences are used more frequently in the ‘any’ sense. Combined with the findings of our experiment, the results suggest that the ‘any’ interpretation is the default for indefinite
bare NPs in object position regardless of the type of sentences in which they appear. This is compatible with a universal tendency concerning the interpretation of NPs: Comrie (1989) notes that in the most natural type of a transitive sentence, the subject is high in animacy and definiteness while the object is lower in animacy and definiteness. Therefore, the NPs in subject position are more likely to be human and definite whereas NPs in object position are more likely to be inanimate and indefinite. Furthermore, indefinite NPs with a non-specific interpretation are lower in prominence than those with a specific interpretation, and therefore more often in object position. The interpretive preference for the ‘any’ interpretation of the adults who participated in the present study reflects the universal tendency with respect to the interpretation of object NPs.

What still remains unclear is why Korean-speaking children assign the ‘any’ and ‘particular’ interpretations to bare object NPs in negative sentences at similar rates even though the mapping between the NP type and the ‘any’ interpretation is more likely to occur in the input according to the analysis of the adult directed speech. One possibility is that some of the child participants in our experiment paid more attention to the last event of the story in which an unaffected entity or entities were introduced, and interpreted a bare NP in the ‘particular’ sense so that they associated the referent of the NP with the unaffected entity or entities introduced at the end. However, further research needs to be conducted to test the plausibility of this idea and to examine whether other factors are involved in children’s interpretive patterns with respect to bare NPs in object position.
CHAPTER 4. SCOPE INTERPRETATION IN L2 ENGLISH

4.1 Previous research

Several studies have examined second language learners’ knowledge of scope-related contrasts in their target language (Dekydtspotter et al. 1999, 2001, Lee, Yip & Wang 1999, Marsden 2003, 2004, 2005, among others). These studies explore how second language learners (L2 learners) interpret infrequently used target constructions in the target language in comparison to native speakers. For example, Dekydtspotter et al. (1999, 2001) examined the interpretation of continuous and discontinuous *combien* ‘how many’ constructions in English-French interlanguage. Sample test items include:

(1) Continuous construction: ambiguous

*Combien de livres* est-ce que tous les étudiants lisent?
how many of books is it that all the students read
‘How many books do all the students read?’

a. Indefinite NP wide scope interpretation
   ‘What is the number of the books that all the students read in common?’

b. Indefinite NP narrow scope interpretation (distributive reading)
   ‘For each student, how many books does that student read?’

(2) Discontinuous construction: unambiguous

*Combien* est-ce que tous les étudiants lisent *de livres*?
how many is it that all the students read of books

a. Indefinite NP narrow scope interpretation (distributive reading)
   ‘For each student, how many books does that student read?’

In French, the continuous *combien* construction allows both indefinite NP wide scope and indefinite NP narrow scope interpretations while the discontinuous *combien* construction only allows the indefinite NP narrow scope interpretation. Dekydtspotter et al. (1999, 2001) found that advanced English speaking L2 learners of French know the
contrast between the continuous and discontinuous *com bien* constructions just as native speakers of French do, while lower proficiency learners don’t make that contrast.

Marsden (2003, 2004, 2005) investigated how non-native speakers of Japanese interpret doubly quantified sentences in comparison to native speakers of Japanese. She examined whether L2 learners of Japanese could acquire the target-like knowledge of the interpretive contrasts even when those contrasts are underdetermined in the input. Furthermore, by focusing on three different L1 groups (i.e., Chinese, English, and Korean), she examined whether L1 knowledge can influence scope interpretation in the L2. The four types of test sentences she considered are as follows:

(3) Type 1: Subject *dareka* ‘someone’ and direct object *dono N-mo* ‘every N’

Dareka-ga dono neko-mo nadeta.

someone-NOM every cat-also stroked.

‘Someone stroked every cat.’

a. Subject wide scope interpretation
‘There is someone who stroked every cat.’

b. Object wide scope interpretation
‘For every cat, there is someone who stroked it.’

(4) Type 2: Subject *dareka* ‘someone’ and direct object *subete-no N* ‘all the N’

Dareka-ga subete-no suutukeesu-o hakonda.

someone-NOM all-GEN suitcase-ACC carried.

‘Someone carried all the suitcases.’

a. Subject wide scope interpretation
‘There is someone who carried all the suitcases.’

b. Object wide scope interpretation
‘For each of the suitcases, there is someone who carried it.’

(5) Type 3: Subject Number + N and direct object *dono N-mo* ‘every N’

Sannin-no onnanoko-ga dono tako-mo ageta.

three-GEN girl-NOM every kite-also flew

‘Three girls flew every kite.’
a. Subject wide scope interpretation
   ‘There are three girls who flew every kite.’

b. Object wide scope interpretation
   ‘For every kite, there are three girls who flew it.’

(6) Type 4: Subject Number + N and direct object subete-no N ‘all the N’
   Hutari-no onnanoko-ga subete-no mado-o aratta.
   two-GEN girl-NOM all-GEN window-ACC washed.
   ‘Two girls washed all the windows.’

a. Subject wide scope interpretation
   ‘There are two girls who washed all the windows.’

b. Object wide scope interpretation
   ‘For each of the windows, there are two girls who washed it.’

The subject wide scope interpretation is allowed in each of the four types of sentences in Japanese, whereas the object wide scope interpretation is not allowed in the canonical SOV word order. The corresponding Chinese and Korean sentences are interpreted in a similar way, showing scope rigidity in which only the subject wide scope interpretation is allowed (Aoun & Li 1993, Kim 1989). For English, in contrast, the sentences containing every in object position can be interpreted in two ways (Aoun & Li 1993, Beghelli & Stowell 1997, Hornstein 1995, May 1977, 1985): For example, the sentence in (3) can be paraphrased as ‘there is someone who stroked every cat.’ (i.e., subject wide scope interpretation) and ‘for every cat, there is someone who stroked it.’ (i.e., object wide scope interpretation). In contrast, target sentences containing all in object position freely allow the subject wide scope interpretation while the object wide scope interpretation is far less accessible (Ioup 1975, Lee, Yip, & Wang 1999).

Marsden investigated whether L2 learners of Japanese are aware of scope rigidity in Japanese by employing a picture-sentence matching task. She found that English-
speaking L2 learners showed a developmental path with respect to scope interpretation that differed from that of Chinese-speaking and Korean-speaking L2 learners. Regardless of proficiency levels, Chinese-speaking and Korean-speaking L2 groups rejected the object wide scope interpretation while accepting the subject wide scope interpretation on all types of the test sentences. However, the English-speaking L2 learners showed a developmental divergence: While the subject wide scope interpretation was highly accessible in the four types of target sentences, the object wide scope interpretation tended to be accepted by lower proficiency learners, which was similar to the interpretive patterns of native speakers of English. In contrast, higher proficiency learners tended to reject that interpretation. The analysis of individual performance revealed that in the target sentences containing *dono N-mo* ‘every N’ in object position such as (3) and (5) above, three of nine high proficiency learners consistently accepted the object wide scope interpretation while the remaining six participants consistently rejected it, just as native speakers of Japanese do. Based on these results, Marsden claimed that L1 knowledge can play a role in scope interpretation in L2, and that even though acquisition of this type of scope phenomenon involves a poverty-of-the-stimulus problem, some L2 learners can overcome it and achieve target-like interpretation.

The studies introduced above deal with the second language learners’ knowledge of constraints on scope (i.e., knowledge of which interpretation is allowed and which is not allowed) in the target language. However, few studies have been conducted to investigate second language learners’ interpretive preferences in the relevant languages where the target constructions allow more than one interpretation. However, some recent research involving two typologically different languages, Korean and English, has
explored how L2 learners interpret scopally ambiguous sentences containing universally quantified noun phrases and negation.

O’Grady et al. (2009) examined scope interpretations of sentences containing the universal quantifier ‘all’ in object position and negation. By employing a written version of the TVJT, they investigated how 42 Korean speaking L2 learners of English interpret sentences such as the following.

(7) Tom didn’t fix all the computers.
   a. Full set interpretation (i.e., all > not reading)
      ‘Tom fixed none of the computers.’
   b. Partitioned set interpretation (i.e., not > all reading)
      ‘Tom fixed (just) some of the computers.’

The full set reading corresponds to the interpretation in which a universally quantified NP is interpreted outside the scope of negation. As the name suggests, on this interpretation, all members of the set available in the discourse behave alike with respect to some property. In sentence (7), for example, each and every computer introduced in the discourse is grouped together as a set and shares the property of not having been fixed by Tom. In contrast, the partitioned set reading corresponds to the interpretation in which the universally quantified NP is inside the scope of negation. On this interpretation, only part of the set relevant to the discourse shares a given property. For example, in sentence (7), not all the computers were fixed: Some computers were fixed while some computers were not.

The participants in O’Grady et al.’s study read stories favoring either the full set or the partitioned set reading accompanied by summary pictures. As they read each story, it was simultaneously presented orally by means of a pre-made recording. At the end of each story, the participants were asked to judge the truth of negated sentences containing
all the N in direct object position. In the context stories, three target objects were introduced. In the stories favoring the full set interpretation, none of the three objects was affected by the action that the main character performed whereas in the stories favoring the partitioned set interpretation, one of the target objects was affected. For example, in the story favoring the full set interpretation for the sample sentence (7) above, three broken computers were included, as illustrated below:

Tom is at his uncle’s repair shop. Tom’s uncle is about to go out for lunch. He asks Tom to fix three radios and three computers before he returns. Tom promises to do so.

Tom fixes the three radios easily.

Then, Tom examines the first computer. But, he can’t fix it. He decides to wait until his uncle comes back.

Then, Tom looks at the second computer. There is something wrong with the sound, but he can’t fix it.

Finally, Tom comes to the third computer. There is something wrong with the screen. He thinks that he can fix it quickly.

However, after Tom works on it for a while, he gives up.

Figure 4.1. Summary Picture for the Story Favoring the Full Set Interpretation

Consistent with the story, a summary picture was presented that depicted three broken computers. In contrast, for the story and summary picture favoring the partitioned set interpretation, there were two broken computers and one repaired computer.
In order to minimize the influence of the participants’ first language, the English version of the task was given one week prior to the Korean version of the task. The Korean counterpart of sentence (7) is as follows:

    Tom-NOM all computer-ACC fix-ci NEG-PST-DECL
    ‘Tom didn’t fix all the computers.’

In both the English and the Korean versions of the task, a total of 20 items were included, which consisted of eight experimental items, two practice items and 10 filler items.

According to O’Grady et al.’s findings, Korean-speaking L2 learners displayed a strong preference for the full set interpretation in the English version of the task. In addition to being accessed 93% of the time in contexts favoring it, the full set reading was also selected 72% of the time in contexts favoring the partitioned set interpretation. It thus had the effects of suppressing access to the partitioned set interpretation in those contexts, which ended up being accepted just 28% of the time.

The interpretive preferences for the Korean test items were very similar to the patterns found in English: The same group of participants accessed the full set interpretation more frequently than the partitioned set interpretation. Thus the full set interpretation was selected 97% of the time in contexts that favored it and 79% of the time in contexts that were supposed to support the partitioned set interpretation, which as a result was accepted just 21% of the time. Table 4.1 summarizes these findings.
Table 4.1. Proportion of “True” and “False” Responses in English and Korean

<table>
<thead>
<tr>
<th>Context favoring</th>
<th>Context favoring</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>the full set reading</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>English (L2)</td>
<td>93%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>Korean (L1)</td>
<td>97%</td>
<td>3%</td>
<td></td>
</tr>
</tbody>
</table>

As a baseline for L2 data, O’Grady et al. examined the interpretive preferences of six native English speakers for English. The results show that while both interpretations were allowed, the partitioned set interpretation was more accessible. It was accepted 100% of the time in contexts that favored it; in contrast, the full set reading was accessed just 67% of the time in contexts that supported it. In contrast to the native English group, the L2 group showed a strong preference for the full set interpretation which is also favored in L1 Korean.

In parallel with O’Grady et al.’s study, Lee (2009) conducted a series of on-line L2 studies on the comprehension of scopally ambiguous sentences containing negation and the universal quantifier *every* in subject and direct object position. By adding a phrase-by-phrase, non-cumulative, moving-window self-paced reading paradigm to the TVJT, she was able to explore how Korean-speaking L2 learners interpret scopally ambiguous sentences and at which point scope ambiguity occurs in on-line processing. She also examined whether there is a developmental divergence with respect to interpretive preferences and processing patterns. An English version of the task was administered first and a Korean version of the task was given to the same participants after an interval of approximately four weeks. Each version of the task included 24 experimental items and 48 filler items. Each item consisted of a target sentence preceded by a context story favoring either the full set or the partitioned set interpretations, and
participants were asked to judge the truth of the sentence against the preceding context.

The plot of each context story was similar to the one used in O’Grady et al. (2009). In the story favoring the full set reading, either none of the three characters performed a given action or none of the three objects was affected; in the story favoring the partitioned set reading, one of the three characters performed a given action or one of three objects was affected. Sample test sentences and context stories from her study are given below.

(9) *Every* in subject position

*Story favoring the full set reading>*
Mrs. Keenan and her three kids were enjoying the beautiful sunset while taking a walk in the park. Suddenly, many doves flocked to the park. Since the kids were afraid to come near them, they stepped back and watched other people feeding the doves from a distance.

*Story favoring the partitioned set reading>*
Mrs. Keenan and her three kids were enjoying the beautiful sunset while taking a walk in the park. Suddenly, many doves flocked to the park. Joy and Martina were afraid to come near them and they stepped back. However, Alfred remained there to feed bread crumbs to the doves.

Test sentence: Every kid didn’t feed the doves in the park.

(10) *Every* in object position

*Story favoring the full set reading>*
Last night Cindy worked late and came back home around the midnight. Right after she took a shower, the electric lights suddenly went out. She found three candles on the table near the bed. However, since she was so tired, she didn’t light the candles but went to sleep directly in the dark.

*Story favoring the partitioned set reading>*
Last night Cindy worked late and came back home around the midnight. Right after she took a shower, the electric lights suddenly went out. She found three candles on the table near the bed. She took out one candle and lit it. Then she started reading a novel until she fell asleep.

Test sentence: Cindy didn’t light every candle.

For sentences containing universally quantified NPs in subject position, data from 40 L2 learners (i.e., 20 participants per proficiency group) were analyzed while for
sentences with universally quantified NPs in object position, data from 36 L2 learners (i.e., 18 learners per proficiency group) were examined. In the case of the sentences containing every in subject position, the results revealed that both L2 groups showed similar interpretive preferences and processing patterns: They exhibited a preference for the full set interpretation (i.e., low proficiency group: 92.10% for the full set interpretation, 34.17% for the partitioned set interpretation; high proficiency group: 87.92% for the full set interpretation, 69.19% for the partitioned set interpretation). In addition, they read the target sentences more slowly, particularly at the NP in object position, and took longer to associate sentences with the less preferred partitioned set interpretation. These interpretive preferences and processing patterns were found to be similar to those of 24 native English speakers. Lee’s findings are summarized in Table 4.2.

<table>
<thead>
<tr>
<th>Table 4.2. Mean Percentage of “True” Responses in English (Quantified Subject)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td>Low proficiency group (n = 20)</td>
</tr>
<tr>
<td>High proficiency Group (n = 20)</td>
</tr>
<tr>
<td>Native English group (n = 24)</td>
</tr>
</tbody>
</table>

In the case of the sentences containing every in object position, the findings revealed that the low proficiency L2 group accepted the full set interpretation more frequently than the partitioned set interpretation (86.58% versus 37.51%). In addition, in assigning the partitioned set interpretation, they read the target sentences more slowly at the NP in object position and took longer to associate it with that interpretation. In
contrast, the high proficiency L2 group accepted both interpretations at similar frequency rates (78.53% and 75.17%, respectively) and there was no significant difference in reading times and judgment times for the target sentences between the two types of interpretations. While the interpretive preferences of the low proficiency group were similar to those found in L1 Korean, the high proficiency group showed a quite unique interpretive pattern. In comparison to these L2 learners, 24 native English speakers showed a preference for the partitioned set interpretation over the full set reading (90.63% versus 45.14%). Moreover, they read the target sentences more slowly at the NP in object position when assigning the full set interpretation and took longer to accept this interpretation. The mean acceptance rates for the target interpretations are summarized in Table 4.3.

<table>
<thead>
<tr>
<th>Group</th>
<th>Context favoring the full set reading</th>
<th>Context favoring the partitioned set reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low proficiency group</td>
<td>86.58% ( (SD = 14.61) )</td>
<td>37.51% ( (SD = 15.96) )</td>
</tr>
<tr>
<td>High proficiency Group</td>
<td>78.53% ( (SD = 15.93) )</td>
<td>75.17% ( (SD = 15.61) )</td>
</tr>
<tr>
<td>Native English group</td>
<td>45.14% ( (SD = 12.02) )</td>
<td>90.63% ( (SD = 9.30) )</td>
</tr>
</tbody>
</table>

The results from O’Grady et al.’s and Lee’s studies suggest that interpretive preferences manifested in L1 can have an influence on scope interpretation in L2, and that there may be a difference in interpretive preference patterns across proficiency levels. However, it is not clear from those results whether L2 learners can acquire target-like interpretive preferences. By extending the breadth of research on scope interpretation in second language acquisition, this study aims to explore how Korean-speaking L2 learners
of English comprehend scopally ambiguous sentences containing numerically quantified NPs and negation in English. The results from previous L1 studies in English and Korean show that English and Korean work differently with respect to scope interpretation. This raises the question of whether Korean-speaking L2 learners can attain target-like interpretive preferences given that mappings between those target constructions and their intended meanings are infrequent in the input. In the remainder of this chapter, I will endeavor to fill in a gap in the SLA literature by examining scope interpretation involving numeral quantifiers and negation.

**4.2 Research questions**

This study investigates the following research questions:

1. How do Korean-speaking learners of English comprehend scopally ambiguous sentences containing numerically quantified NPs and negation in their target language?

2. Are there developmental patterns in preferences for scope interpretation involving numerically quantified NPs and negation? In other words, are there any differences in interpretive preferences across proficiency levels?

3. How do Korean-speaking L2 learners’ interpretive preferences in their target language compare to those of their native language?

Experiment 5 explores scope ambiguity involving negation and numerically quantified NPs in subject position, while Experiment 6 examines scope interaction involving negation and numerically quantified NPs in object position.
4.3 Experiment 5

4.3.1 Method

4.3.1.1 Participants

A total of 80 college students participated in the experiment as learners of English as a second language. All of them were recruited from two institutions in Korea. Data from nine students were excluded from analysis: Three students performed poorly on filler items with accuracy rates of lower than 80%, five students didn’t complete one of the two tasks, and one student didn’t complete the required cloze test. The L2 participants were tested on a cloze test devised by Brown (1980) (see Appendix F for details) and were divided into two groups (i.e., low versus high proficiency groups) based on their cloze test scores. The mean was used as a cut-off point for this division because the data was normally distributed. The participants whose scores were above the mean were grouped into a high proficiency group while the participants whose scores were equal to or lower than the mean score were grouped into a low proficiency group. Table 4.4 summarizes the background information for the two groups.
Table 4.4. Background Information of the L2 Groups

<table>
<thead>
<tr>
<th></th>
<th>Low proficiency group</th>
<th>High proficiency group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n = 30 )</td>
<td>( n = 41 )</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td>22 (1.90)</td>
<td>22 (2.02)</td>
</tr>
<tr>
<td>Age at starting learning English (years)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td>11 (2.20)</td>
<td>10 (2.65)</td>
</tr>
<tr>
<td>Length of learning English (years)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td>11 (2.49)</td>
<td>12 (3.31)</td>
</tr>
<tr>
<td>Length of staying in English-speaking countries (months)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td>0.73 (4.02)</td>
<td>6 (12.11)</td>
</tr>
<tr>
<td>Cloze test score (Maximum: 50)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td>11.13 (6.48)</td>
<td>29.73 (5.37)</td>
</tr>
<tr>
<td>Range</td>
<td>2-21</td>
<td>22-41</td>
</tr>
</tbody>
</table>

Ten native English speakers were also recruited as a control group.

4.3.1.2 Procedure

A TVJT was employed in the form of a questionnaire. The participants were presented with an individual booklet which contained context stories followed by summary pictures and target sentences. They were asked to mark the truth value of each target sentence on separate answer sheets. After they had finished making their choices, they were asked to write down the reasons for their choices for certain of the items on the back of the answer sheets.

The L2 participants were tested on the English version of the task in the first session and then tested on the Korean version of the task in the second session, with an intervening time interval of two weeks. At the end of the second session, the participants
were given a cloze test to measure their proficiency and filled out a background information questionnaire.

The L2 participants took approximately 40 minutes to finish the English version of the task and less than 30 minutes for the Korean version of the task.

4.3.1.3 Materials

Two conditions were created based on the contexts supporting the *two > not* reading and the *not > two* reading. In the *two > not* context, the *two > not* interpretation is true while the *not > two* interpretation is false. In contrast, in the *not > two* context, the *not > two* interpretation is true whereas the *two > not* interpretation is false.

Eight experimental items were included along with two practice items and 10 fillers, for a total of 20 items for the English and Korean materials (see Table 4.5 for the test sentences). All of the filler sentences in the English materials were unambiguous and consisted of affirmative sentences containing definite articles, numerals, or universal quantifiers in subject position. As in the English materials, the filler sentences in the Korean materials consisted of unambiguous affirmative sentences (see Appendix D for a list of English filler sentences, and test and filler sentences in Korean). All of the items in each set of materials were distributed in a pseudo-random order across two lists based on a Latin Square design.

---

14 Two of the eight experimental items were adapted from the items used by O’Grady et al. (2009).
<table>
<thead>
<tr>
<th>English sentences</th>
<th>Equivalent Korean sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two boys didn’t pat the dog.</td>
<td>Namca-ai twu myeng-i kay-lul an ssutatum-ess-ta.</td>
</tr>
<tr>
<td>Two women didn’t run on the new treadmill.</td>
<td>Acwumeni twu myeng-i say leningmesiye an twi-ess-ta.</td>
</tr>
<tr>
<td>Two boys didn’t listen to the classical music.</td>
<td>Namca-ai twu myeng-i khullaysik umak-ul an tul-ess-ta.</td>
</tr>
<tr>
<td>Two girls didn’t take the medicine.</td>
<td>Yeca-ai twu myeng-i mwulyak-ul an mek-ess-ta.</td>
</tr>
<tr>
<td>Two students didn’t draw the face.</td>
<td>Namhaksayng twu myeng-i elkwul-ul an kul-yess-ta.</td>
</tr>
<tr>
<td>Two guys didn’t ride the wild horse.</td>
<td>Namca twu myeng-i yasayngmal-ul an tha-ss-ta.</td>
</tr>
<tr>
<td>Two cooks didn’t taste the soup.</td>
<td>Yolisa twu myeng-i swupu-lul an mek-ess-ta.</td>
</tr>
<tr>
<td>Two athletes didn’t jump over the high hurdle.</td>
<td>Senswu twu myeng-i nophun hetul-ul an nem-ess-ta.</td>
</tr>
</tbody>
</table>

The stories for the *not > two* context were constructed in such a way that two characters were expected to perform a target action, which only one of the two characters succeeded in doing. In contrast, in the stories relevant to the *two > not* context, four characters were supposed to perform the target action, which two of the characters failed to do. A sample item for the English materials is listed below.

**Not > two context**

Two cooks are working at a restaurant. Their chef asks them to taste a cake and a bowl of soup which she has made for a special guest. They say that they will do so.

The two cooks taste the cake right away.

Then, the first cook looks at the soup. She sees that it contains onions. She has an allergy to onions so she doesn’t taste the soup.

The second cook looks at the soup. When she is about to taste it, she sees that it contains shrimp. She remembers that she had a severe stomach ache after she ate soup just like it. She is worried that she will get sick again.

But, to please the chef, she tastes the soup.
According to the story you just read,
Two cooks didn’t taste the soup.
True                   False

In this context, the not > two reading is true because it is not the case that two cooks
tasted the soup—only one cook did so. However, the two > not reading is false because it
is not the case that there are two cooks who didn’t taste the soup.

Here is a sample story for the two > not context.

**Two > not context**

Four cooks are working at a restaurant. Their chef asks them to taste a cake and a bowl of
soup which she has made for a special guest. They say that they will do so.

The four cooks taste the cake right away.

Then, the first cook tastes the soup.

The second cook looks at the soup. When she is about to taste it, she sees that it contains
shrimp. She remembers that she had a severe stomach ache after she ate soup just like it.
She is worried that she will get sick again.

But, to please the chef, she tastes the soup.

The third and fourth cooks decide to taste the soup later, after they finish what they are
doing.

But when they are about to taste the soup, they realize that the guest has arrived. So they
don’t taste it.
According to the story you just read,  
Two cooks didn’t taste the soup.  
True  False

Unlike the case of the not > two context, the two > not reading is true because there are two cooks (i.e., the third and fourth cooks) who didn’t taste the soup. However, the not > two reading is false given the fact that two cooks (i.e., the first and second cooks) did taste the soup.

The Korean materials consisted of a translated version of the items used in the English materials. However, the stories for both contexts were reversed in the two materials. For example, if an item was accompanied by the story supporting the not > two reading in English, the story associated with the two > not reading was provided in Korean for that item. Similarly, if the story supporting two > not reading was provided for a given item in English, the story for the not > two interpretation was used in Korean for that item.

4.3.2 Results

In the data analysis, the dependent variable was the mean proportion of “true” responses to the target sentences. This dependent measure was analyzed by participants and by items, and T-tests and a repeated measures ANOVA were used for statistical analysis. The results revealed that the native English group showed a strong preference
for the \textit{two > not} interpretation (100\% for the \textit{two > not} reading versus 20\% for the \textit{not > two} reading) as shown in Table 4.6.

<table>
<thead>
<tr>
<th>Group</th>
<th>Context favoring the \textit{two &gt; not} interpretation ((k = 4))</th>
<th>Context favoring the \textit{not &gt; two} interpretation ((k = 4))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native English group</td>
<td>1.00 ((SD = 0.00))</td>
<td>0.20 ((SD = 0.37))</td>
</tr>
<tr>
<td>((n = 10))</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textbf{Note.} \(k\) represents the number of experimental items per context.

Results for the L2 groups revealed that the high and low proficiency L2 learners accepted the \textit{two > not} interpretation at a high rate, but rarely accepted the \textit{not > two} interpretation in the English version of the task. Each group’s interpretive preference patterns are very similar to those of the native English group, who accessed the \textit{two > not} interpretation all the time but permitted the \textit{not > two} interpretation just 20\% of the time (see Table 4.7). The differences between the two interpretations were statistically significant (For the high proficiency group, \(t_1(40) = 20.51, p < .05; t_2(7) = 27.68, p < .05\); for the low proficiency group, \(t_1(29) = 9.77, p < .05; t_2(7) = 37.91, p < .05\)).

<table>
<thead>
<tr>
<th>Group</th>
<th>Context favoring the \textit{two &gt; not} interpretation ((k = 4))</th>
<th>Context favoring the \textit{not &gt; two} interpretation ((k = 4))</th>
</tr>
</thead>
<tbody>
<tr>
<td>High proficiency group ((n = 41))</td>
<td>0.97 ((SD = 0.08))</td>
<td>0.11 ((SD = 0.24))</td>
</tr>
<tr>
<td>Low proficiency group ((n = 30))</td>
<td>0.91 ((SD = 0.24))</td>
<td>0.10 ((SD = 0.23))</td>
</tr>
</tbody>
</table>

\textbf{Note.} \(k\) represents the number of experimental items per context.

In order to investigate whether there are differences in scope interpretation with respect to proficiency, the proportions of “true” responses were entered into an ANOVA with context as a within-participant/item factor and proficiency as a between-participant and within-item factor. The results showed that there was a significant effect of context.
but no interaction effect of context and proficiency was observed ($F(1, 69) = 0.36, p > .05; F(1, 7) = 1.07, p > .05$).

The same L2 participants also accepted the $two > not$ reading far more frequently than the $not > two$ reading in the Korean version of the task (for the high proficiency group, 98% versus 6%; for the low proficiency group, 93% versus 10%, see Table 4.8).

The proportions of “true” responses were entered into an ANOVA with two within-participant factors, context (i.e., context favoring the $two > not$ reading versus context favoring the $not > two$ reading) and language (i.e., English versus Korean). The results revealed that there was a statistically significant effect of context ($F(1, 69) = 743.11, p < .05$). However, there was neither a significant effect of language ($F(1, 69) = 0.05, p > .05$) nor an interaction effect between context and language ($F(1, 69) = 1.17, p > .05$), between context and proficiency ($F(1, 69) = 1.33, p > .05$) and between language and proficiency ($F(1, 69) = 0.75, p > .05$).

The analysis of the participants’ justifications for their answers revealed that they accepted or rejected target interpretations for the right reasons. For example, “true” responses in the context favoring the $two > not$ reading were associated with statements pointing out that two of the four characters in the stories failed to perform the target action (e.g., ‘the remaining two cooks didn’t taste the soup.’). By contrast, “true”
responses in the context favoring the $not > two$ interpretation were accompanied by statements that the number of characters who succeeded in performing the target action is one, not two (e.g., ‘two cooks didn’t taste it, just one cook did.’). In contrast, “false” responses in the same context were provided with statements saying that only one character failed to perform the target action (e.g., ‘one of the two cooks tasted the soup: Only one of the two did not.’).

4.3.3 Discussion

The results reveal that both the Korean-speaking L2 groups and the native English group showed a strong preference for the $two > not$ interpretation in English sentences containing negation and numerically quantified NPs in subject position. Furthermore, there was no difference in overall interpretive preferences between the low and high proficiency groups. The results also showed that the L2 groups displayed similar interpretive preferences in their L1, Korean.

The interpretive preferences of the native speakers of English replicate the findings of Musolino and Lidz (2003). Employing a TVJT, Musolino and Lidz tested 20 adult native speakers of English to examine how they interpret sentences such as $Two butterflies didn’t go to the city$. They found that the $two > not$ interpretation was far more accessible than the $not > two$ interpretation (100% versus 27.5%). In the current study, all ten participants accepted the $two > not$ interpretation all the time. However, there was individual variation in the acceptance of the $not > two$ interpretation. Two out of the ten participants accepted the $not > two$ interpretation more than 75% of the time and one participant accepted the $not > two$ interpretation only 25% of the time. In contrast, the remaining seven participants didn’t accept the $not > two$ interpretation at all.
Similar to the preference patterns in L1 English, the data from L1 Korean show that the \( \text{two} > \text{not} \) reading is preferred. The analysis of individual interpretive preferences reveals that the \( \text{two} > \text{not} \) reading was strongly preferred in most of the cases. Although both the \( \text{two} > \text{not} \) and the \( \text{not} > \text{two} \) readings were accepted by six participants at a similar frequency rate, no one showed a preference for the \( \text{not} > \text{two} \) reading. These findings suggest that when numerically quantified NPs occur in subject position, the \( \text{two} > \text{not} \) reading is much easier to access than its counterpart.

Now, let us turn to our L2 group’s interpretive preferences. Like native speakers of English, the L2 groups (both low and high proficiency groups) displayed a strong preference for the \( \text{two} > \text{not} \) reading in English. Comparative analysis of individual interpretive preferences in L1 and L2 revealed that most of the L2 participants showed a preference for the \( \text{two} > \text{not} \) reading in both Korean and English. Interestingly, however, five participants accepted both interpretations at a similar frequency rate in Korean while accepting the \( \text{two} > \text{not} \) reading more frequently in English. Another three participants showed the opposite pattern, accepting only the \( \text{two} > \text{not} \) reading in Korean but accepting both readings at a similar frequency rate in English. Another two participants preferred the \( \text{not} > \text{two} \) interpretation in English while one participant showed a preference toward the \( \text{two} > \text{not} \) reading and the other participant didn’t show any preference in Korean.

It is noteworthy that in this experiment, the low and high proficiency groups didn’t show a significant difference with respect to scope interpretation involving negation and numerically quantified NPs in subject position. This finding will be discussed along with the results of Experiment 6 in a later section.
4.4 Experiment 6

4.4.1 Method

4.4.1.1 Participants

A total of 80 college students participated in my second experiment as L2 learners. As in Experiment 5, all were recruited from two institutions in Korea. For data analysis, 10 students were excluded because their performance on filler items was accurate less than 80% of the time. As in Experiment 5, the L2 participants were divided into two groups (i.e., low versus high proficiency groups) based on their cloze test scores. Since the distribution of the test scores was not normal, the median was used as a cut-off point for this division. Table 4.9 shows the background information of the two groups.

<table>
<thead>
<tr>
<th></th>
<th>Low proficiency group (n = 35)</th>
<th>High proficiency group (n = 35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female 24</td>
<td>Female 17</td>
</tr>
<tr>
<td></td>
<td>Male 11</td>
<td>Male 18</td>
</tr>
<tr>
<td>Age (years) (SD)</td>
<td>Mean 22 (2.08)</td>
<td>Mean 23 (2.56)</td>
</tr>
<tr>
<td>Age at starting learning English (years) (SD)</td>
<td>Mean 11 (2.48)</td>
<td>Mean 10 (2.89)</td>
</tr>
<tr>
<td>Length of learning English (years) (SD)</td>
<td>Mean 11 (2.78)</td>
<td>Mean 12 (1.98)</td>
</tr>
<tr>
<td>Length of staying in English-speaking countries (months) (SD)</td>
<td>Mean 1.29 (3.40)</td>
<td>Mean 4.09 (8.42)</td>
</tr>
<tr>
<td>Cloze test score (SD) (Maximum: 50)</td>
<td>Mean 13.86 (6.16)</td>
<td>Mean 30.46 (4.05)</td>
</tr>
<tr>
<td>Range</td>
<td>5-23</td>
<td>24-39</td>
</tr>
</tbody>
</table>
In addition to the L2 group, 12 native English speakers participated in this experiment as a control group.

4.4.1.2 Procedure

The procedure was the same as the one used in Experiment 5. The participants were tested with an English version of the materials and then tested with a Korean version of the materials two weeks later.

4.4.1.3 Materials

In both the English and Korean materials, eight experimental items were included with two practice items and 10 fillers, for a total of 20 items (see Table 4.10 for the test sentences). The filler sentences consisted of unambiguous affirmative and negated sentences (see Appendix E for a list of English filler sentences, and test and filler sentences in Korean). All of the items were distributed in a pseudo-random order across two lists based on a Latin Square design.

\[15\] Four of the eight experimental items were adopted from Experiment 4 presented in Chapter 3 and the remaining items were adapted from the ones used by O’Grady et al. (2009).
<table>
<thead>
<tr>
<th>English sentences</th>
<th>Equivalent Korean sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary didn't light two big candles.</td>
<td><em>Hyeyswu-ka khun cho-lul twu kay an khye-ss-ta.</em></td>
</tr>
<tr>
<td>Tom didn't slice two carrots.</td>
<td><em>Cinho-ka tangkun-ul twu kay an ssel-ess-ta.</em></td>
</tr>
<tr>
<td>Mary didn't pick up two seashells.</td>
<td><em>Hyeyswu-ka cokay-lul twu kay an cwu-wess-ta.</em></td>
</tr>
<tr>
<td>Mary didn't sharpen two long pencils.</td>
<td><em>Hyeyswu-ka kin yenphil-ul twu kay an kkakk-ass-ta.</em></td>
</tr>
<tr>
<td>Mary didn't throw out two boxes.</td>
<td><em>Hyeyswu-ka sangca-lul twu kay an pel-yess-ta.</em></td>
</tr>
<tr>
<td>Tom didn't fix two computers.</td>
<td><em>Cinho-ka khemphyuthe-lul twu kay an koch-yess-ta.</em></td>
</tr>
<tr>
<td>Tom didn't cut down two apple trees.</td>
<td><em>Cinho-ka sakwanamwu-lul twu kay an pey-ess-ta.</em></td>
</tr>
<tr>
<td>Tom didn't write two Japanese words.</td>
<td><em>Cinho-ka ilpone tane-lul twu kay an sse-ss-ta.</em></td>
</tr>
</tbody>
</table>

In the plot of the stories for the *not > two* context, the main character was expected to perform an action on two objects but ended up performing the action on only one object. In contrast, the stories for the *two > not* context were constructed in such a way that the main character ended up not performing an action on two of the four objects, contrary to expectation. A sample item for the English materials is given below.

**Not > two context**

Mary and Tom are at home. Their father wants Mary to cut down two peach trees and wants Tom to cut down two apple trees. They say that they will do so.

Mary cuts down the two peach trees right away.

Tom looks at one of the two apple trees. When he is about to start, he realizes that his sister really likes this tree. So he doesn’t cut it down.

Then, he comes to the second apple tree. It looks very big. He doesn’t think that he can cut it down by himself.

But he decides to try, and he manages to cut it down.
According to the story you just read, Tom didn’t cut down two apple trees.

True                   False

In this story, the *not > two* reading is true because it is not the case that Tom cut down two apple trees: He cut down only one apple tree. In contrast, the *two > not* reading is false in that there are not two apple trees that Tom didn’t cut down: There is only one apple tree that was not cut down.

A sample story for the *two > not* context is as follows:

**Two > not context**

Mary and Tom are at home. Their father wants Mary to cut down four peach trees and wants Tom to cut down four apple trees. They say that they will do so.

Mary cuts down the four peach trees right away.

Tom easily cuts down one of the four apple trees.

Then, Tom comes to the second apple tree. It looks very big. He doesn’t think that he can cut it down by himself.

But he decides to try, and he manages to cut it down.

Then he looks at the third and fourth apple trees. They are smaller than the other trees. But, when he is about to start, he realizes that his sister really likes them. So he doesn’t cut them down.
According to the story you just read, Tom didn’t cut down two apple trees.

True                   False

In the story favoring the *two > not* reading, Tom ended up not cutting down two out of the four apple trees. The *two > not* interpretation is true because there are two apple trees which were not cut down. However, the *not > two* interpretation is false because the main character did in fact cut down two apple trees.

As in Experiment 5, the Korean materials consisted of a translated version of the items used in the English materials.

4.4.2 Results

As in Experiment 5, the dependent measure was the mean proportion of “true” responses to target sentences. T-tests and a repeated measures ANOVA were used for statistical analysis. As shown in Table 4.11, the native English group accepted the *two > not* interpretation and the *not > two* interpretation at a similar rate (83% for the *two > not* reading versus 85% for the *not > two* reading).
The results for the L2 groups revealed that in the English version of the task, the high and low proficiency L2 learners accepted the *two > not* interpretation more frequently than the *not > two* interpretation (for the high proficiency group, 82% versus 64% and for the low proficiency group, 89% versus 61%, see Table 4.12). The differences are statistically significant (for the high proficiency group, \( t_1(34) = 2.17, p < .05; t_2(7) = 2.60, p < .05 \); for the low proficiency group, \( t_1(34) = 4.20, p < .05; t_2(7) = 4.18, p < .05 \)).

In order to examine developmental patterns in preferences in scope interpretation, the proportions of “true” responses were entered into an ANOVA with context as a within-participant/item factor and proficiency as a between-participant and within-item factor. The results showed a significant effect of context (\( F_1(1, 68) = 18.88, p < .05; F_2(1, 7) = 19.52, p < .05 \)) but no interaction effect of context and proficiency (\( F_1(1, 68) = 1.01, p > .05; F_2(1, 7) = 1.48, p > .05 \)).
The results from the Korean version of the task revealed that the same participants accessed the $two > not$ interpretation more frequently than the $not > two$ interpretation (for the high proficiency group, 97% versus 36% and for the low proficiency group, 95% versus 36%, see Table 4.13).

<table>
<thead>
<tr>
<th>Group</th>
<th>Context favoring the $two &gt; not$ interpretation ($k = 4$)</th>
<th>Context favoring the $not &gt; two$ interpretation ($k = 4$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High proficiency group</td>
<td>0.97 ($SD = 0.08$)</td>
<td>0.36 ($SD = 0.36$)</td>
</tr>
<tr>
<td>(n = 35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low proficiency group</td>
<td>0.95 ($SD = 0.16$)</td>
<td>0.36 ($SD = 0.37$)</td>
</tr>
<tr>
<td>(n = 35)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $k$ represents the number of experimental items per context.

I conducted a repeated measures ANOVA setting up context (i.e., the $two > not$ versus the $not > two$ contexts) and language (i.e., English versus Korean) as within-participant factors and proficiency as a between-participant factor. The results revealed that there is a statistically significant effect of context ($F(1, 68) = 113.91, p < .05$), as well as an effect of language ($F(1, 68) = 7.31, p < .05$). Moreover, there is a statistically significant interaction effect between context and language ($F(1, 68) = 29.32, p < .05$). However, no interaction effects of context and proficiency, of language and proficiency, or of context, language and proficiency were found.

The analysis of the participants’ justifications for their answers revealed that they accepted or rejected target interpretations for the right reasons. For example, “true” responses in the context favoring the $two > not$ reading were associated with statements pointing out that two of the four target objects in the stories were left unaffected (e.g., ‘he didn’t cut down the remaining two apple trees.’) while “false” responses in the same context were presented with justifications highlighting that the first two objects were affected (e.g., ‘he cut down two of the four apple trees.’). By contrast, “true” responses in
the context favoring the $not > two$ interpretation were accompanied by statements that the number of the objects that were acted upon by the main character is one, not two (e.g., ‘he cut down one of the two apple trees, so it is not the case that he cut down two apple trees.’). In contrast, “false” responses in the same context were provided with statements saying that only one object was unaffected, not two (e.g., ‘it is not true that he didn’t cut down both of the apple trees because he didn’t cut down the second tree.’).

4.4.3 Discussion

The results revealed that the native English group accepted both the $two > not$ and the $not > two$ interpretations at a quite similar rate of frequency when a numerically quantified NP occurred in object position of a negated sentence. Unlike the native English group, both high and low proficiency L2 groups accessed the $two > not$ interpretation more frequently than the $not > two$ interpretation in English. Moreover, the low and high proficiency groups didn’t show a significant difference in their interpretive preferences in English. The results also revealed that the L2 groups showed a strong preference for the $two > not$ interpretation in their native language, Korean.

The L1 English data from the current study are consistent with the findings of Lidz and Musolino’s 2002 study. Lidz and Musolino examined how 24 adult native speakers of English interpret sentences such as Donald didn’t find two guys and found no significant difference in acceptance rates between the $two > not$ and the $not > two$ interpretations (93% and 97%, respectively).

The analysis of individual performance in the current study reveal that five of the 12 native speakers of English accepted both interpretations 100% of the time, two participants accepted both interpretation 75% of the time, and one participant accessed
the *two > not* interpretation 100% of the time while accepting the *not > two* interpretation 75% of the time. Two participants accepted the *two > not* interpretation 100% of the time while accepting the *not > two* interpretation at the rate of 50%. The remaining two participants showed an opposite pattern of preferences by accepting the *not > two* interpretation 100% of the time, with one accessing the *two > not* interpretation 50% of time and the other not accepting it at all.

Our L1 Korean data also replicates the interpretive preference patterns found in the experiments involving adult native speakers of Korean, which were described in the preceding chapters. Even though there are slight differences in the acceptance rates of the two target interpretations across experiments, overall interpretive preferences are consistent: The *two > not* interpretation was more accessible and preferred in Korean. The analysis of individual performance shows that our participants either accepted both interpretations at a similar frequency rate or accessed the *two > not* interpretation more frequently.

Our L2 groups also exhibited a preference toward the *two > not* interpretation in English, just as they did in their native language. Even though they showed similar interpretive preferences in Korean, it is noteworthy that they accessed the *not > two* interpretation more readily in English than in Korean (64% versus 36% for the high proficiency group, and 61% versus 36% for the low proficiency group). This contrast may reflect the fact that 16 of the 26 participants who rejected the *not > two* interpretation 100% of the time in Korean accepted it more than 50% of the time in English: Three of them accepted it 50% of the time, eight accepted it 75% of the time and the remaining five accepted it 100% of the time.
These results indicate that the not > two interpretation is less likely to be accepted in our participants’ L1 (Korean) than in their L2 (English). Interpretive preferences from both languages suggest that in Korean, the not > two interpretation is more difficult to access than the two > not interpretation while in English, neither interpretation is more difficult to access than the other. Therefore, when they are exposed to English sentences containing numerals in object position and negation, Korean-speaking L2 learners can get at the not > two interpretation with relative ease, thereby accepting the interpretation at a higher frequency rate.

It is also noteworthy that, as in Experiment 5, there was no proficiency-related difference with respect to interpretive preferences, as compared to previous studies that reported differences in scope interpretation among different proficiency groups. It seems that proficiency didn’t have an effect on participant’s interpretive preferences. However, it is not clear whether this finding results from the nature of the target constructions containing numerically quantified NPs and negation or whether it is due to other confounding factors.

4.5 General discussion

The findings of this study reveal that when a numerically quantified NP occurs in subject position in a negative sentence, the two > not interpretation is far more accessible than the not > two reading in L1 English and L1 Korean, and that Korean-speaking L2 learners access this interpretation in English without difficulty. The results also show that when a numerically quantified NP occurs in object position in a negative sentence, both the two > not and not > two interpretations are equally accessible in L1 English whereas the two > not interpretation is strongly favored in L1 Korean. Furthermore, the results
suggest that Korean-speaking L2 learners assign the \( two > not \) reading to English target sentences more frequently than the \( not > two \) reading, as in Korean but accept the \( not > two \) reading at a higher frequency rate in English than in Korean.

Combined with the findings from previous studies (e.g., Lee 2009, O’Grady et al. 2009) involving the universal quantifiers *every* and *all*, the results of this study raise the following question: Why do we observe stronger L1-like interpretive patterns in L2 scope interpretation involving universal quantifiers and negation than in the case of numeral quantifiers and negation? In other words, why are Korean-speaking L2 learners more likely to accept the \( not > two \) interpretation than the \( not > all/every \) interpretation in English?

A difference in the pragmatic considerations relevant to the two types of sentences might provide an answer for this. It has been claimed that in the case of universally quantified NPs in negative sentences such as *Jane didn’t eat all the oranges/every orange*, the \( not > all/every \) interpretation is preferred in English for pragmatic reasons (Musolino & Lidz 2006, Lee, Kwak, Lee & O’Grady to appear).

According to Lee et al., when speakers of English hear a sentence containing a universally quantified NP such as *Mary didn’t read all the books*, they reason as follows (p. 3):

If the speaker has intended to express the full set interpretation (i.e., the \( all > not \) interpretation), s/he would have done so more directly by using an unambiguous pattern such as *Mary didn’t read any of the books*. Because the speaker uttered *Mary didn’t read all the books* rather than *Mary didn’t read any of the books*, s/he must have intended to express the partitioned set interpretation.

Matters work differently in Korean, although it too has an unambiguous sentence, which is equivalent to *Mary didn’t read any of the books*. 
(11) Mary-ka amwu chayk-to an ilk-ess-ta.
Mary-NOM any book-even NEG read-PST-DECL
‘Mary didn’t read any books.’

Lee et al. (to appear) claim that the availability of this sentence doesn’t lead to a preference for the partitioned set interpretation in the Korean case because of processing considerations: Based on the independent evidence from Lee’s (2009) study which was summarized in the preceding previous research section, they claim that the high processing cost of the partitioned set interpretation overrides the effects of the pragmatic calculus that would otherwise favor this reading.

Lee et al. tested Korean-English child and adult bilinguals who were exposed to Korean before English became their dominant language and found that the bilingual participants preferred assigning the full set interpretation to English target sentences such as Robert didn’t cut down all the trees. Lee et al.’s results are presented in Table 4.14.

Table 4.14. Mean Percentage of “True” and “False” Responses to English Sentences such as Robert didn’t cut down all the trees

<table>
<thead>
<tr>
<th>Group</th>
<th>Context favoring the full set interpretation</th>
<th>Context favoring the partitioned set interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Bilingual children</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Bilingual adults</td>
<td>86%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Based on these findings, they claim that the prior knowledge of Korean may suppress or interfere with pragmatic reasoning involved in the interpretation of universally quantified NPs in object position in negated sentences in English.

As was the case in Lee et al.’s study, the findings of Lee (2009) and O’Grady et al.’s (2009) studies on the interpretation of sentences containing universally quantified object NPs imply that Korean-speaking L2 learners of English whose dominant language
is Korean may be less sensitive to pragmatic reasoning associated with preferences for
the partitioned set interpretation in English due to the influence of Korean, thereby
showing a strong preference for the full set (i.e., all/every > not) interpretation. The
results of O’Grady et al.’s study and Lee’s study are repeated in Table 4.15 and Table
4.16, respectively.

Table 4.15. Proportion of “True” and “False” Responses in English
(O’Grady et al. 2009)

<table>
<thead>
<tr>
<th>Group</th>
<th>Context favoring the full set reading</th>
<th>Context favoring the partitioned set reading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>L2 learner group</td>
<td>93%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Table 4.16. Mean Percentage of “True” Responses in English (Lee 2009)

<table>
<thead>
<tr>
<th>Group</th>
<th>Context favoring the full set reading</th>
<th>Context favoring the partitioned set reading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>True (SD)</td>
<td>False (SD)</td>
</tr>
<tr>
<td>Low proficiency L2 learner group</td>
<td>86.58% (SD = 14.61)</td>
<td>37.51% (SD = 15.96)</td>
</tr>
<tr>
<td>High proficiency L2 learner group</td>
<td>78.53% (SD = 15.93)</td>
<td>75.17% (SD = 15.61)</td>
</tr>
<tr>
<td>Native English group</td>
<td>45.14% (SD = 12.02)</td>
<td>90.63% (SD = 9.30)</td>
</tr>
</tbody>
</table>

Overall, then, it appears that prior knowledge of Korean has a strong influence on
scope interpretation in English, particularly with respect to interpretive preferences that
derive from pragmatic reasoning that is not relevant to Korean. Because of the
irrelevance of the pragmatic calculus to the interpretation of universally quantified NPs in
their first language, Korean-speaking learners of English initially fail to develop a
preference for the partitioned set (not > all) interpretation of English patterns such as

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16 The high proficiency group shows unique interpretive patterns which differ from those of the
low proficiency and native English groups.
Jane didn’t eat all the oranges, preferring instead the reading that assigns the universally quantified NP its usual full set interpretation.

Matters should be very different in the case of numerically quantified NPs in negated sentences such as Jane didn’t eat two oranges in English. In such cases, pragmatic factors are irrelevant to the final interpretation, as there is no conventionalized alternative for the expression of either the two > not or the not > two reading comparable to the not–any pattern. This makes it possible to treat the two interpretations alike in the direct object pattern, where the negative precedes the numerically quantified NP. Therefore, thanks to exposure to linguistic input containing cases where the not > two reading is conveyed, some L2 learners may learn to access the not > two reading. This point will be explained in more detail in the following chapter. Of course in subject patterns, where the numeral-bearing NP comes first, processing considerations will continue to favor the two > not interpretation, just as our results show.

In order to have a more complete picture of scope interpretation in second language acquisition, further studies need to be conducted to examine how English-speaking L2 learners of Korean interpret sentences containing numerically quantified NPs and negation in that language. In particular, it will be informative to explore interpretive preferences for negated sentences containing numerically quantified NPs in object position. This is one of many issues that I hope to explore in future work.
CHAPTER 5. GENERAL DISCUSSION AND CONCLUSION

In this dissertation, I have investigated Korean-speaking children’s acquisition of scopal patterns involving numerically quantified NP patterns and negation and explored Korean-speaking adults’ L2 acquisition of scope interpretation in English. The main findings from my experimental investigation are summarized below.

(1) When expressing propositions involving scope interactions between negation and numerically quantified NPs in object position, Korean-speaking children and adults produce negative sentences containing numerically quantified NPs at a very low rate. Instead, they prefer to express the target propositions in an unambiguous way by employing affirmative sentences. When they do produce negative sentences, they tend to use them in the $two > not$ sense.

(2) Korean-speaking children strongly prefer to assign the wide scope reading (i.e., the $two > not$, or ‘particular two’ interpretation) to numerically quantified NP patterns in object position in negative sentences containing short-form negation. Korean-speaking adults also display a preference for the wide scope ‘particular two’ reading, but they tend to access the narrow scope reading of the NP patterns (i.e., the $not > two$, or ‘any two’ interpretation) more frequently than children do.

(3) Korean-speaking children’s low acceptance rates for the narrow scope ‘any two’ reading do not mean that they simply lack that interpretation. In certain contexts, the ‘any two’ reading becomes more easily accessible to them. In particular, when target sentences are preceded by affirmative sentences carrying contrastive information that create a context for denial, children accept the ‘any two’ interpretation more frequently and faster than when there is no such a contextual support.
(4) Korean speakers (adults and children) assign the wide scope reading to numerically quantified NP patterns more frequently than to bare NPs. Moreover, even though there is a difference between adults and children with respect to the interpretation of bare NPs, the presence of numerals and/or classifiers seem to bias Korean speakers toward the ‘particular two’ reading.

(5) In interpreting negative sentences containing numerically quantified NPs in subject position in English as a second language, Korean-speaking adults resemble native adult speakers of English in preferring the ‘particular two’ reading. However, in the case of numerically quantified NPs in object position, Korean speakers tend to accept the ‘particular two’ interpretation more frequently, in contrast to English native speakers, who access both ‘particular two’ and ‘any two’ interpretations with equal ease.

(6) In the case of numerically quantified NPs in object position, even though Korean-speaking L2 groups exhibit an overall preference for the ‘particular two’ interpretation in both English and Korean, they access the ‘any two’ interpretation at a higher frequency rate in English than in Korean.

(7) Low and high proficiency groups show no differences in their interpretive preferences for numerically quantified NPs in subject and object position in English.

In the following sections, I will discuss some issues relevant to these main findings.

5.1 The isomorphism effect

The role of the surface position for the operators, defined in terms of either linear order or hierarchical structure, has long been recognized as an important factor in the
comprehension of scopally ambiguous sentences. As first mentioned in Chapter 2, Musolino (1998) and Musolino et al. (2000) propose the ‘observation of isomorphism’—the generalization that, unlike adults, young children systematically interpret negation and quantified NPs on the basis of their surface position (i.e., linear precedence and hierarchical structure). Extending this generalization, Lidz and Musolino (2002) propose that children’s interpretation of such scopally ambiguous sentences is constrained by the surface hierarchical c-command relations between the operators. In other words, they claim that in interpreting scopally ambiguous sentences, children prefer the interpretation in which semantic scope coincides with syntactic scope. For example, the sentence *Mary didn’t eat two apples* can be interpreted in two ways: One interpretation is that it is not the case that Mary ate two apples and the other interpretation is that there are two apples that Mary didn’t eat. The former interpretation, which is preferred by English-speaking children, is isomorphic in that the earlier and structurally higher element *not* has scope over the other element, *two apples*, as illustrated in (8).

(8)

```
  IP
  /   \                     NP
   I'  \\                  /   \
    NP  VP
      /   \               /   \
     I    NP
      /     \
     V     \
   /       \
 Mary       not two apples.
```

Despite its attractiveness, several studies have provided evidence against this surface position-based approach (Gualmini 2008, Krämer 2000, Miller & Schmitt 2003, Musolino & Gualmini 2004, Su 2003, 2008, among others). In this section, I will explore whether the Korean data discussed in the preceding chapters can shed light on the
viability of the isomorphism hypothesis. Let us consider how the isomorphism based on linear order and isomorphism based on hierarchical structure account for the Korean data in detail.

Before proceeding, it is important to distinguish between two versions of the isomorphism hypothesis. According the linear version of isomorphism (e.g., Bunt 1985, Fodor 1982, Kurtzman & MacDonald 1992, among others), the preferred scope of quantified phrases corresponds to their relative linear order. In contrast, the hierarchical version of isomorphism (Aoun & Li 1989, Hornstein 1995, Jackendoff 1972, May 1977, among others) holds that the c-command relation among operators is crucial: The higher operator should have wide scope. Let us consider each possibility in turn in light of the data we have obtained from Korean.

5.1.1 Isomorphism based on linear order

If we rely on linear precedence, the isomorphic surface scope interpretation is the interpretation in which a leftmost operator takes scope over an operator to its right, while the non-isomorphic inverse scope interpretation is the one in which a rightmost operator has wide scope. Given that in Korean, indefinite NPs such as numerically quantified NP patterns and bare NPs in object position always occur prior to preverbal, short-form negation in the canonical SOV word order as in (9) and (10), the interpretation in which the indefinite NPs takes scope over negation is predicted to be preferred by children.

(9) Dora-ka cokay-lul twu kay an cwu-wess-e.
    Dora-NOM seashell-ACC two CL NEG pick up-PST-DECL
    ‘Dora didn’t pick up two seashells.’
a. Isomorphic interpretation
   \[Two \triangleright not\] interpretation (i.e., ‘particular two’ interpretation)
   ‘There exist two seashells that Dora didn’t pick up.’

b. Non-isomorphic interpretation
   \[Not \triangleright two\] interpretation (i.e., ‘any two’ interpretation)
   ‘It is not the case that Dora picked up two seashells.’

(10) Dora-ka cokay-lul an cwu-wess-e.
Dora-NOM seashell-ACC NEG pick up-PST-DECL
‘Dora didn’t pick up a seashell.’

a. Isomorphic interpretation
   \[A \triangleright not\] interpretation (i.e., ‘particular’ interpretation)
   ‘There exists a particular seashell that Dora didn’t pick up.’

b. Non-isomorphic interpretation
   \[Not \triangleright a\] interpretation (i.e., ‘any’ interpretation)
   ‘It is not the case that Dora picked up any seashells.’

As is shown in Table 5.1, the results of the experiments involving numerically quantified NP patterns in object position in negative sentences seem to bear out this prediction.

<table>
<thead>
<tr>
<th>Group</th>
<th>The [two \triangleright not] interpretation</th>
<th>The [not \triangleright two] interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 children (Experiment 2; mean age 5;2)</td>
<td>0.70</td>
<td>0.12</td>
</tr>
<tr>
<td>30 children (Experiment 4; mean age 5;0)</td>
<td>0.69</td>
<td>0.32</td>
</tr>
</tbody>
</table>

In the case of bare NPs in negative sentences such as (10), we can predict that as in the case of numerically quantified NP patterns, children should prefer the interpretation in which the indefinite bare NP has wide scope because it occurs to the left of negation in the canonical word order. However, this prediction was not borne out. As seen in Table 5.2, children did not show a preference for the \[a \triangleright not\] interpretation in which an indefinite bare NP takes wide scope.
Table 5.2. Mean Acceptance Rates of the Target Interpretations of the Bare NPs by Children

<table>
<thead>
<tr>
<th>Group</th>
<th>the $a &gt; not$ interpretation</th>
<th>the $not &gt; a$ interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 children (Experiment 4; mean age 5;0)</td>
<td>0.47</td>
<td>0.53</td>
</tr>
</tbody>
</table>

The combined results for numerically quantified NP patterns and bare NPs thus establish that linear ordering of target elements does not fully account for Korean children’s interpretive behaviors.

5.1.2 Isomorphism based on hierarchical structure

Now let us consider the possible relevance of the structural relationship between operators to Korean-speaking children’s interpretive preferences. In Korean, several proposals have been made concerning the syntactic status of short-form negation (Hagstrom 2000, 2002, Han et al. 2007, Kim 2000, Suh 1989, among others). In this section, I will focus on Han et al.’s (2007) analysis since this claim is based on data collected from carefully designed experiments.

Han et al. claim that the short-form negative $an$ is adjoined to VP and cliticizes to the verb in overt syntax\(^{17}\) and that due to variation among Korean speakers with respect to verb raising, the negative is raised to I together with the verb in the grammar of some speakers, but not others. This is illustrated in the following two syntactic structures.

(Notice that in both structures the direct object raises to the specifier position of a functional projection (FP), for reasons that need not concern us here.)

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\(^{17}\) Han et al. don’t provide details on how $an$ cliticizes to the verb, which is not immediately adjacent to it. However, several studies (Burzio 1986, Pollock 1989) have shown that an element can cliticize to another element across intervening elements. For example, according to Pollock (1989), the negative clitic $ne$ in French can move from its original position in the head of NegP leftward to its target position above NegP, crossing over $pas$ in the Spec of NegP.
(11) a. I lowers to V; short negation cliticizes to V; the direct object takes scope over short negation (Han et al. 2007:33-4).

b. Short negation cliticizes to V; V raises to I; short negation takes scope over the direct object.
Han et al.’s claim that two different grammars with respect to verb raising exist among Korean speakers is based on their experimental findings on the interpretation of sentences containing universally quantified NPs and short-form negation, as in (12).

    Cookie    Monster-NOM every    cookie-ACC    NEG eat-PST-DECL
    ‘Cookie Monster didn’t eat every cookie.’

Han et al. tested Korean-speaking adults’ and children’s interpretations of target sentences by employing a Truth Value Judgment Task with a between-participants design. The participants were tested only in one of the two conditions: the not > every condition in which the not > every reading (e.g., ‘Cookie Monster ate some of the cookies but not the others.’) is true and the every > not condition in which the every > not interpretation (e.g., ‘Cookie Monster ate none of the cookies.’) is true. They found that the mean percentage of accepting not > every and every > not interpretations by adults was 37% and 98%, respectively. Focusing on the performance in the not > every condition, they found that some of the adult speakers always accepted the not > every interpretation while some of the speakers always rejected the interpretation. The results of the number of participants who accepted the not > every interpretation are summarized in Table 5.3.

Table 5.3. The Number of Adult Participants Showing Different Acceptance Rates of the Not > Every Interpretation

<table>
<thead>
<tr>
<th>Percentage of accepting the not &gt; every interpretation</th>
<th>Number of adult participants (20 participants in total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>10</td>
</tr>
<tr>
<td>25%</td>
<td>2</td>
</tr>
<tr>
<td>50%</td>
<td>2</td>
</tr>
<tr>
<td>75%</td>
<td>0</td>
</tr>
<tr>
<td>100%</td>
<td>6</td>
</tr>
</tbody>
</table>

They also reported that their child participants showed interpretive patterns similar to those of the adult participants. The child participants accepted not > every and
every > not interpretations 36.67% and 81.67%, respectively. Similar to the split in the adult participants, five children accepted the not > every interpretation all the time, one child accepted it 50% of the time, and nine children rejected it all the time. Based on these interpretive patterns, Han et al. propose that some Korean speakers have a verb-raising grammar which allows the negative an to take scope over a quantified object NP while Korean speakers who do not have a verb-raising grammar never accept the not > every interpretation.

Before considering how the developmental data from the present study fit into the structure-based isomorphism account based on Han et al.’s structures, it is worth considering whether the data from Han et al.’s study showed a true bimodal distribution in acceptance rates of the not > every interpretation, as they claimed. Given that their experiment was conducted with a between-participants design, the participants who were tested in the not > every condition were not tested in the every > not condition. In order to give stronger evidence for their claim, it is necessary to investigate whether the same participants who always rejected the not > every interpretation in the not > every condition would accept the every > not interpretation all the time in the every > not condition due to their I-lowering grammar in which object quantified phrases always c-command negation.

Furthermore, the finding that two adults and one child accepted the not > every interpretation 50% of the time suggests that the not > every and every > not interpretations may be possible to those speakers, thereby undermining Han et al.’s claim concerning the existence of two different grammars. If the speakers chose the not > every and every > not interpretations for the right reasons 50% of the time each, this provides
counterevidence for the claim that Korean speakers can be divided into two subgroups: one with a 1-lowering grammar and the other one with a verb-raising grammar.

Even if the bimodal distribution in acceptance rates of the $not > every$ interpretation is true, as Han et al. proposed, the structure-based isomorphism account based on their structures is problematic for accounting for the interpretive preferences in Korean from the present study. Before providing a detailed discussion, it is necessary to say a word about the position of the type of numerically quantified NP that concerns us, namely the noun-accusative case + numeral + classifier pattern illustrated in (13).

(13) Goofy-ka pizza-lul twu kay an mek-ess-e.
    Goofy-NOM pizza-ACC two CL NEG eat-PST-DECL
    ‘Goofy didn’t eat two slices of pizza.’

Here again, there is considerable controversy on the internal structure of this type of NP pattern. For the sake of exposition, I will adopt Park’s (2009) view that the case-marked NP and the numeral classifier are generated as a constituent of a small clause labeled RP inside a DP and that the NP moves to the Spec of a higher phrase above VP, leaving behind the numeral classifier as in (14).
According to Park, a numeral is generated in the Spec of #P, a functional projection whose head is #, a locus for the counting or quantizing feature (Borer 2005 as cited in Park 2009) and a classifier occurs in the head position of ClP, a functional projection. The numeral classifier construction composes a #P and functions as a predicate of its host NP generating in the Spec of RP. The subject and predicate relationship between the host NP and the numeral classifier construction is mediated by Relator head. The host NP then moves to the Spec of a higher phrase above VP to get Case.

Now, let us take a closer look at how predictions on scope interpretations based on the two types of negation structure proposed by Han et al. are borne out by our findings. In structure (11a), where negation cliticizes to V, the negative an c-commands the numeral construction inside DP. This predicts that the narrow scope ‘any two’ reading
(i.e., not > two interpretation) will be preferred. Structure (11b), in which negation is raised to I along with the verb, makes the same prediction since the negative an once again c-commands the numeral construction. Crucially, however, the findings from the experiments in this dissertation do not bear out these predictions since they show that Korean children prefer the wide scope ‘particular two’ reading (i.e., two > not interpretation).

5.2 Processing-based account for interpretive preferences

Several studies have recognized the importance of processing for first and second language acquisition even though there are various differences in their theoretical claims (O’Grady 2008, O’Grady et al. 2009, Sharwood Smith & Truscott 2006, Viau et al. 2009, among others). As one possible way to make sense of the interpretive preferences found in our L1 child and adult Korean data and our L2 English data, I will consider the role of processing in scope interpretation by applying O’Grady’s (2006, 2008) processor-based account which was summarized in Chapter 1. His main claims are repeated in the following section.

5.2.1 Processor-based account of scope

The processor-based account proposed by O’Grady (2008) contends that scope phenomena can be explained by largely in terms of processing considerations, related to minimizing the burden on working memory. O’Grady’s account of scope phenomena is based on the following two assumptions:

(15) As the processor works its way through a sentence, it assigns NPs tentative initial interpretations, based on clues such as position, determiner type, case marker, context and so forth.
(16) The revision of a previously assigned interpretation is computationally costly since it disrupts the normal linear operation of the processor, which forms and interprets sentences in real time under conditions that value quickness.

In this framework, it is predicted that the interpretation which does not involve any revisions will be preferred than the one which has been assigned through a recomputation process.

The following sections examine how our data fits into this framework.

5.2.2 L1 Korean data

Experiments 2, 4, and 6 on L1 scope interpretation focus on sentences containing numerically quantified NP patterns (noun-accusative case + numeral + classifier) and negation, which are presented without a preceding affirmative sentence carrying contrastive information. Under these circumstances, Korean speakers (including children and adults) prefer the ‘particular two’ interpretation for the numerically quantified NP patterns. In contrast, the findings of Experiment 3 show that when target sentences are presented following affirmative sentences carrying contrastive information, Korean speakers are more willing to accept the ‘any two’ interpretation than in the cases lacking such contrastive information.

Let us consider how the processor-based approach might account for the interpretive preferences for the ‘particular two’ interpretation when contextual information such as preceding affirmative sentences with contrastive information is not available. In the following exposition, I will use the term ‘specific’ to refer to the ‘particular two’ reading and the term ‘non-specific’ to refer to the ‘any two’ reading, following O’Grady (2008).
According to O’Grady’s (2008) proposal, when the processor goes through a sentence and encounters an NP, it assigns a tentative initial interpretation to the NP as soon as possible based on the availability of a variety of clues including position, determiner type, case marking and contextual information. Before proceeding to detailed exposition, let us look at the target sentences tested in Experiments 2, 4 and 6, which contain the following numeral classifier construction:

(17) Noun-accusative case marker + numeral + classifier
     Holangi-nun pihayngki-lul twu kay an nall-yess-e.
     Tiger-TOP airplane-ACC two CL NEG fly-PST-DECL
     ‘Tigger didn’t fly two airplanes.’

Bare common nouns such as pihayngki ‘airplane’ in a singular form can denote a set of singular or plural individuals/entities, or can express a kind reading (Kang 1994, 2002, Lee 2000, Martin 1992, to name a few). Kang (2002) claims that in the numerically quantified NP patterns under consideration, the accusative-marked NP denotes the kind of entity (e.g., ‘airplane’) and the classifier functions as a domain shifter (p. 383) that converts the denotation of the NP from that of a kind to that of a set of individual airplanes.

If we adopt Kang’s idea, the processor begins its interpretation of the phrase pihayngki-lul twu kay in (17) by assigning a kind reading to the NP pihayngki-lul ‘airplane’ + accusative, as in (18).

(18)   Step 1: Assignment of the ‘kind’ reading to the NP pihayngki-lul
     pihayngki-lul
     [the kind ‘airplane’]

Next, upon encountering the domain-changing numeral classifier construction twu kay, the processor converts the denotation of the NP to a set of individual airplanes.
(19) Step 2: Domain changing in response to encountering the Numeral + Classifier

\[ \text{pihayngki-lul twu kay} \]
[a specific set of two airplanes]

Contextual clues encourage a specific interpretation for the members of the newly formed set of airplanes. The context stories presented prior to target sentences introduce a series of individual objects/entities as illustrated in (20).

(20) <Context story> (English translation; from Experiment 4)

Pooh and Tigger make things with paper in class together. Pooh makes a circle and triangles. Tigger makes four paper airplanes with a lot of excitement. He wants to fly them. He flies one of them. It flies well. Then, he flies the second airplane. It flies well too. Then, he grabs the other two airplanes. When he is about to fly them, it occurs to him that his friend loves flying paper airplanes. He decides to give the airplanes to his friend. So, he doesn’t fly them.

Such a context encourages the association of the referents of the quantified NP with entities established in the discourse. This specific interpretation is then maintained and reinforced through the rest of the sentence without extra processing cost.

Assignment of the non-specific interpretation is more costly, as it involves an extra step:

(21) Assignment of the non-specific interpretation in sentences such as (17)

a. \[ \text{pihayngki-lul} \]
   [the kind ‘airplane’]

b. \[ \text{pihayngki-lul twu kay} \]
   [a specific set of two airplanes]

c. When the processor encounters an ‘not’ and allows an to take scope over the NP \[ \text{pihayngki-lul twu kay} \]
   [a specific set of two airplanes] \(\rightarrow\) [a non-specific set of two airplanes]
As illustrated in (21c), the processor has to revise the interpretation assigned to the NP *pihayngki-lul twu kay* from specific to non-specific. This reinterpretation adds to the burden on working memory, thereby increasing the cost of the non-specific interpretation.

To sum up, on this processor-based approach, the specific interpretation will be preferred by Korean speakers. Our L1 child and adult data supports this prediction: Both children and adults showed this interpretive preference. Furthermore, given that the assignment of the non-specific interpretation requires revision of the previously assigned interpretation thereby increasing the burden on working memory, the interpretation should be more difficult to access for children than for adults, since children presumably have more limited processing resources. Our results for adults and children bear out this prediction: Adults access the non-specific interpretation more frequently than children.

Now, let us consider the interpretation of sentences that follow affirmative sentences carrying contrastive information, as in Experiment 3. In addition to the presence of preceding affirmative sentences, the context stories in this experiment differed from those in the other experiments in that a summary sentence stating the number of target objects that the second character acted upon was always provided at the end of each story as in (22).

(22) *<Context story>* (English translation; from Experiment 3)

Piglet and Tigger find three balloons each. Piglet blows up the three balloons quickly. Tigger first blows up one balloon. He is so happy, and blows up the second balloon. However, he decides not to blow up the other balloon because his mouth starts to hurt from blowing up the balloons quickly. **He ends up blowing up two balloons.**
As the processor goes through the numerically quantified NP pattern in the first clause, it is more likely to assign the specific interpretation to the NP "balloon" + Accusative for the reasons outlined in our preceding discussion of (18) and (19).

Upon encountering the NP "balloon" + Accusative in the second clause, it converts the 'kind' reading of "balloon" + Accusative to the 'set of entities' reading upon encountering the numeral + classifier construction in the usual way.

(24) a. Assignment of the ‘kind’ reading to "balloon"

    phwungs-en-ul
    [the kind ‘balloon’]

b. Assignment of the ‘set’ reading upon encountering "three"

    phwungs-en-ul sey kay
    [a set of three balloons]

But what about specificity? There are three possibilities: the specific three balloons that Piglet blew up, another specific set of three balloons, and a non-specific set of three balloons. Of these, the latter seems most appropriate on contextual and pragmatic grounds. Given the presence of the suffix -ciman ‘but’ at the end of the verb in the first clause and of the contrastive marker -nun on the subject NPs, it is reasonable for the listener to infer that the second sentence will describe a situation that contrasts with the one expressed in the first clause. The summary sentence at the end of the context story is
also crucial: It indicates that Tigger blows up just two balloons (of the three that he was
given). This information might facilitate the assignment of the non-specific interpretation
(i.e., ‘it is not the case that Tigger blew up any set of three balloons’), highlighting the
number of the target objects affected by Tigger.

All clues therefore point strongly to the ‘non-specific set of three balloons’
interpretation. This interpretation is thus assigned to the direct object NP from the outset
and is maintained as the remainder of the sentence is interpreted. Given that this process
doesn’t involve any revision of the previously assigned interpretation, the non-specific
reading will be relatively easy to access. What remains to be determined is the precise
point at which the processor commits to this interpretation. Is it right after encountering
the full NP pattern or is it at a point later in the sentence? Further studies should be
conducted by employing on-line measures to provide an answer for this question.

To sum up, the processor-based approach also seems to account for the findings
from the experiment where target sentences were presented following affirmative
sentences carrying contrastive information even though there are remaining questions for
further research.

5.2.3 L2 English data

The findings of Experiments 5 and 6 reveal that in interpreting negative sentences
containing numerically quantified subject NPs in English, Korean-speaking L2 learners
resemble native adult speakers of English in preferring the specific interpretation.
However, in the case of numerically quantified object NPs, Korean speakers tend to
accept the specific interpretation more frequently, in contrast to English native speakers,
who access both specific and non-specific interpretations with equal ease. Our findings
also show that Korean-speaking L2 groups access the non-specific interpretation at a higher frequency rate in English than in Korean even though overall preferences for the specific interpretation in English and Korean are similar. These findings are summarized in Table 5.4.

<table>
<thead>
<tr>
<th>Table 5.4. Interpretive Preferences in English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
</tr>
<tr>
<td>English native speakers</td>
</tr>
<tr>
<td>Korean-speaking L2 learners</td>
</tr>
</tbody>
</table>

Let us consider how compatible these findings are with the processor-based approach outlined earlier.

**5.2.3.1 Subject NPs**

Let us first consider sentences such as (25), which contain numerically quantified subject NPs.

(25) a. English
    Two cooks didn’t taste the soup.

b. Korean
    Yolisa  twu myeng-i swupu-lul an mek-ess-ta.
    cook   two CL-NOM soup-ACC NEG eat-PST-DECL
    ‘Two cooks didn’t eat the soup.’

Here, the data shows that both English speakers and Korean speakers have a preference for the specific interpretation in their respective native languages. The processor-based approach predicts this result, since the processor is expected to assign the subject a specific interpretation from the outset in accordance with the universal tendency for NPs with this grammatical role to have specific referents as illustrated in (26) and (27).
(26) Assignment of the specific interpretation in English
a. Formation and interpretation of the phrase *two* *cooks*
   *Two cooks*
   [specific]

b. Formation and interpretation of the rest of the sentence without a change to the interpretation of the subject NP
   *Two cooks didn’t taste the soup.*
   [specific]

(27) Assignment of the specific interpretation in Korean
a. Formation and interpretation of the phrase *yolisa twu myeng-i*
   ‘two cooks’ + nominative
   *Yolisa twu myeng-i*
   [a specific set of two cooks]

b. Formation and interpretation of the rest of the sentence without a change to the interpretation of the subject NP
   *Yolisa twu myeng-i swupu-lul an mek-ess-ta.*
   [a specific set of two cooks]

Since the initial specific interpretation of the subject NP is maintained in the case of the *two* > *not* interpretation, it creates no special burden for working memory.

In contrast, when the negative takes wide scope, the processor goes through an additional step that involves recomputing the initially assigned interpretation of the subject NP, and assigns the non-specific interpretation as illustrated below.

(28) Assignment of the non-specific interpretation in English
a. Formation and interpretation of the phrase *two* *cooks*
   *Two cooks*
   [specific]

b. Addition of the negative, which is then allowed to have wide scope, forcing reinterpretation of the subject NP
   *Two cooks + didn’t*
   [specific] → [non-specific]

c. Formation and interpretation of the rest of the sentence
   *Two cooks didn’t taste the soup.*
   [specific] → [non-specific]
Assignment of the non-specific interpretation in Korean

a. Formation and interpretation of the phrase yolisa twu myeng-i
   ‘two cooks’ + nominative
   Yolisa twu myeng-i
   [a specific set of two cooks]

b. Addition of the negated verb, with wide scope for the negative, forcing reinterpretation of the subject NP
   Yolisa twu myeng-i... + an mek-ess-ka.
   [a specific set of two cooks] → [a non-specific set of two cooks]

The reinterpretation process required in (28b) and (29b) increases the burden on working memory and therefore adds to the processing cost for the sentence.

Turning now to the interpretation of English subject NPs by Korean L2 learners, I will adopt the approach to transfer outlined by O’Grady, Lee and Kwak (2009:83), which makes the following prediction.

(30) The preferred interpretation in the L1 will be favored in the L2 if and only if it does not have a greater processing cost in the L2.

According to this approach, if interpretation A is preferred to interpretation B in the L1, then interpretation A will also be preferred in the L2 unless interpretation B has a lower processing cost in the L2. If interpretation A and interpretation B are equally preferred, they will also be equally preferred in the L2 unless one has a lower processing cost than the other in the L2.

Take, for example, the Korean sentence Yolisa twu myeng-i swupu-lul an mek-ess-ka, ‘two cooks didn’t eat the soup’ for which the specific interpretation is strongly preferred for the reasons that we have already seen. According to the hypothesis above, this specific interpretation will also be preferred by Korean speakers in English unless the non-specific interpretation involves a lower processing cost in that language. As discussed above, in English, the non-specific interpretation doesn’t involve a lower
processing cost than the specific interpretation. Therefore, it is predicted that the specific interpretation will also be favored by Korean speakers in English. Our L2 English data bears out this prediction. Note that there is nothing that second language learners need to learn about English in this regard. The cost of processing the specific and non-specific interpretations in that language follows automatically from the burden that accrues on working memory in the course of comprehension, with extra cost arising whenever the processor has to retreat from its initial interpretation.

The present study has not tested the interpretive preferences of English-speaking learners of Korean, but like Korean-speaking L2 learners of English, they should prefer the specific interpretation when they process Korean sentences such as *Yolisa twu myeng-i swupu-lul an mek-ess-ta*, ‘two cooks didn’t eat the soup.’ Since the non-specific interpretation does not incur a lower processing cost than the specific interpretation in Korean, the English speakers are predicted to accept the specific interpretation more frequently in Korean, just as they do in their L1, English. This prediction should be confirmed experimentally in the future.

**5.2.3.2 Direct object NPs**

Now let us consider patterns, such as (31), in which the numerically quantified NP is a direct object.

(31) a. English

Tom didn’t cut down two apple trees.

b. Korean

*Cinho-ka sakwanamwu-lul twu kay an pey-ess-ta.*

Jinho-NOM apple tree-ACC two CL NEG cut down-PST-DECL

‘Jinho didn’t cut down two apple trees.’
The data from the native English group is compatible with the processor-based approach in that both specific and non-specific interpretations are equally accessible. Because negation precedes the direct object in English, the processor has the option of letting it have scope over the direct object from the outset and can therefore compute either a specific or non-specific interpretation without the need to retrace its steps.

(32) Assignment of the specific interpretation
   a. Combination of the negative and verb
      *Tom didn’t cut down*
   
   b. Addition of *two apple trees* and assignment of the specific interpretation
      *Tom didn’t cut down two apple trees.*
      [specific]

(33) Assignment of the non-specific interpretation
   a. Combination of the negative and verb
      *Tom didn’t cut down*
   
   b. Addition of *two apple trees* and assignment of the non-specific interpretation
      *Tom didn’t cut down two apple trees.*
      [non-specific]

What about L1 Korean data? As described in the preceding section, Korean speakers show a preference for the specific interpretation in the case of numerically quantified object NP patterns due to the interaction of the internal structure of the NP (including the classifier) with contextual clues. On this view, the specific interpretation is assigned as the default, all other things being equal, and an extra step is required to derive the non-specific reading. (Refer back to the relevant example in the earlier section.)

Now let us consider our Korean-speaking L2 group’s performance in English. According to the transfer hypothesis outlined earlier, the specific interpretation preferred in L1 Korean will also be preferred in L2 English unless the competing non-specific
interpretation involves a less processing cost. (Recall that there is no difference in the processing cost of the two interpretations for a direct object NP in English.) Our L2 data bears out the prediction: Both high and low proficiency L2 groups accepted the specific interpretation more frequently than the non-specific interpretation in English.

As in the numerically quantified subject NP cases, the present study has not tested interpretive preferences of Korean sentences containing numerically quantified object NP patterns by English-speaking learners of Korean but we can make a prediction on the basis of the transfer hypothesis. When they process negative sentences containing numerically quantified object NPs in their L1, English, both the specific and non-specific interpretation are equally accepted as explained above. In processing Korean sentences such as Cinho-ka sakwanamwu-lul twu kay an pey-ess-ta ‘Jinho didn’t cut down two apple trees,’ it is predicted that both interpretations will not equally accepted in Korean because in that language the specific interpretation incurs a lower processing cost than the non-specific interpretation when there is no special contextual support such as the existence of a preceding affirmative sentence carrying contrastive information. It is also predicted that the non-specific interpretation will not be favored by English-speaking L2 learners since the competing specific interpretation involves a lower processing cost in Korean. Further studies involving English-speaking learners of Korean should be investigated in order to examine whether these predictions are on the right track.

Still to be explained, however, is the fact that both low and high proficiency L2 groups accessed the non-specific interpretation at a higher rate in English than in Korean. How can we account for this increase in acceptance rates of the non-specific interpretation? The answer may lie in the input.
Even though negated sentences with numeral-bearing NPs in direct object position are relatively infrequent, L2 learners may be able to generalize from more frequent constructions of other types. According to Gennari and MacDonald (2005/6), for example, the analysis of child directed speech and children’s speech samples in English reveals that negative sentences containing transitive verbs typically have an interpretation in which negation has scope over elements to its right. For example, indefinite direct objects in negated sentences tend to have narrow scope (e.g., *I didn’t buy a bicycle*), as do quantified direct objects (as in *You aren’t going to have four dinners today*—‘It is not the case that you are going to have any four dinners today.’) (pp.151-2). It seems plausible to assume that similar tendencies are found in input to which L2 learners are exposed and will be noted by at least some L2 learners, who may then be able to overturn the propensity to assign numeral-bearing direct objects a specific interpretation especially since they can do so without incurring any extra processing cost.

This raises the possibility that the processor might actually overgeneralize in certain cases in L2. Of particular interest in this regard are patterns such as *Jane didn’t eat some oranges*, in which—contrary to the general tendency in English—the indefinite direct object allows only the specific interpretation (‘there are some oranges that Jane didn’t eat.’). Further research should be conducted to test how Korean-speaking L2 learners of English will interpret this type of sentence.

To sum up, the processor-based approach that we have outlined seems to account for our L2 English data in addition to the L1 Korean data even though there are some remaining issues to solve in further research. In order to broaden our understanding of
how this approach works in real time, it would be particularly helpful to conduct a study
by employing on-line measures such as eye tracking.

5.3 Availability of the specific interpretation for numerically quantified NP patterns
in Korean

As noted in Chapter 1, Korean nouns can occur with postnominal numeral
classifier constructions of various types. Of these, the pattern in which the noun takes an
accusative case particle and is followed by a numeral and a classifier, was chosen for the
experiments conducted in this dissertation.

(34) Example pattern: noun-accusative case marker + numeral + classifier
Holangi-nun pihayngki-lul twu kay an nall-yess-e.
Tiger-TOP airplane-ACC two CL NEG fly-PST-DECL
‘Tigger didn’t fly two airplanes.’

According to some researchers (Choi 2001, Lee 1994, 2000, Park 2009), this particular
pattern permits only a non-specific interpretation. However, the findings of our studies
clearly show that it can have a specific referent in certain contexts. This led us to suggest
that the specificity of Korean indefinite NPs, including the NP type exemplified in (34),
appears to depend on factors such as whether the preceding discourse highlights
individual entities that may be easily associated with the NP, the type of a verb with
which it occurs, tense and modality of the verb, and so on (O’Grady, personal
communication).

Target sentences containing numerals and negation tested in our studies were
preceded by either of two types of context stories: (1) the main character ends up
performing a target action on two of four objects, or (2) the main character ends up
performing a target action on one of two objects. In addition, in order to fulfill one of the
core requirements of the Truth Value Judgment Task that we employed, target sentences
were always presented in the past tense: At the end of each context story, the target sentence described what had happened in the story by using the past tense form.

In contexts that include a particular type of preceding discourse and/or the tense of target sentences, it may be easier to assign the numerically quantified NP pattern chosen in our studies a specific referent, contrary to the claim that it only takes a non-specific referent. For exposition, the sample item presented in Chapter 3 is repeated below.

(35) a. Context story in which two of the four objects are affected

Pooh and Tigger make things with paper in class together. Pooh makes a circle and triangles. Tigger makes four paper airplanes with a lot of excitement. He wants to fly them. He flies one of them. It flies well. Then, he flies the second airplane. It flies well too. Then, he grabs the other two airplanes. When he is about to fly them, it occurs to him that his friend loves flying paper airplanes. He decides to give the airplanes to his friend. So he doesn’t fly them.

b. Context story in which one of the two objects is affected

Pooh and Tigger make paper airplanes in class together. The teacher tells them to fly two airplanes each so that they can check whether the airplanes are well made. They are very excited and tell the teacher that they will. Pooh flies two airplanes. They fly very well. Tigger first flies one airplane. It flies well. Then, he grabs another airplane. But when he is about to fly it, he finds that it has a big hole in it. So he doesn’t fly it.

c. Target sentence

Holangi-nun pihayngki-lul twu kay an nall-yess-e.
Tigger-TOP airplane-ACC two CL NEG fly-PST-DECL
‘Tigger didn’t fly two airplanes.’

Given that context plays a crucial role in the interpretation of noun phrases in Korean, stories such as (35a) and (35b), which highlight individual entities, seem to increase the possibility that a numerically quantified NP pattern such as pihayngki-lul twu kay ‘two airplanes’ will refer to a specific set of two airplanes which has been established in the
discourse: For example, the third and fourth airplanes that were not flown by Tigger in (35a) and the two specific airplanes that Tigger was supposed to fly in (35b). The interpretive preferences for the specific reading found in our studies suggest that this is the case.

In addition, the past tense form used in all of the target sentences may have contributed to higher acceptance of a specific reading combined with the preceding discourse. When we describe events that happened in the accompanying story, we are more likely to associate indefinite NPs with specific referents established in the discourse than with non-specific referents. In contrast, when we predict or imagine events that will happen, the likelihood that an indefinite NP will denote a non-specific referent seems to increase. This provides another topic for further research. It will be informative to explore how the same type of NP is interpreted in sentences in non-past tense forms as follows, which does not evoke an actual event:

(36) Holangi-nun pihayngki-lul twu kay an nalli-l ke-ya.
    Tigger-TOP airplane-ACC two CL NEG fly-will-DECL

  ‘(I predict that) Tigger won’t fly two airplanes.’

In sum, the widely held view that the type of a numerically quantified NP pattern under consideration lacks a specific reading does not provide a full account for the distribution of the NP. The findings of the series of experiments conducted in this dissertation indicate that it may refer to a specific referent under certain contexts, opening the door for the further study of the way in which nonstructural information influences the processor as it seeks to interpret the NPs that it encounters.
5.4 Concluding remarks

In line with current acquisition research on the interpretation of scopally ambiguous sentences, this dissertation has explored the interpretation of numerically quantified NP patterns in negated sentences by examining L1 Korean and L2 English data. The findings of a series of studies reported here suggest that processing factors can play a crucial role in interpretive preferences in L1 and L2, and that nonstructural information may be employed in the interpretation of target constructions. In addition, by looking at the interpretation of numerically quantified NP patterns in Korean, which show typologically unusual properties, this dissertation shows that it is necessary to consider language-specific properties of numerically quantified NP patterns in our cross-linguistic comparison of interpretive preferences. Unsolved issues raised in each chapter await further research with an appropriate methodology.
APPENDIX A. TEST AND FILLER SENTENCES IN KOREAN FOR EXPERIMENT 2

1. Test sentences for the *two > not* context

 아주머니가 가방을 두 개 안 샀어.
 구피가 피자를 두 개 안 먹었어.
 도라가 우유를 두 개 (냉장고에) 안 넣었어.
 남자아이가 말을 두 마리 안 탔어.
 도라가 조개를 두 개 안 주셨어.

2. Test sentences for the *not > two* context

 여자아이가 과자를 두 개 안 먹었어.
 남자아이가 개를 두 마리 안 만졌어.
 피그렛이 책을두 개 안 읽었어.
 도날드 덕이 풍선을 두 개 안 터뜨렸어.
 도라가 우유를 두 개 안 마셨어.

3. Filler sentences

 여자아이가 자전거를 안 탔어.
 피그렛이 그네를 안 탔어.
 구피가 별을 두 개 그렸어.
 피그렛이 아이스크림을 한 개만 먹었어.
 여자아이가 붉고기를 네 마리 샀어.
 미키가 공책에 스티커를 세 개만 붙었어.
 구피가 네모를 안 그렸어.
 푸가 모자를 두 개만 샀어.
 미키가 풍선을 하나도 안 붙었어.
 티거가 조개를 모두 못 찾았어.
 곰이 고양이를 모두 안 찾았어.
 푸가 동그라미를 모두 색칠 안 했어.
APPENDIX B. TEST AND FILLER SENTENCES IN KOREAN FOR EXPERIMENT 3

1. Test sentences for Condition 1 and Condition 2

티거는 책을 두 권 안 읽었어.
도라는 사과를 두 개 안 먹었어.
톰은 구두를 두 켤레 안 닦았어.
부츠는 우유를 두 개 안 샀어.
도라는 페자를 두 개 안 먹었어.
메리는 말을 두 마리 안 먹었어.
티거는 풍선을 세 개 안 불었어.
푸는 별을 세 개 색칠 안 했어.
톰은 그림조각을 세 개 안 찾아.
부츠는 우유를 세 개 안 샀어.
도라는 접시를 세 개 안 치웠어.
티거는 조개를 세 개 안 찾았어.

2. Test sentences for Condition 3 and Condition 4

푸는 책을 두 권 읽었지만 티거는 책을 두 권 안 읽었어.
부츠는 사과를 두 개 먹었지만 도라는 사과를 두 개 안 먹었어.
메리는 구두를 두 켤레 닦았지만 풍선 구두를 두 켤레 안 닦았어.
도라는 우유를 두 개 샀지만 부츠는 우유를 두 개 안 샀어.
부츠는 페자를 두 개 먹었지만 도라는 페자를 두 개 안 먹었어.
톰은 말을 두 마리 먹었지만 메리는 말을 두 마리 안 먹었어.
피그렛은 풍선을 세 개 불었지만 티거는 풍선을 세 개 안 불었어.
티거는 별을 세 개 색칠했지만 푸는 별을 세 개 색칠 안 했어.
메리는 그림조각을 세 개 찾아지만 풍선이 그림조각을 세 개 안 찾아.
메리는 물고기를 세 마리 샀지만 풍선 물고기를 세 마리 안 샀어.
부츠는 접시를 세 개 치웠지만 도라는 접시를 세 개 안 치웠어.
푸는 조개를 세 개 찾아지만 티거는 조개를 세 개 안 찾았어.

3. Filler sentences

도라와 부츠가 체리를 다섯 개씩 샀어.
모리는 사탕을 세 개 먹었어.
도라는 조개를 한 개 주었어.
남자아이는 개를 네 마리 만겼어.
곰돌이가 고양이를 두 마리만 찾아.
미키가 풍선을 두 개만 불었어.
미키가 수첩과 저금통에 스티커를 세 개씩 붙였어.
남자가이가 말은 한 마리 타고 소는 두 마리 탔어.
푸가 동그라미를 두 개 색칠하고 네모를 한 개 색칠했어.
아주머니는 체리를 세 개 사고 토마토는 더 많이 샀어.
도라는 수첩에 나비스티커를 모두 붙였어.
구피는 가방에 바나나와 사탕을 모두 넣었어.
푸가 친구를 한 명도 못 찾았어.
피그랫이 아이스크림을 안 먹었어.
구피는 동그라미를 그리고 미키는 동그라미를 안 그렸어.
호랑이는 별은 그리고 동그라미는 안 그렸어.
APPENDIX C. TEST AND FILLER SENTENCES IN KOREAN FOR EXPERIMENT 4

1. Test sentences for Condition 1 and Condition 3

호랑이는 모자를 안 그렸어.
곰은 야채를 안 썰었어.
오리는 접시를 안 닦았어.
메리는 초를 안 켰어.
톰은 요구르트를 안 먹었어.
도라는 바나나를 안 먹었어.
도라는 풍선을 안 터뜨렸어.
메리는 말을 안 탔어.
톰은 물고기를 안 삽어.
도라는 조개를 안 주었어.
톰은 개를 안 만졌어.
호랑이는 비행기를 안 날렸어.
곰은 연필을 안 깎았어.
톰은 신발을 안 닦았어.
톰은 그림조각을 안 찾아.
호랑이는 책을 안 읽었어.

2. Test sentences for Condition 2 and Condition 4

호랑이는 모자를 두 개 안 그렸어.
곰은 야채를 두 개 안 썰었어.
오리는 접시를 두 개 안 닦았어.
메리는 초를 두 개 안 켰어.
톰은 요구르트를 두 개 안 먹었어.
도라는 바나나를 두 개 안 먹었어.
도라는 풍선을 두 개 안 터뜨렸어.
메리는 말을 두 마리 안 탔어.
톰은 물고기를 두 마리 안 삽어.
도라는 조개를 두 개 안 주었어.
톰은 개를 두 마리 안 만졌어.
호랑이는 비행기를 두 개 안 날렸어.
곰은 연필을 두 개 안 깎았어.
톰은 신발을 두 개 안 닦았어.
톰은 그림조각을 두 개 안 찾아.
호랑이는 책을 두 개 안 읽었어.
원숭이는 토마토를 두 개 샀어.
곰은 고양이를 한 마리만 찾았어.
도라는 모든 동물 스티커를 필통에 붙였어.
도라는 모든 접시를 치웠어.
원숭이는 우유를 두 개 샀어.
오리는 꽃자를 네 개 먹었어.
메리는 개를 세 마리 먹었어.
돼지는 그네를 탔어.
곰은 과일을 씻었어.
호랑이는 풍선을 불었어.
오리는 햄버거를 먹었어.
구피는 가방에 사탕을 모두 안 냈어.
곰은 별을 모두 색칠 안 했어.
돼지는 아이스크림을 모두 안 먹었어.
오리는 동그라미를 모두 색칠 안 했어.
APPENDIX D. TEST AND FILLER SENTENCES
FOR EXPERIMENT 5

1. English filler sentences

Four bottles were broken by Tom.
The onions were sliced by Tom.
All the small plates were washed by Mary.
Three pebbles were picked up by Tom.
The big airplanes worked very well.
The short pencils were sharpened by Mary.
The German words were written by Mary.
All the radios were fixed by Tom.
Two peach trees were cut down by Mary.

2. Korean test sentences

남자아이 두 명이 개를 안 쓰다듬었다.
 아주머니 두 명이 새 러닝머신에서 안 뛰었다.
 남자아이 두 명이 클래식 음악을 안 들었다.
 여자아이 두 명이 물약을 안 먹었다.
 남학생 두 명이 얼굴을 안 그렸다.
 요리사 두 명이 수프를 안 먹었다.
 선수 두 명이 높은 허들을 안 넘었다.

3. Korean filler sentences

짧은 연필들을 혜수가 깎았다.
독일어 단어 두 개가 혜수에 의해 쓰여졌다.
모든 라디오가 진호에 의해 고쳐졌다.
작은 조 네 개가 진호에 의해 켜졌다.
병 네 개가 진호에 의해 깨졌다.
양파를 진호가 썰었다.
모든 작은 접시가 혜수에 의해 닦여졌다.
조약돌 세 개를 진호가 주었다.
복숭아 나무 두 개를 혜수가 베었다.
큰 비행기들이 잘 날았다.
APPENDIX E. TEST AND FILLER SENTENCES FOR EXPERIMENT 6

1. English filler sentences
   The boys patted a cat.
   The women cleaned the old treadmill.
   The students read a magazine.
   The girls ate the soup.
   The guys rode three wild cows.
   All the students drew the tree.
   The cooks tasted four pieces of cake.
   The athletes jumped over the low hurdle.
   The four boys didn’t listen to jazz music.
   The girls didn't swim in the sea.

2. Korean test sentences
   혜수가 큰 초를 두 개 안 켰다.
   진호가 당근을 두 개 안 썰었다.
   혜수가 조개를 두 개 안 주웠다.
   혜수가 긴 연필을 두 개 안 깎았다.
   혜수가 상자를 두 개 안 냉렸다.
   진호가 컴퓨터를 두 개 안 고쳤다.
   진호가 사과나무를 두 개 안 베타.
   진호가 일본어 단어를 두 개 안 썼다.

3. Korean filler sentences
   아주머니들이 오래된 러닝머신을 청소했다.
   여자아이들이 수프를 먹었다.
   남자들이 야생소를 세 마리 탔다.
   모든 학생들이 나무를 그렸다.
   요리사들이 케이크를 세 조각 맛보았다.
   선수들이 낮은 허들을 한 개 넘었다.
   남자아이들이 고양이를 한 마리 쏙다듬었다.
   학생들이 잭지를 한 권 입었다.
   남자아이들이 재즈음악을 안 들었다.
   여자아이들이 바다에서 수영을 안 했다.
APPENDIX F. CLOZE TEST

DIRECTIONS

1. Read the passage quickly to get the general meaning.
2. Write only one word in each blank next to the item number. Contractions are considered to be one word.
3. Check your answers.

EXAMPLE: The boy walked up the street. He stepped on a piece of ice.

He fell (1) **down** but he didn’t hurt himself.

MAN AND HIS PROGRESS

Man is the only living creature that can make and use tools. He is the most teachable of living beings, earning the name of Homo sapiens. (1) __________ ever restless brain has used the (2) __________ and the wisdom of his ancestors (3) __________ improve his way of life. Since (4) __________ is able to walk and run (5) __________ his feet, his hands have always (6) __________ free to carry and to use (7) __________. Man’s hands have served him well (8) __________ his life on earth. His development, (9) __________ can be divided into three major (10) __________, is marked by several different ways (11) __________ life.

Up to 10,000 years ago, (12) __________ human beings lived by hunting and (13) __________. They also picked berries and fruits, (14) __________ dug for various edible roots. Most (15) __________, the men were the hunters, and (16) __________ women acted as food gatherers. Since (17) __________ women were busy with the children, (18) __________ men handled the tools. In a (19) __________ hand, a dead branch became a (20) __________ to knock down fruit or (21) __________ for tasty roots.
Sometimes, an animal (22)__________ served as a club, and a (23)__________ piece of stone, fitting comfortably into (24)__________ hand, could be used to break (25)__________ or to throw at an animal. (26)__________ stone was chipped against another until (27)__________ had a sharp edge. The primitive (28)__________ who first thought of putting a (29)__________ stone at the end of a (30)__________ made a brilliant discovery: he (31)__________ joined two things to make a (32)__________ useful tool, the spear. Flint, found (33)__________ many rocks, became a common cutting (34)__________ in the Paleolithic period of man’s (35)__________. Since no wood or bone tools (36)__________ survived, we know of this man (37)__________ his stone implements, with which he (38)__________ kill animals, cut up the meat, (39)__________ scrape the skins, as well as (40)__________ pictures on the walls of the (41)__________ where he lived during the winter.

(42)__________ the warmer seasons, man wandered on (43)__________ steppes of Europe without a fixed (44)__________, always foraging for food. Perhaps the (45)__________ carried nuts and berries in shells (46)__________ skins or even in light, women (47)__________. Wherever they camped, the primitive people (48)__________ fires by striking flint for sparks (49)__________ using dried seeds, moss, and rotten (50)__________ for tinder. With fires that he kindled himself, man could keep wild animals away and could cook those that he killed, as well as provide warmth and light for himself.
## ANSWER KEYS

<table>
<thead>
<tr>
<th>Item</th>
<th>Target</th>
<th>Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>his</td>
<td>our, man's, the</td>
</tr>
<tr>
<td>2</td>
<td>knowledge</td>
<td>ideas, skill, work, teaching, wit, experience(s), talent, ingenuity, intelligence, cunning, culture, examples, mistakes, skills, words, thought, accomplishments, power, hands, nature, technique, instinct, will, information</td>
</tr>
<tr>
<td>3</td>
<td>to</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>man</td>
<td>he</td>
</tr>
<tr>
<td>5</td>
<td>on</td>
<td>with, using, upon</td>
</tr>
<tr>
<td>6</td>
<td>been</td>
<td>hung, felt, remained</td>
</tr>
<tr>
<td>7</td>
<td>tools</td>
<td>freely, implements, readily, them, objects, carefully, productively, creatively, conventionally, weapons, adequately, diligently, efficiently, things</td>
</tr>
<tr>
<td>8</td>
<td>during</td>
<td>throughout, in, all, with, improving, for, through</td>
</tr>
<tr>
<td>9</td>
<td>which</td>
<td>however, often, also, since, that, conveniently, easily, historically, basically, thus</td>
</tr>
<tr>
<td>10</td>
<td>periods</td>
<td>groups, categories, parts, eras, stages, areas, sections, phases, topics, divisions, trends, steps, facets</td>
</tr>
<tr>
<td>11</td>
<td>of</td>
<td>for, towards, through, in</td>
</tr>
<tr>
<td>12</td>
<td>all</td>
<td>most, the, many, early, these, hungry, primitive, only</td>
</tr>
<tr>
<td>13</td>
<td>fishing</td>
<td>gathering, farming, killing, scavenging, sleeping, trapping, foraging</td>
</tr>
<tr>
<td>14</td>
<td>and</td>
<td>often, some, the, ravenously</td>
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<tr>
<td>15</td>
<td>often</td>
<td>of, normally, always, trips, nights, important, times, emphatically</td>
</tr>
<tr>
<td>16</td>
<td>the</td>
<td>most, many, house, all, their, younger, older</td>
</tr>
<tr>
<td>17</td>
<td>the</td>
<td>most, many, often, all, married, these, primate, older</td>
</tr>
<tr>
<td>18</td>
<td>the</td>
<td>most, many, tough, constructive, primate, older, younger, all</td>
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<td>19</td>
<td>man's</td>
<td>skilled, strong, learned, single, skillful, closed, big, empty, able, human(s), hunter's, person's, free, creative, right, needy, trained, deft, small, needed, coordinated</td>
</tr>
<tr>
<td>20</td>
<td>tool</td>
<td>club, pole, device, rod, stick, spear, instrument, weapon</td>
</tr>
<tr>
<td>21</td>
<td>dig</td>
<td>burrow, search, probe, excavate, test</td>
</tr>
<tr>
<td>22</td>
<td>bone</td>
<td>leg, horn, foot, tusk, tail, skull, had, arm, easily, hide</td>
</tr>
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<td>23</td>
<td>sharp</td>
<td>round, shaped, small, strong, chipped, fashioned, big, heavy, soft, rough, smooth, solid, sizeable, flat, thin, large, hard</td>
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<td>24</td>
<td>the</td>
<td>one(s), man's, a, his</td>
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<td>25</td>
<td>nuts</td>
<td>branches, wood, heads, bones, apart, trees, things, coconuts, down, bark, tinder, firewood, objects, food, sticks, shells, rocks, items, open, stone, ice, meat</td>
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<td>26</td>
<td>one</td>
<td>the, softer, obsidian, shale, a, flat, hard, flint, glass, some, then, each, this</td>
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<td>Page</td>
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<td>------</td>
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<td>---</td>
</tr>
<tr>
<td>27</td>
<td>it</td>
<td>one, they, each</td>
</tr>
<tr>
<td>28</td>
<td>man</td>
<td>owner, being, person, human's, men, hunter, people, creature</td>
</tr>
<tr>
<td>29</td>
<td>sharp</td>
<td>small, sharpened, pointed, glass, lime, jagged, hard, large</td>
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<td>30</td>
<td>stick</td>
<td>branch, log, rod, shaft, pole, bone, club</td>
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<tr>
<td>31</td>
<td>had</td>
<td>then, first, clumsily, tightly, tastefully, dexterously, cleverly, simply, double, securely, easily, soon, creatively, ingeniously, conveniently, would, suddenly, accidentally</td>
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<td>32</td>
<td>very</td>
<td>portentously, modern, useful, tremendously, necessarily, good, long, bad, quite, hunter's, extremely, intelligent, most, incredibly, new</td>
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<tr>
<td>33</td>
<td>in</td>
<td>that, among, by, using, inside, amongst, within, on, all</td>
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<td>34</td>
<td>tool</td>
<td>stone, device, material, instrument, practice, utensil, implement, edge, piece, method, item, object</td>
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<tr>
<td>35</td>
<td>development</td>
<td>history, evolution, life, existence, time, discoveries, age, exploration, era, ancestry</td>
</tr>
<tr>
<td>36</td>
<td>have</td>
<td>actually, apparently, ever</td>
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<tr>
<td>37</td>
<td>by</td>
<td>and, used, from, through, for, using, had, made</td>
</tr>
<tr>
<td>38</td>
<td>could</td>
<td>would, did</td>
</tr>
<tr>
<td>39</td>
<td>and</td>
<td>or, then, carefully, would, help, skillfully</td>
</tr>
<tr>
<td>40</td>
<td>draw</td>
<td>carve, paint, create, the, hang, drawing, painting, place, sketch, engrave, some</td>
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<tr>
<td>41</td>
<td>cave(s)</td>
<td>place(s), animals, room</td>
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<tr>
<td>42</td>
<td>in</td>
<td>during, and, with</td>
</tr>
<tr>
<td>43</td>
<td>the</td>
<td>plain, unknown, to, flat, high, various, dry, toward, through, stone, across, aimless, barren, long, in, all, many</td>
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<td>44</td>
<td>home</td>
<td>habitat, meal, income, weapons, diet, direction, destination, course, path, supplement, domain, place, camp, time, map, route, supply, lunch, plan, destiny, location, pattern, knowledge, foundation, appetite</td>
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<td>45</td>
<td>women</td>
<td>men, man, primitives, wanderers, people, human, woman, children, voyager, group, families, hunter</td>
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<td>46</td>
<td>or</td>
<td>and, with, of, animal, in, like, using, on, their, animal's, covered</td>
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<td>47</td>
<td>baskets</td>
<td>bags, cloth(s), sacks, pouches, garments, material, fabric, chests, nets, hides, blankets, clothes</td>
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<tr>
<td>48</td>
<td>made</td>
<td>started, lit, built, lighted, used, produced, began</td>
</tr>
<tr>
<td>49</td>
<td>and</td>
<td>then, while, by, or, occasionally, together, also</td>
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<tr>
<td>50</td>
<td>wood</td>
<td>branches, bark, lumber, tree(s), skin, dung, roots, grass, timber, forage, leaves</td>
</tr>
</tbody>
</table>
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