

Korean-speaking L2 Learners' Comprehension of Sentences Containing Numerically Quantified NPs and Negation in English*

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This study investigates Korean-speaking second language learners' comprehension of scopally ambiguous sentences in English that contain numerically quantified object NPs and negation (e.g., *Tom didn't cut down two apple trees*). Using a written Truth Value Judgment Task, the study examines how the learners' interpretive preferences in English compare to those of their native language and whether there are any differences in interpretive preferences across proficiency levels. Seventy native Korean-speaking learners of English, divided into low and high proficiency groups, and twelve English native speakers participated in the study. The participants' responses in the Truth Value Judgment Task were analyzed in terms of the acceptance of specific or non-specific interpretations of the target sentences. The learners tended to prefer the specific interpretation to the non-specific interpretation, in contrast to the English native speakers, who did not show a clear preference. The learners' preference in English was similar to their preference in Korean. The low and high proficiency learner groups showed no difference in their interpretive preferences. The learners' interpretive preferences in English are discussed in the framework of the processor-based approach to scope interpretation proposed by O'Grady (2005, 2008, 2013) and O'Grady, M. Lee and H. Y. Kwak (2009), which highlights the importance of processing considerations in scope interpretation.

**[numeral quantifier/negation/interpretive preferences/processor-based approach/
수량양화사/부정어/이해선호양상/언어처리]**

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I. INTRODUCTION

A sentence containing a numeral quantifier and negation, like those in (1), is known to cause scope ambiguity in both Korean and English.

(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

Dora didn’t pick up two seashells.

Both the Korean and English sentences in (1) are scopally ambiguous due to the interaction between the numeral quantifier *two* and the negation; thus, they each have two possible interpretations (H. Y. Kwak, 2012; Lidz & Musolino, 2002; O’Grady, 2008). The first interpretation is ‘there are two particular seashells that Dora didn’t pick up.’ This interpretation is called the quantifier wide scope (*two* > *not*) interpretation or specific interpretation, where the quantified noun phrase (NP) is interpreted without being influenced by the negation. The second interpretation of the sentences is ‘it is not the case that Dora picked up any two seashells,’ and this is called the negation wide scope (*not* > *two*) interpretation or non-specific interpretation, where the interpretation of the quantified NP is influenced by the negation.

Previous studies on Korean and English native speakers’ comprehension of sentences such as those in (1) have revealed that adult native speakers of each language have different interpretive preference patterns (H. Y. Kwak, 2012; Lidz & Musolino, 2002). For example, H. Y. Kwak (2012) showed that Korean adult speakers have a preference for the specific interpretation. In contrast, Lidz and Musolino (2002) demonstrated that English adult speakers accepted the two interpretations at approximately equal rates, showing no preference toward one interpretation.

The findings of previous research on interpretive preferences by native Korean and English speakers raise interesting questions on second language acquisition. How do second language (L2) learners of Korean and English interpret target sentences containing quantified NPs and negation in an L2 that has interpretive preferences different from those of their first language (L1)? Does the L1 play a role in second language acquisition of scope interpretations?

The interpretation of scopally ambiguous sentences containing quantifiers and negation in second language acquisition has received much attention from scholars working in various theoretical frameworks. Given that such sentences are used infrequently in spoken

or written language (Gennari & MacDonald, 2006), how second language learners acquire target interpretations in the L2 and whether there is any transfer of interpretive preferences from the L1 are matters of interest. Recently, one line of research that has investigated these issues has shown that interpretive preferences in the L1 may play an important role in second language acquisition of scope interpretation (M. Kim, 2010; S. Lee, 2009; O'Grady, M. Lee, & H. Y. Kwak, 2009). Among the different theoretical approaches to transfer in second language acquisition, the processing perspective proposed by O'Grady (2013) and O'Grady et al. (2009) suggests that a dominant interpretation in the L1 that has a lower processing cost can be carried over to the L2 unless the assignment of that interpretation is less favorable in the L2 than in the L1. Research in this framework has focused on L2 learners' comprehension of sentences containing universal quantifiers and negation such as *Dora didn't pick up all the seashells/every seashell*. However, there have been few studies conducted with a focus on sentences containing numeral quantifiers and negation. Given that numeral quantifiers have semantic properties different from those of universal quantifiers (Hornstein, 1984; Lidz & Musolino, 2002), it is worthwhile to explore the interpretation of numeral quantifiers in relation to negation. Furthermore, from the educational perspective, this study provides some insight into how the interpretation of this type of sentence can be taught to Korean students learning English as a foreign language.

This study aims to, first, examine the interpretive preferences for sentences containing numerically quantified object NPs and negation in English manifested by Korean-speaking L2 learners, which is a little-investigated topic; second, to explore how their interpretive preferences in the L2 compare to those in the L1; and third, to account for their interpretive preferences in the L2 from the processing perspective.

II. THEORETICAL BACKGROUND

1. Processor-based Account of Scope

O'Grady (2005) proposes that the processor, which values efficiency and seeks to reduce the burden on working memory in performing computational operations, plays a major role in how language works and how language properties are acquired. This processor-based approach to scope interpretation posits two assumptions (Grodner & Gibson, 2005, pp. 262-263; O'Grady, 2008, p. 13):

- (2) a. As the processor processes a sentence, an NP is encountered and assigned an initial interpretation based on its position and other clues (e.g., determiner type, case marker, context, etc.):

NP

[x]

- b. Based on the properties of a subsequently encountered element,
the NP's interpretation may have to be recomputed:

NP.....Z.....

[x] → [y]

According to O'Grady (2008), the revision of a previously assigned interpretation is computationally costly because it disrupts the normal linear operation of the processor. Thus, an interpretation requiring a recomputation process would increase the burden on working memory, a temporary storage of information during language processing, because the memory system has to hold more information relevant to the on-going processing task than it does for the interpretation without the revision process. This will cause more processing difficulty, and therefore would be less preferred.

Let us take, for example, the interpretation of the numerically quantified subject NP *two cooks* in the sentence *two cooks didn't taste the soup*. According to O'Grady (2008), in assigning the specific meaning 'there are two particular cooks who didn't taste the soup', the processor encounters the phrase *two cooks* and interprets it as specific based on the universal tendency of subject NPs to have specific referents (Aissen, 2003, as cited in O'Grady, 2008).

Two cooks

[specific: two particular cooks]

The processor then encounters the rest of the sentence and assigns its meaning without changing the interpretation of the subject NP.

In assigning the non-specific interpretation, the subject NP is again assigned the specific interpretation in the initial stage. Then, however, the negative is encountered and is allowed to have wide scope; the interpretation of the subject NP therefore has to be recomputed from the specific to the non-specific 'it is not the case that any two cooks tasted the soup.'

Two cooks + didn't

[specific: two particular cooks] → [non-specific: any two cooks]

In the processing-based framework, this reinterpretation causes a higher processing cost, that is, more difficulty for the processor. Therefore, it is predicted that the non-specific interpretation is less accessible and less preferred than the specific interpretation. This

prediction has been supported by studies testing adult English native speakers (for example, Musolino & Lidz, 2003)

2. Processor-based Approach to Transfer in L2 Acquisition

O'Grady's (2005, 2008, 2013) processor-based approach to scope interpretation accounts for transfer in L2 acquisition from the processing perspective. This approach proposes that the dominant scope interpretation in the L1 will be transferred to the L2 unless that dominant interpretation is more computationally costly in the L2 than in the L1 (O'Grady et al., 2009; O'Grady, 2013). Let us take the interpretation of a sentence containing a numerically quantified NP and negation as an example. The sentence *Dora didn't pick up two seashells* can have the specific or the non-specific interpretation, as discussed in the introduction. The specific interpretation is 'there are two particular seashells that Dora didn't pick up' and the non-specific interpretation is 'it is not the case that Dora picked up any two seashells.' In the case of L1 Korean and L2 English, if the specific interpretation is the dominant interpretation of NPs and does not involve a reinterpretation process in the L1 Korean, then the prediction is that the specific interpretation will be transferred to L2 English if that interpretation does not have a higher processing cost in English than in Korean. In contrast, if the specific interpretation is more costly in English than in the L1 Korean, that interpretation will not be transferred to the L2 English. According to this framework, processing considerations play a major role in the phenomenon of transfer in second language acquisition.

3. Previous Studies on L2 Acquisition of Scope Interpretation

Most L2 acquisition studies of scope interpretation involving Korean and English have explored how L2 learners interpret scopally ambiguous sentences containing universal quantifiers such as *all* and *every* and negation in the L2 in comparison to the L1. A few of these studies have accounted for interpretive preferences in the L2 in the framework of the processor-based approach to scope (S. Lee, 2009; O'Grady et al., 2009; O'Grady, 2013). For example, O'Grady et al. (2009) examined how Korean-speaking L2 learners of English interpret sentences like (3) and (4).

(3) English sentence

Tom didn't fix all the computers.

a. Full set interpretation (*all* > *not* interpretation)

'Tom fixed none of the computers.'

b. Partitioned set interpretation (*not* > *all* interpretation)

‘Not all the computers were fixed: Tom fixed some of the computers
but he didn’t fix some of them.’

(4) Korean sentence

Tom-i motun khemphyute-lul kochi-ci anh-ass-ta.
Tom-Nom all computers-Acc repair-ci NEG-do-Pst-Decl
‘Tom didn’t fix all the computers.’

Sentences like those in (3) and (4) are known to have two interpretations. One of them is the full set interpretation, ‘Tom fixed none of the computers,’ where the universally quantified NP is interpreted without being influenced by the negative *not*. The other interpretation is the partitioned set interpretation, ‘Tom fixed some of the computers, but he didn’t fix some of them,’ where the quantified NP is interpreted under the influence of the negative.

O’Grady et al. (2009) proposed that in English the two interpretations are comparable from the processing perspective.¹ According to them, the processor interprets the subject NP, *Tom*, first, and then the negative *didn’t* and the verb *fix*. In encountering the object NP, it calculates the full set interpretation or the partitioned set interpretation without the recalculation process given that the negative *didn’t* has been interpreted prior to the quantified NP. However, in the case of the Korean counterpart sentence, they proposed that the full set interpretation is favorable from the processing perspective. Given that in Korean the quantified object NP precedes the main verb in a sentence, the processor gives the object NP the full set interpretation by default.

(5) Formation of the object NP and assignment of the full set interpretation

... motun khemphyute-lul
[full set]

In contrast, to assign the partitioned set interpretation, the processor must recalculate the interpretation of the object NP. Upon encountering the negative *-ci anh* form and allowing the negative to have wide scope over the quantified NP, the processor must trace back to the interpretation of the object NP and recalculate it from the full set to the partitioned set. This recalculation process increases processing costs.

(6) a. Formation of the object NP and assignment of the full set interpretation

¹ It has been argued that adult English native speakers prefer the partitioned set interpretation for universally quantified NPs in negative sentences for pragmatic reasons, not due to processing considerations. For more information, see O’Grady (2013).

... motun khemphute-lul

[full set]

b. Addition of the negative and reinterpretation of the previously encountered object NP

... motun khemphute-lul kochi-ci anh-ass-ta

[full set] → [partitioned set]

O'Grady et al. (2009) tested how 42 native speakers of Korean who were university students interpreted English sentences containing universally quantified direct object NPs and negation in comparison to the Korean counterpart sentences. For data collection, they employed a written version of a Truth Value Judgment Task (Crain & Thornton, 1998). During the task, the participants were given two types of context stories followed by summary pictures of the end results of the stories. The context stories were presented in two conditions: one context favoring the full set interpretation and the other context favoring the partitioned set interpretation. In the context favoring the full set interpretation, the full set interpretation of a test sentence was true while the partitioned set interpretation was false. By contrast, in the context favoring the partitioned set interpretation, the partitioned set interpretation was true and the full set interpretation was false. For example, in the context story favoring the full set interpretation, Tom, the main character, was supposed to fix three computers but he ended up fixing none of the computers. In the context story favoring the partitioned set interpretation, Tom ended up fixing one of the computers.

The participants read a written version of the context stories while hearing a prerecorded version of the stories. At the end of each context story, they read a test sentence containing a universally quantified direct object NP and negation such as *Tom didn't fix all the computers*. They were asked to judge whether the sentence was true or false according to the context story that they had read.

The test materials consisted of eight target items, ten fillers, and two practice items. The participants were tested on the English version of the materials and then were tested on the Korean version of the materials a week later.

O'Grady et al. (2009) found that in L2 English, the Korean-speaking L2 learners of English accepted the full set interpretation 93% of the time in the context favoring the full set interpretation and accepted the partitioned set interpretation 28% of the time in the context favoring the partitioned set interpretation. They also found that as in English, in their L1 Korean, the participants accepted the full set interpretation more frequently than the partitioned set interpretation (97% versus 21%). The researchers accounted for the strong preference for the full set interpretation in both English and Korean from the processing perspective. They proposed that the full set interpretation preferred in L1

Korean was transferred to L2 English because the interpretation does not have a higher processing cost in English than in Korean.

Research on scope interpretation involving numeral quantifiers and negation has mainly focused on how children acquire the target interpretations in their native language. Few studies have explored scope interpretation involving these linguistic elements in L2 acquisition; however, one study explored L2 acquisition of scope interpretation in English and Turkish. Özçelik (2009) investigated how L1 Turkish learners of L2 English and L1 English learners of L2 Turkish interpret the following sentences:

(7) a. English sentence

Donald didn't find two guys.

b. Turkish sentence

Donald iki çocuk bul-ma-dı

Donald two child find-NEG-Pst

'Donald didn't find two guys.'

Specific interpretation: 'There are two particular guys that Donald didn't find.'

Non-specific interpretation: 'It is not the case that Donald found any two guys.'

Özçelik pointed out a cross-linguistic difference in interpretive patterns between English and Turkish. In English, both the specific and non-specific interpretations are possible. In contrast, in Turkish, only the non-specific interpretation is possible. He tested nineteen L1 Turkish learners of L2 English including ten advanced and nine intermediate learners, and nine L1 English learners of L2 Turkish including six advanced and three intermediate learners, along with ten native speakers of Turkish as a control group. The study employed a written version of a TVJT where a participant read a short context story and judged whether a target sentence was true or false according to the story. The context stories, which were of only one type, favored the specific interpretation, where the specific interpretation was true and the opposite interpretation was false. For example, in the context story for the target sentence in (7), Donald found two of the four friends playing hide-and-seek with him. The specific interpretation was true because there were two friends that Donald didn't find. However, the non-specific interpretation was false because Donald did find two of the four.

Özçelik (2009) found that both intermediate and advanced L2 English learners accepted the specific interpretation of the English sentences, which is allowed in the L2 but not in their L1. All of the L2 learners of Turkish also accepted the specific interpretation of the Turkish sentences, which is allowed in their L1 but not in the L2. Based on these findings, he claimed that the L2 English learners were able to acquire the specific interpretation by

being exposed to the L2 input, whereas the L2 Turkish learners carried their L1 interpretive patterns over to their L2 due to the lack of positive evidence in the input showing that the specific interpretation was not allowed.

Özçelik (2009) showed that an L1 may play a role in L2 scope interpretation involving numeral quantifiers and negation. However, cross-linguistic differences between Korean and English interpretive patterns differ from those between Turkish and English. While both specific and non-specific interpretations are possible in Korean and English, preference patterns differ. In addition, unlike Turkish, Korean uses classifier constructions in numerically quantified NPs, as in (8).

- (8) *cokay-lul* *twu* *kay*
 seashell-Acc *two* *CL*
 'two seashells'

In (8), the classifier *kay* attached to the numeral *twu* 'two' is a default classifier that indicates that the noun with which it is associated refers to 3-D objects (M. Choo & H. Y. Kwak, 2008). It is worthwhile to explore how numerically quantified NPs containing these constructions interact with negation in scope interpretation.

4. Research Questions

Several of the studies discussed thus far have shown that processing considerations may play a role in interpretive preference patterns in scope interpretation involving quantifiers and negation. Most of the studies that tested L1 Korean learners of L2 English focused on interpretive preferences involving universal quantifiers and negation. Investigating the interpretation of negative sentences containing other types of quantified NPs will help to corroborate the processor-based account for scope interpretation. Few studies have been conducted focusing on the interpretation of sentences containing numerically quantified NPs and negation. This study aims to help fill this gap in the literature. This study investigates the following research questions:

- 1) How do Korean-speaking L2 learners of English comprehend scopally ambiguous sentences containing numerically quantified object NPs and negation in their target language?
- 2) 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? Is there any transfer from L1 in L2 scope interpretation?

III. METHOD

1. Participants

Seventy learners of English who were recruited in Korea participated in the experiment. All of them were students at two universities in Korea, and they included 29 males and 41 females. In order to estimate the participants' English proficiency levels, they were given a cloze test devised by Brown (1980). Based on their test scores, they were divided into two groups: a high proficiency group, whose scores were higher than the mean score, and a low proficiency group, whose scores were equal to or lower than the mean.² The mean length of time spent in English-speaking countries for the high and low proficiency groups was 4.09 months and 1.29 months, respectively. As a control group, twelve English native speakers who were recruited in the United States were tested.

2. Procedure

For data collection, a written version of a Truth Value Judgment Task was employed, which was similar to that used by O'Grady et al. (2009). During the task, all participants read context stories followed by summary pictures, and then read target sentences. They then judged whether the sentences were true or not according to the stories that they had read. After making their choices, they were asked to write down the reasons for their choices for some of the items.

The Korean-speaking L2 participants were tested on the English version of the task first. Two weeks later, they were tested on the Korean version of the task, and they filled out background information questionnaires. The English native speaker group was tested on the English version of the task only.

3. Materials

Two types of context stories were constructed for the task: contexts favoring the non-specific interpretation and contexts favoring the specific interpretation. In the context stories favoring the non-specific interpretation, the non-specific interpretation was true while the specific interpretation was false. In contrast, in the context stories favoring the specific interpretation, the specific interpretation was true and the non-specific

² In the cloze test, participants read a passage consisting of three paragraphs with 50 blanks, filling in each blank with a word that they thought appropriate. The average test score of the high proficiency group was 30.46 and the average score of the low proficiency group was 13.86.

interpretation was false. A sample item for the English version of the materials is presented below.

(9) Context favoring the non-specific interpretation

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.

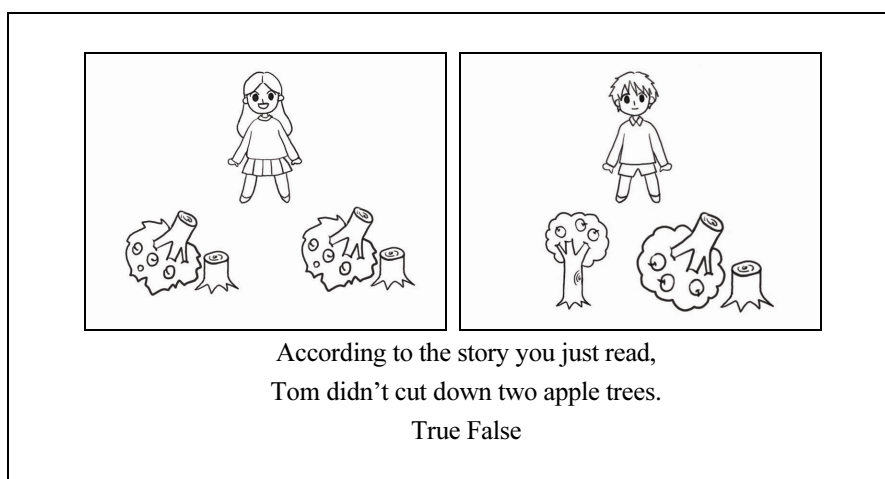


FIGURE 1 Context Favoring the Non-specific Interpretation

In this context, the non-specific interpretation of the target sentence is true because it is not the case that Tom cut down any two apple trees: He cut down only one apple tree. In contrast, the specific interpretation is false because it is not true that there are two particular trees that Tom didn't cut down.

In the case of the context stories favoring the specific interpretation, the specific interpretation of the target sentence is true while the non-specific interpretation is false.

A sample item is given below.

(10) Context stories favoring the specific interpretation

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.

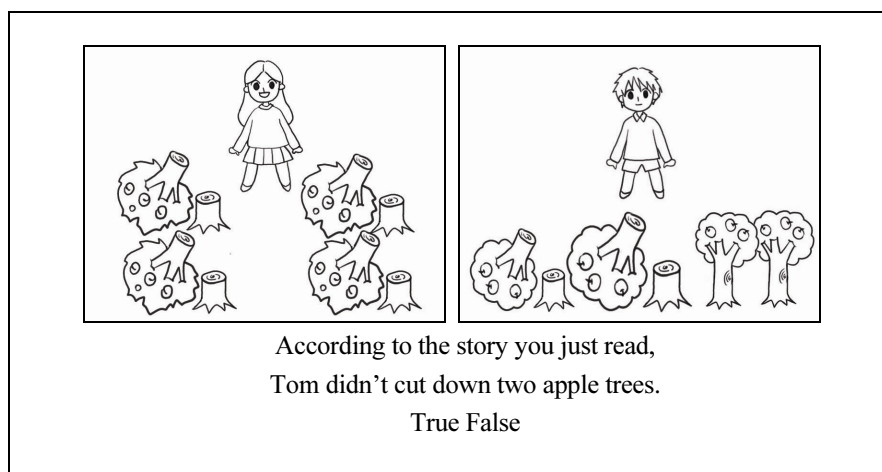


FIGURE 2 Context Favoring the Specific Interpretation

In this context, the specific interpretation is true since there are two particular apples trees that Tom didn't cut down: the third and fourth ones. However, the non-specific interpretation is false because it is false that it is not the case that Tom cut down any two apple trees.

In the Korean version of the materials, context stories were composed of the Korean translations of the stories in the English version of the materials. Test sentences were constructed to include short form negation *an* based on H. Y. Kwak's (2012) study exploring L1 Korean speakers' comprehension of target sentences containing numerically quantified NPs and negation. A sample Korean test sentence is given below.

- (11) Cinho-ka sakwanamwu-lul twu kay an pey-ess-ta.
Cinho-Nom apple tree-Acc two CL NEG cut down-Pst-Decl
'Cinho didn't cut down two apple trees.'

For both versions of the materials, a total of twenty items was used, including eight experimental items (i.e., four items in each type of context), two practice items, and ten filler items.

4. Data Analysis

In both English and Korean materials, providing the “True” response in the context favoring the non-specific interpretation was interpreted as the acceptance of the non-specific interpretation while giving the “True” response in the context favoring the specific interpretation was interpreted as the acceptance of the specific interpretation. For each participant, the mean proportion of “True” responses was calculated for the four items in each context. For the statistical analysis, the mean proportions of “True” responses in each context were the dependent measures for *t*-tests and a repeated measures ANOVA.³

IV. RESULTS

The English native speakers provided “True” responses 83% of the time on average in the contexts favoring the specific interpretation and 85% of the time on average in the contexts favoring the non-specific interpretation (see Table 1). The difference was not statistically significant ($t(11) = -0.18, p > .05$).

TABLE 1
Mean Proportion of “True” Responses in English

Group	Context favoring the specific (<i>two > not</i>) interpretation		Context favoring the non-specific (<i>not > two</i>) interpretation	
	M	SD	M	SD
Native English group (<i>n</i> = 12)	0.83	0.31	0.85	0.20
High proficiency group (<i>n</i> = 35)	0.82	0.31	0.64	0.33
Low proficiency group (<i>n</i> = 35)	0.89	0.21	0.61	0.33

Unlike the English native speakers, both high and low proficiency groups of Korean-speaking L2 learners provided “True” responses more frequently in the context favoring the specific interpretation than in the context favoring the non-specific

³ The methods of statistical analysis were chosen following many previous studies on scope interpretation that used a Truth Value Judgment Task.

interpretation on the English task (for the high proficiency group, 82% versus 64%; for the low proficiency group, 89% versus 61%; see Table 1). The differences between the two contexts were found to be statistically significant (for the high proficiency group, $t(34) = 2.17, p < .05$; for the low proficiency group, $t(34) = 4.20, p < .05$). The ANOVA results revealed a significant effect of context ($F(1, 68) = 18.88, p < .05$) but no interaction effect of context and proficiency ($F(1, 68) = 1.01, p > .05$).

As for the interpretation of Korean sentences, the Korean-speaking L2 learners preferred the specific interpretation to the non-specific interpretation, as they had with the English sentences, but they showed a much stronger preference for the specific interpretation in the Korean test (for the high proficiency group, 97% versus 36%; for the low proficiency group, 95% versus 36%; see Table 2). The results from the ANOVA revealed an effect of context ($F(1, 68) = 113.91, p < .05$) and an effect of language ($F(1, 68) = 7.31, p < .05$). In addition, there was 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.

TABLE 2
Mean Proportion of “True” Responses in Korean

Group	Context favoring the specific (<i>two > not</i>) interpretation		Context favoring the non-specific (<i>not > two</i>) interpretation	
	M	SD	M	SD
High proficiency group ($n = 35$)	0.97	0.08	0.36	0.36
Low proficiency group ($n = 35$)	0.95	0.16	0.36	0.37

V. DISCUSSION

To summarize the results of the study, the L2 learners showed a preference for the specific interpretation, unlike the English native speakers, who did not show a clear preference for either interpretation over the other. Moreover, the low and high proficiency groups showed no significant difference in their interpretive preferences in English. Similar preferences were found in the L2 learners’ interpretation of the numerically

quantified object NPs in Korean negative sentences. However, the learners accepted the non-specific interpretation much more frequently in L2 English than in L1 Korean.

Now, let us discuss the results in the framework of the processor-based approach. In L1 English, neither the specific nor the non-specific interpretation is preferred because neither interpretation involves reinterpretation processes and therefore, both are equally accessible. Let us consider the sentence in (12), for example.

(12) Tom didn't cut down two apple trees.

The processor first interprets the subject NP *Tom*, then processes the negative *didn't*, and then interprets the verb phrase *cut down*. As for the object NP *two apple trees*, there are two interpretation options available. In one option, the NP is interpreted under the influence of the negative where the non-specific interpretation ('it is not the case that Tom cut down any two apple trees') is calculated. In the other option, the NP is interpreted without the influence of the negative; in this case, the specific interpretation ('there are two particular apple trees that Tom didn't cut down') is derived. From a processing perspective, either interpretation can be accessed without a recomputation process, and therefore both are equally accessible.

How can we account for the findings in L1 Korean? It appears that the assignment of the specific interpretation to the NPs in object position incurs a lower processing cost than the assignment of the non-specific interpretation. Let us consider the sentence in (13), for example.

(13) Cinho-ka sakwanamwu-lul twu kay an pey-ess-ta.
 Cinho-Nom apple tree-Acc two CL NEG cut down-Pst-Decl
 'Cinho didn't cut down two apple trees.'

The processor encounters the first part of the object NP *sakwa namwu-lul* 'apple tree-accusative case,' and interprets it by using various clues available at that point of processing. Which interpretation is assigned to it? According to B. M. Kang (1994, 2002), the accusative-marked NP denotes the kind of entity (e.g., 'apple tree') and the classifier functions as a domain shifter that converts the denotation of the NP from that of a kind to that of a set of individual apple trees. If we adopt B. M. Kang's idea, the processor first assigns the kind 'apple tree' reading to the accusative-marked NP *sakwa namwu-lul*, and upon encountering *twu kay* 'two-CL', it changes the interpretation to a set reading (i.e., a set of individual apple trees).

Regarding the specificity of the referent, the specific interpretation of 'two particular apple trees' is more likely to be assigned because of contextual clues available at that point

in the course of processing. All the participants had been exposed to a context story, as in (14), when they encountered the target NP.

(14) Hyesoo and Cinho are at home. Their father wants Hyesoo to cut down four peach trees and wants Cinho to cut down four apple trees. They say that they will do so. Hyesoo cuts down the four peach trees right away. Cinho easily cuts down one of the four apple trees. Then, Cinho 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.

Such a context seems to encourage the processor to associate the referent of the numerically quantified NP with particular entities established in the discourse. This seems to be due to the fact that the Korean language is highly context-dependent in comparison to English. This specific interpretation is maintained throughout the sentence.

What about the assignment of the non-specific interpretation? The processor initially assigns the specific interpretation to the quantified NP including a numeral construction, as explained above. When it encounters the negative *an*, and allows it to have scope over the quantified NP, it has to revise the previously assigned interpretation, changing it to the non-specific interpretation. This recomputation process places a burden on the working memory, causing processing difficulty. In sum, the L1 Korean data of this study can also be accounted for in the framework of the processing-based approach.

Now, let us consider the study's findings in L2 English. According to the processing approach to transfer, it is predicted that the specific interpretation, the dominant interpretation in L1 Korean, will be carried over to L2 English unless that interpretation causes higher processing cost in L2 English than in L1 Korean. Given that the assignment of the specific interpretation does not involve reinterpretation processes in both cases, it is predicted that the specific interpretation will be transferred from L1 Korean to L2 English. The data from the Korean-speaking L2 learners support this prediction.

It is noteworthy that the Korean L2 learners accepted the non-specific interpretation in English more frequently than in Korean. How can this increase in acceptance rates of the non-specific interpretation be accounted for? It may be that input plays a role in these interpretive patterns. Although target constructions containing numerically quantified direct object NPs and negation occur infrequently in the input, L2 learners may be able to generalize from more common constructions of other types. Based on the analysis of child-directed speech and children's speech samples, Gennari and MacDonald (2006) reported that negative sentences including transitive verbs in English tend to be given an

interpretation where negation has wide scope, influencing the interpretation of the elements to its right. For example, in sentences such as *I didn't buy a bicycle*, negation tends to have scope over the indefinite direct object NP, meaning 'it is not the case that I bought any bicycle.'

It is possible that input to which L2 English learners are exposed has similar features, and that some L2 learners would notice such interpretive patterns in negative sentences including transitive verbs. If so, the learners might generalize them to numerically quantified direct object NPs, overriding the propensity to assign the specific interpretation. They thus would assign the non-specific interpretation to numerically quantified direct object NPs, which, from a processing perspective, could be done without incurring any extra processing cost, given that it does not involve recomputation processes.

It is also noteworthy that there was no difference in interpretive preferences between the low and high proficiency groups. It is plausible to predict that learners of higher English proficiency would be more likely to behave like English native speakers in scope interpretation than learners of lower English proficiency. However, this prediction was not borne out. It is not clear whether language proficiency does not matter in L2 scope interpretation involving numeral quantifiers and negation or whether these results are due to other confounding factors. In the present study, the two groups of learners completed the proficiency test, which consisted of fifty items, in a group instead of being tested individually under the supervision of the researcher. The testing environment may have caused some participants to become distracted or answer hastily. Therefore, some learners might not have shown their true English proficiency. In further research, it would be worthwhile to divide the groups using different proficiency measures and to explore the role of language proficiency in L2 scope interpretation more thoroughly.

VI. CONCLUSION

This study explored Korean-speaking English L2 learners' comprehension of scopally ambiguous sentences containing numerically quantified object NPs and negation in English and in Korean. The dominant interpretation in Korean was found to be transferred to L2 English. In line with previous research on scope interpretation involving universally quantified NPs and negation, the study showed that L1 Korean can have an influence on L2 acquisition of scope interpretation involving numerically quantified NPs in English. Moreover, the study proposed that this transfer phenomenon can be accounted for by the recently developed processor-based approach to scope.

The study's results have pedagogical implications. The sentence pattern under investigation is not a type of construction that is commonly taught in schools in Korea.

Korean students are unlikely to be exposed to this pattern very often. In order to reduce the influence of L1 Korean on scope interpretation in L2 English and facilitate the acquisition of both of the interpretations available in English, teachers should help students encounter the target sentence pattern in contexts where it is used in the non-specific meaning as well as the specific meaning. For example, as one way to teach the non-specific interpretation, teachers could develop an activity where students read or listen to English texts that contain target sentences whose correct interpretation in that context is the non-specific meaning. In such an activity, a target sentence such as *Tom didn't cut down two apple trees* might be juxtaposed with an unambiguous counterpart sentence that has the same meaning such as *Tom cut down one of the apple trees* or *Tom only cut down one apple tree*, in order to lead the students to become aware of the availability of the non-specific interpretation. If necessary, teachers could highlight the difference in interpretive preferences between English and Korean. According to the processor-based approach, the non-specific interpretation should be no more costly than the specific interpretation of numerically quantified object NPs in English negative sentences, as neither would involve any recomputation process. Therefore, if students are exposed to the non-specific interpretation in English sufficiently, at some point in their second language development the processor will be able to override the tendency to carry over the specific interpretation from the L1.

Further research should explore how scopally ambiguous target sentences are processed in real time by employing on-line measures such as reading times and eye movements. In addition, in order to have a more complete picture of how the processor-based approach to scope and transfer works in second language acquisition, it is necessary to investigate native English-speaking Korean L2 learners' comprehension of target sentences in Korean and to compare their interpretive preferences to those in their L1 English.

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Examples in: English, Korean
Applicable Languages: English
Applicable Levels: All levels

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