

Noun Phrase Accessibility and Acquisition of English Relative Clauses by Korean Learners*

Incheol Choi Jeong-Im Kim
(Kyungpook National University)

Choi, Incheol and Kim, Jeong-Im. 2008. Noun Phrase Accessibility and Acquisition of English Relative Clauses by Korean Learners. *Linguistic Research* 25(2), 83-104. Although it has been widely accepted that the noun phrase accessibility hierarchy (NPAH) in Keenan and Comrie (1977, 1979) plays a significant role in the acquisition of relative clauses, the interpretations of this correlation vary. To test the role of the NPAH in Korean learners' acquisition of English relative clauses, we conducted three experiments: a sentence combining test, a computerized reading comprehension test, and a sentence combining test checking animacy effects. Our results were consistent with the predictions made by the NPAH. In addition, contrary to the argument made by Traxler et al. (2002), we confirmed that the NPAH effects cannot be substituted with animacy effects, but are more likely correlated with the processing difficulties encountered among relative clause types. (Kyungpook National University)

Keywords Noun Phrase Accessibility Hierarchy, second language acquisition, relative clauses, animacy effect, sentence combining test, reading comprehension test

1. Introduction

The noun phrase accessibility hierarchy (hereafter NPAH: Keenan and Comrie, 1977, 1979) has been considered an important factor that has influence on the acquisition process of the English relative clauses (Gass, 1979, 1982; Eckman, Bell, and Nelson, 1988; Doughty, 1991). The NPAH was originally suggested as a typological generalization that classifies languages according to the possibility of relativization. Specifically, the NPAH concerns the relativizability of a noun phrase with respect to its structural position (cf. Keenan and Comrie 1979).

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(1) Noun Phrase Accessibility Hierarchy¹⁾

subject > direct object > indirect object > oblique > genitive

Relative clauses are classified on the basis of their gap position.

(2) a. Subject: John is the person who wrote the journal.

b. Direct Object: I don't like the food which John ate this morning.

c. Indirect Object: I hate the girl who Jane sent the invitation.

e. Oblique: The hotel that I stayed in was very expensive.

f. Genitive: The boy whose bag was stolen was very upset.

According to the NPAH constraints, if a language allows relativization of indirect objects, it also allows relativization of subjects and direct objects. If a language allows relativization of objects of prepositions, it also allows relativization of subjects, objects, and indirect objects, and so on down the hierarchy in (1). This is because if a language can relativize any position on the hierarchy in (1), it can relativize all higher positions. Therefore, the NPAH is considered a typological generalization about the possibilities for relativization in human languages.

This generalization was drawn from the empirical observation of languages rather than theoretical reasoning (Comrie 2007). However, no matter what the creators of the generalization intended, the generalization has been widely accepted as a factor which predicts the difficulty of relative clause acquisition. For example, Gass (1979) showed through an experiment that the NPAH was significantly relevant to the order of difficulty in the second language acquisition process of English relative clauses (see also Eckman, Bell and Nelson 1988; Doughty 1991). Similarly, Cho (2002) and Jang (2005) reported that Korean learners of English relative clauses conform to the NPAH as an order of difficulty.

In spite of the general agreement on the relevance of the NPAH for the acquisition process, there are still controversies about what this relevance means. That is, if there is a clear difference in the acquisition of the relativization of the NPs, this seems to be an instance of the NPAH effects. Then, how and why does the effect take place in the second language acquisition process? The creators of the NPAH did not commit themselves to this issue. Nevertheless, the efforts to answer the question have been

1) In addition to the NPs, OCOMP which stands for object of comparison is placed after genitive in the hierarchy and it will not be included in our discussion.

made by many other scholars. For example, Eckman et al. (1988) suggested that the NPAH effect is due to the language learners' built-in linguistic ability, i.e. Universal Grammar. That is, in this proposal, learners do not have to learn all the relative types separately. Instead, they simply have to find out how far down the hierarchy the language allows relativization. Therefore, in this proposal, learners who know that their language allows the relativization of oblique NPs will automatically know that it also allows the relativization of subjects and objects. On the other hand, O'Grady (1997) suggests that the structural distance between the relative pronoun and the gap underlies the NPAH effects in the acquisition of relative clauses. Subject is the closest to the relative pronoun. The lower on the hierarchy the NP is, the farther it is from the relative pronoun. In this proposal, the differences of the structural distances between the relative pronoun and the gap cause the differences of the complexity of the clauses. Diessel and Tomasello (2005) also added that various processing complexity correlates with the NPAH effects. There is yet another type of explanation about the NPAH effects. According to recent studies, the animacy of the noun involved in the relativization strongly influences the processing difficulty of relative clauses (Mak, Vonk and Schriefers 2002; Traxler, Morris, and Seely 2002; Ozeki and Shirai 2007). For example, Ozeki and Shiari (2007) show that the reported NPAH effects are, in fact, due to strong associations between subjects and animate references. In general, subjects are more easily associated with animate references whereas other NPs are associated with inanimate references. In this account, the asymmetry between the subject and other NPs with respect to relativization is due to learners' preferences for animate references of the relativized NPs.

In this paper, we will first confirm whether the NPAH effects exist in Korean learners' acquisition process of English relative clauses. To do this, we carry out a series of experiments including a sentence combining test and a comprehension test. With the sentence combining test, we examine whether the subjects participating show any differences of difficulty in terms of the NPAH. Specifically, we will check whether the learners correctly use relative pronouns and make the corresponding gaps. The reading comprehension test was designed to check whether the subjects show any differences of perception on the basis of the NPAH. Finally, we perform another sentence combining test with which we examine the animacy effects in this acquisition process. Our results obtained from these tests provide strong support to the existence of the NPAH effects in Korean learners' acquisition process of English relative clauses. Furthermore, they show that the effects are not reduced to the simple animacy effects,

but are more likely to be explained by the different processing difficulty of the relative clause types.

2. Sentence combining test

The NPAH effects have been extensively tested in various ways. Among them, the most widely used test was the sentence combining test. For example, Gass (1979) investigated 17 second language learners of English with nine different first languages including Korean. In the experiment, Gass asked the participants of the experiment to combine sentences on the pattern of “The girl ran home” and “The girl was crying” becoming “The girl who was crying ran home.” The data collected from this experiment were scored in term of mistakes with case marking and making appropriate gaps. The experiment by Gass (1979) reported that the order of difficulty has a clear relationship to the NPAH. Jang (2005) carried out a similar experiment to check whether Korean high school students show a similar learning pattern of the order of difficulty to those in Gass (1979). The result obtained from 435 students was almost the same as that reported by Gass (1979) except that possessive relative clauses were located between subject relative clauses and object relative clauses in the order of the accuracy rate. Jang’s result is not deviant from the prediction made by the NPAH effects. As we will discuss later, this is because possessive pronouns have a special status in that they can be located either in subject’s determiner position or in object’s determiner position. Building on the previous experiments, we carried out a sentence combining test. The aim of this test was to investigate the NPAH effects on Korean learners of English. What we examined in this test was subject, object and oblique relative clauses. In our experiment, the possessive relative clauses and indirect object relative clauses were excluded. This is because we decided the three types of relative clauses are structurally distinctive enough to show the differences of processing difficulties. The research hypothesis of this test is described in (3).

- (3) The scores of the three types of sentences are consistent with the NPAH.

2.1 Participants²⁾

Two different groups of subjects participated in this test. The first group consisted of 22 Korean college freshmen from the department of English Education in Kyungpook National University. Their English skills are considered high level in general. In addition, they also can be considered a homogeneous group in that they entered the department through similar entrance criteria several months before the experiment. Another group consisted of 23 elementary school students who were enrolled in the children English program in the Language Institute of Kyungpook National University. The English program consists of 6 different levels and students are assigned to each level through placement tests. The students who participated in our experiment were chosen from the intermediate, advanced, and post-advanced classes. Through a pretest interview, we checked that they all have knowledge of English relative clauses. In addition, they were able to use and understand the sentences containing relative clauses although their English proficiency was much lower than the college student participants.

2.2 Procedure

The basic procedure of the test was almost identical to that in Gass (1979). For example, the two groups of participants were asked to combine two simple sentences in (4) to the complex sentences containing relative clauses in (5).

(4) a. I like his courage.

b. His courage takes the children to the better world.

(5) I like his courage that takes the children to the better world.

In our experiment, we also show the participants the sentences in (4) and (5), which are almost identical to those in (2) except that the sentences in (b) have different underlined words.

2) All the college students voluntarily participated in the experiments. In the case of the elementary school students, we obtained written consents from their parents.

- (6) a. I like the children.
 b. His courage takes the children to the better world.
- (7) a. I like the better world.
 b. His courage takes the children to the better world.

The task given to the participants was to make complex sentences including relative clauses with given simple sentences as in (4), (6) and (7). According to the underlined words, the participants would have included subject, object or oblique relative clauses in the sentences they would make. This test included 5 sets of this type of triplet, i.e. 15 question items. Exactly the same test was conducted on the two groups of participants. The data collected from this test were scored in terms of mistakes with relative pronouns and gap positioning.

2.3 Result

The first group, college students, completed the task very well. In fact, 15 out of 22 participants scored a perfect score. That is, only 7 participants actually affected the results. The following table shows the results of the experiment.

Table 1. Descriptive statistics for the college student test

	Mean	Std. Deviation	N
subject	5.00	.000	22
object	4.82	.664	22
oblique	4.64	.727	22

The mean differences observed from Table 1 suggest there are differences of difficulty in learning the three types of relative clauses. However, their performance across the three types of relative clauses was too good to be differentiated statistically. When we checked the differences through a repeated measures one-way ANOVA, the differences were not significant (subject - object : $p = .213$; object - oblique: $.104$). This means that most participants had already reached the stage at which they create all the types of relative clauses quite well. As a result, it was hard to verify with these participants the hypothesis that the Korean learners' performance in the test is consistent with the NPAH. Therefore, the mean differences shown in Table 1 are taken

as suggestive evidence for the hypothesis rather than statistically backed evidence.

The elementary school students who participated in this test were originally 23. However, among them, the overall performance of 5 participants was too poor to be taken as a serious result.³⁾ Thus, we excluded their results from this research. As a result, we were able to draw effective results from the 18 participants. The descriptive statistics in Table 2 present the three types of test result means, their standard deviation, and the sample size.

Table 2. Descriptive statistics for the children test

	Mean	Std. Deviation	N
subject	4.61	.850	18
object	3.61	1.685	18
oblique	2.11	1.844	18

The differences of the means in the table suggest that the test results of the participants are consistent with the NPAH. These differences turned out to be statistically significant. In the table 3, type 1, 2 and 3 stand for subject, object, and oblique relative clauses, respectively. The second column in Table 3 shows the actual difference between each pair of means. The fourth column indicates that each pair of means is significantly different. Since *p* is less than .05 in this column for all comparisons, we can conclude that performance for the production of subject relative clauses was significantly better than that for object relative clauses. Likewise, performance for the object relative clauses was significantly better than that for oblique relative clauses.

Table 3. Pairwise comparisons for the children test

(I) type	(J) type	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference ^a	
					Lower Bound	Upper Bound
1	2	1.000*	.302	.004	.362	1.638
	3	2.500*	.398	.000	1.660	3.340
2	1	-1.000*	.302	.004	-1.638	-.362
	3	1.500*	.487	.007	.473	2.527
3	1	-2.500*	.398	.000	-3.340	-1.660
	2	-1.500*	.487	.007	-2.527	-.473

³⁾ 4 students scored 0 and the other student scored 1 out of 15. However, these students were not ignorant of relative clause formation. Furthermore, their performance in the perception test was not significantly different from that of the other students. Thus, we decided to exclude their results from the experiment since we concluded that they did not perform the task in earnest.

3. Computerized sentence comprehension test

In addition to the sentence combining test, we also carried out a sentence comprehension test. In contrast to the former, it measures participants' perceptual ability. The result of this test can be meaningful in that the previous research mostly employed either a sentence combining test or a grammaticality judgement test. Of course, if the learners show different difficulties in understanding relative clauses depending on the types defined in the NPAH, it may support the NPAH effects. However, what we have to notice here is that the ease or difficulty of perception is more likely related to the processing complexity of the stimuli.

The factors that affect the participants' comprehension may include their degree of mastering the constructions, vocabulary, discourse, and structural complexities of the input sentences. The test we carried out was not a speech perception test, but a reading comprehension test. Therefore, factors such as pronunciation or speech speed didn't have to be considered. In addition, the input given to the participants consists of isolated sentences. Therefore, discourse structures of the input deserve little consideration. Students' mastery of the construction didn't have to be taken into consideration seriously. This is because the first group of participants has good knowledge of the overall structures of relative clauses as revealed in the result of the first experiment. As in the sentence combining test, the stimuli consist of the three types: sentences including subject, object and oblique relative clauses. Since almost the same vocabulary was used for the three types of input sentences, it is hard to think that the vocabulary used affects the result of this experiment. Finally, the factor that remains to be considered is the different processing difficulties of the three types of the input sentences. As we will discuss later, if the result of the comprehension test is consistent with the prediction in the NPAH, it may also support the conclusion that the NPAH effects are related to the different processing difficulties of the relative clauses.

3.1 Participants

The groups of participants in the sentence combining test also took part in this test.

3.2 Procedure

The reading comprehension test we carried out was a computerized test. To do this

we used a psychological experiment software called Superlab 4.0.⁴⁾ With the software we programmed a computer to show a series of words to the participants one by one. The words eventually form a sentence that includes a relative clause. The stimuli include the same three types of sentences we investigated in the sentence combining test: subject, object, and oblique relative clauses. The stimuli consist of 5 sets of triplets so that the total stimuli are 15 sentences. As given in (6), the sentences in each triplet have almost identical structures and vocabulary except for the choices of the head noun and gap:

- (8) a. The robber killed Brian who served many people with his cousin.
- b. The robber killed many people who Brian served with his cousin.
- c. The robber killed his cousin with whom Brian served many people.

The 15 sentences were presented to the participants in a random order. Therefore, there was no case of biased results that could be caused by the fixed order of the types. The task involved self-paced reading. Each time a participant pressed a key, the next word appeared on the screen. After each sentence, participants were asked to answer a yes-no comprehension question about its content. For example, after the sentence in (8a) appeared on the screen, the participants were shown the sentence in (9).

- (9) The robber killed his cousin and many people.

On the basis of the meaning of (8a), the participants were asked to judge whether the sentence in (9) is correct or not. When a participant correctly answered the question, we gave him one point, otherwise 0.

3.3 Results

In contrast to the sentence combining test, the college students provided statistically meaningful data in the reading comprehension test to a certain extent. The following Table 4 shows the descriptive statistics.

4) The original plan was to measure the time taken by each stimulus to be processed. However, the result did not show any significant relation with the NPAH. Thus, our study included only the result of the perception part while leaving the task for future study.

Table 4. Descriptive statistics for the college student test

	Mean	Std. Deviation	N
subject	4.45	.800	22
object	3.18	1.053	22
oblique	2.95	1.174	22

The mean difference between subject and object relative clauses was 1.273 whereas that between object and oblique relative clauses was 0.227. These differences seem to suggest that the result of the test is consistent with the prediction of the NPAH. However, when we examined the difference through a repeated measures one-way ANOVA, a significant difference was found only between the subject and object relative clauses ($p=.000$), as shown in Table 5.

Table 5. Pairwise comparisons for the college student test

(I) type	(J) type	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference ^a	
					Lower Bound	Upper Bound
1	2	1.273*	.248	.000	.757	1.788
	3	1.500*	.277	.000	.924	2.076
2	1	-1.273*	.248	.000	-1.788	-.757
	3	.227	.315	.479	-.428	.883
3	1	-1.500*	.277	.000	-2.076	-.924
	2	-.227	.315	.479	-.883	.428

In the pairwise comparisons shown in Table 5, the type 1, 2, and 3 stand for the subject, object, and oblique relative clauses, respectively. According to the pairwise comparisons, a significant difference is not observed between object and oblique relative clauses. It means that the mean difference between them is not statistically proven since p is bigger than .05 ($p=.479$).

A similar result was drawn from the test on the children. Table 6 below describes the descriptive statistics for the experiment we conducted on the children.

Table 6. Descriptive statistics for the children test

	Mean	Std. Deviation	N
subject	3.91	.668	23
object	2.78	1.043	23
oblique	2.48	1.123	23

Unlike the sentence combining test, in this reading comprehension test, all data collected from the children were effective. The five students who were excluded from the results of the sentence combining test performed as well as the other participants. Therefore, in this test, the result included the data collected from all the participants ($N=23$).

As in the results of the test on the college students, the differences of the means in this experiment support the NPAH effects in the children's learning of English relative clauses. That is, the children's mean score on the subject relative clauses was 1.130 higher than that on the object relative clauses. The mean score on the object relative clauses was 0.304 higher than that on the oblique relative clauses. Although all these differences were consistent with our prediction, only the former difference was able to be proven statistically.

Table 7. Pairwise comparisons for the children test

(I) type	(J) type	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference ^a	
					Lower Bound	Upper Bound
1	2	1.130*	.269	.000	.573	1.688
	3	1.435*	.280	.000	.854	2.015
2	1	-1.130*	.269	.000	-1.688	-.573
	3	.304	.347	.390	-.415	1.024
3	1	-1.435*	.280	.000	-2.015	-.854
	2	-.304	.347	.390	-1.024	.415

The repeated measures one-way ANOVA procedure we performed revealed that the difference between the object relative clauses and oblique clauses is more than .05 ($p=.390$) and not significant. The same insignificance was observed from the experiment conducted on the college students. Thus, in both the tests, the mean difference was significant only between the subject and object. This result may reflect

the relatively small size of the experiment groups or task items. It may also be due to the less evident difference of processing difficulty between the object and oblique relative clauses. However, as observed in the Figure 1, the mean difference between the two types of relative clauses still exists although it is not statistically backed. We believe that it is possible that the difference can be statistically supported if we increase the

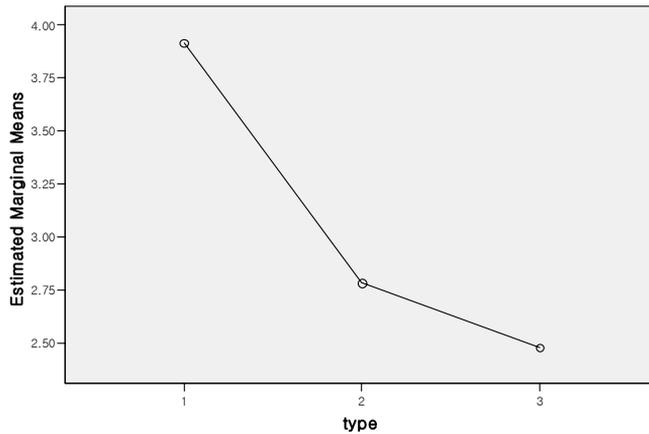


Figure 1. The pattern of the mean differences

4. Animacy and sentence combining test

In the NPAH effects in language acquisition, recent research suggests that strong effects of the animacy of nouns are involved (Traxler, Morris, and Seely, 2002; Weckerly and Kutas, 1999). Specifically, they argue that the animacy of the head noun influences processing ease or difficulty of relative clauses. That is, relative clauses with animate head nouns are easier to process than those with inanimate head nouns. In addition, subjects are more canonically associated with animate references, but objects and obliques with inanimate references. Therefore, learners of relative clauses have strong bias toward the subject relative clause. Similar animacy effect was observed in the second language acquisition process of Korean and Japanese relative clauses (Jeon and Kim, 2007; O'Grady, Lee, and Choo, 2003; Ozeki and Shirai, 2007). According to their research, second language learners of Korean and Japanese show a strong connection between animate head nouns and subject relative clauses.

The most radical argument is to reject the NPAH effects in the second language acquisition process. For example, when a clause in which both the subject and object have animate references participates in the relativization, there will be no difference of difficulty between the two types of relative clauses. That is, the two relative clauses in the sentences in (10) and (11) do not exhibit any significant difference with respect to their production and comprehension.

(10) John has a daughter [who her mother doesn't like].

(11) John has a daughter [who doesn't like her mother].

Conversely, subject relative clauses with animate head nouns may be easier to process than those with inanimate head nouns. That is, it can be predicted that the sentence in (12) is easier than the sentence in (13).

(12) John has a daughter [that runs well].

(13) John has a car [that runs well].

4.1 Procedure and participants

To examine the animacy effect, we carried out a small scale experiment on the same groups of participants. The experiment was basically identical to the sentence combining test described in section 2 except that the test items were divided into four groups as given in (14).

(14) a. The police have seen the men. The men stole my car. (animate SU)

b. I heard the strange sound. The strange sound brought Cindy to the spot.
(inanimate SU)

c. The doctor found the patient. The secret cured the patient. (animate DO)

d. David knows Japanese songs. My Japanese friend often sings Japanese songs. (inanimate DO)

Each group included 3 test sentences. Therefore, the total test items were 12.

A concern raised from this experiment was that it was hard to use identical vocabulary for the four types of relative clauses. Thus, to minimize the influence of vocabulary, we gave up the reading comprehension test but carried out the sentence

combining test which mainly relies on the participants' grammatical competence.

4.2 Results

Table 8. Sentence combining test for checking animacy effects

id	College students				Children			
	AS	AO	IS	IO	AS	AO	IS	IO
1	3	3	3	3	3	3	3	3
2	3	3	3	3	0	0	0	0
3	3	3	3	3	3	3	3	3
4	3	3	3	3	1	0	1	0
5	3	3	3	3	3	3	3	3
6	3	3	3	3	3	3	3	3
7	3	3	3	3	3	3	3	3
8	3	3	3	3	3	3	3	2
9	3	3	3	3	3	1	3	3
10	3	3	3	3	1	0	0	0
11	3	3	3	3	3	1	3	0
12	3	2	2	3	3	3	3	3
13	3	1	3	1	3	3	3	3
14	3	3	3	3	0	0	0	0
15	3	3	3	3	1	0	2	0
16	3	3	3	3	0	0	0	0
17	3	3	3	3	3	2	3	2
18	3	3	3	3	3	1	3	0
19	3	3	3	3	0	0	0	0
20	3	2	3	3	3	3	3	3
21	3	3	3	3	0	0	0	0
22	3	3	3	3	3	2	3	3
23					3	3	3	3
total	66	62	65	64	48	37	48	37
Mean score	3	2.818	2.955	2.909	2.087	1.609	2.087	1.609
%	100	93.939	98.485	96.970	69.565	53.623	69.565	53.623

Table 3 shows the results of the test. In the table, A and I stand for animate and

inanimate, respectively. Therefore, AS stands for subject relative clauses with animate head nouns whereas IS stands for those with inanimate head nouns. The 22 college students show slight differences between relative clauses with animate and inanimate head nouns. Specifically, the difference of scores was 1.515 % between subject relative clauses with animate and inanimate head nouns. It was 3.031% between object relative clauses with animate and inanimate head nouns. Compared to the differences between subject and object relative clauses, these animacy differences are not remarkable. The difference between subject and object relative clauses was about 5%. If we consider that the college students participating had already reached the mastery level for the construction, it seems natural that the differences are subtle across the relative clause types. However, still we were able to find that animacy does not play a significant role here.

This tendency is more clearly observed in the test on children. The marvel was that children exhibit no difference between relative clauses with animate and inanimate head nouns. The mean scores between animate and inanimate relative clauses were exactly the same. In contrast, the difference between subject and object relative clauses was statistically significant ($p=.007$).

To sum up, in our experiment, we were not able to see any big animacy effects, but still found that the difference between subject and object relative clauses is remarkable. Although we admit that the experiment carried out here is too small in scale to be decisive, it is still revealing that the NPAH effects much more surpass the animacy effects. In other words, the NPAH effects observed in previous research cannot simply be substituted by animacy effects.

5. General discussion

In the sentence combining experiment, it was hypothesized that Korean learners of English perform best on subject relative clauses, and better on object relative clauses than on oblique relative clauses. The results supported the hypothesis. It means that Korean learners acquisition of English relative clauses conforms to the NPAH. The same result was drawn from the computerized reading comprehension test. In the test, we could identify a clear statistical difference in perception between subject and object relative clauses. We also found there exists a difference between the object and oblique relative clauses in perception although it was not statistically distinctive. The overall result of these two tests was consistent with the NPAH effects. Thus, we were able to

conclude that the NPAH plays a role in Korean learners' acquisition of English relative clauses.

An issue raised from the result is how that was possible. The most widely accepted idea may be to resort to the idea of Universal Grammar. For example, Eckman et al. (1988) argue that learners do not need to learn all the relative types separately. That is, if they have mastered a relative type, they do not have to learn other types which are located higher on the hierarchy than that. If they know English allows oblique relative clauses, they automatically know that English allows subject and object relative clauses. However, this idea confronts many problems. As observed from our experiments, the learners did not respond to the relative clause types on the NPAH in a radically distinctive way. For example, several participants performed better on oblique relative clauses than on subject or object clauses in the sentence combining test. In the reading comprehension test, this type of unsteadiness is more readily observed. Furthermore, both the sentence combining test and reading comprehension test exhibit gradual and statistical differences among subject, object and oblique relative clauses. If the NPAH effect is due to the universal grammar, this type of irregularity and gradualness may not be predicted.

On the other hand, Hawkins (1988) and O'Grady (1997) suggest that the observed differences among the relative types are due to differences of processing difficulty. Specifically, the ease or difficulty of relative clauses depends on the structural proximity of the head of the relative clause and the gap. The head noun is closer to the subject than to the object or oblique NP. In addition, the dependency between the relative pronoun and the gap is more complex between the head noun and the object than between the head noun and the subject. This proposal well explains the partial irregularities of the results in our experiments. That is, the differences of the difficulty among the relative types are due to the different processing complexities of the types. Therefore, the output of the language learners does not necessarily conform to the NPAH without exception. Instead, the NPAH effects in the language acquisition exhibit statistical regularities. In this sense, the NPAH effects in our proposal are distinguished from the original generalization in Keenan and Comrie (1977, 1979).

Owing to the view we adopted here, we can further explain how the difficulty between object and oblique relative clauses was not distinctive enough to be proven statistically. In this view, we can simply say that the processing difficulty between the two types was not as distinctive as that between subject and object relative clauses. In addition, the observation in Jang (2005), which was considered to be deviant from the

NPAH, can be naturally explained by this view. Jang reported that possessive relative clauses do not conform to the NPAH. When the NPAH is accepted as an absolute principle that learners cannot avoid, possessive relative clauses should have been located after the oblique relative clauses in the order of the accuracy rate. However, Jang reported that they were located between subject relative clauses and object relative clauses in the accuracy order. This result is, in fact, not surprising considering that possessive relative clauses involve various different structural complexities. For example, as given in (15), the head nouns of possessive relative clauses are identical to either the possessor of the subject or the possessor of the object.

- (15) a. I saw the boy [whose girlfriend e left him].
 b. I saw the boy [whose girlfriend he left e].

Thus, as shown in (15), the gap positions of the relative clauses are different from each other: in (15a) it is on the subject position whereas in (15b) it is on the object position. The distance between the relative pronoun and the gap is farther in (15b) than in (15a). In our view, it means that the processing complexity is higher in (15b) than in (15a). Then, it is not plausible that the possessive relative clauses as a whole are compared to other types of relative clauses. In fact, Jang's experiment included only the type in (15a). We can assume that this is the reason for the deviant observation in Jang's experiment. As mentioned previously, this type of unconformity is well explained in the view we support here.

Finally, we checked the possibility that the NPAH effects are, in fact, ascribed to the animacy distribution among the relative types. In our experiment, we could not identify any significant difference between animate and inanimate relative clauses. Instead, we found that the difficulty was significantly different between the subject and object relative clauses regardless of the animacy distribution.

To conclude, a series of experiments we carried out provided strong evidence indicating that Korean learners conform to the NPAH in the acquisition process of English relative clauses. Furthermore, we verified that the NPAH effects cannot be substituted by the animacy effects. That is, the NPAH effects are actual phenomena that play a role during the acquisition process. In addition, the effects seem to be distinguished from the original definition in Keenan and Comrie (1977, 1979). Instead, we suggest that such effects are more likely explained by the different processing difficulty among the relative clause types.

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Choi, Incheol

Kyungpook National University
Sangyeok 3-dong ,Buk-gu, Daegu,
Gyeongbuk, 702-701, Korea
E-mail: incheol@knu.ac.kr

Kim, Jeong-Im

Kyungpook National University
Sangyeok 3-dong ,Buk-gu, Daegu,
Gyeongbuk, 702-701, Korea
E-mail: Kji287@hanmail.net

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Appendix 1: Sentence Combining Test

1. Andrew introduced the scientist. The scientist showed the special thing through the lens.
2. Bring the blanket. Your brother will move the blanket on the bed.
3. I don't trust the man. The man changed Jenny into a witch.
4. Andrew introduced the special thing. The scientist showed the special thing through the lens.
5. The teacher found the boy. The boy surprised the students with the frogs.
6. He greeted Jane. Jane took the child to the teacher.
7. The teacher found the frogs. The boy surprised the students with the frogs.
8. Bring your brother. Your brother will move the blanket on the bed.
9. He greeted the teacher. Jane took the child to the teacher.
10. I don't trust a witch. The man changed Jenny into a witch.
11. He greeted the child. Jane took the child to the teacher.
12. I don't trust Jenny. The man changed Jenny into a witch.
13. The teacher found the students. The boy surprised the students with the frogs.
14. Bring the bed. Your brother will move the blanket on the bed.
15. Andrew introduced the lens. The scientist showed the special thing through the lens.

Appendix 2: Computerized Reading Comprehension Test

Sentences presented:

1. The robber killed Brian that served many people with his cousin.
2. I like your sister that saw Mike at the store.
3. My mother knows these funny pictures that the newcomer keeps in his gallery.
4. I remember the fruit that Rick gave to Mary.
5. He praised Jane that helped her friend with the work.
6. The robber killed many people that Brian served with his cousin.
7. I remember Rick that gave the fruit to Mary.
8. My mother knows the newcomer that keeps these funny pictures in his gallery.
9. I remember Mary to whom Rick gave the fruit.

10. I like the store at which your sister saw Mike.
11. He praised the work with which Jane helped me.
12. I like Mike that your sister saw at the store.
13. My mother knows his gallery in which the newcomer keeps these funny pictures.
14. He praised her friend that the girl helped with the work.
15. The robber killed his cousin with whom Brian served many people.

True/False Comprehension Test

1. The robber killed his cousin and many people.
2. I met your sister at the store.
3. My mother knows the newcomer has pictures.
4. Mary got the fruit from me.
5. Her friend helped him.
6. Brian's fellow served many people and the robber killed them.
7. I know Rick gave something to Mary.
8. The newcomer has his gallery and my mother doesn't know it.
9. I know what Mary received from Rick.
10. Mike saw your sister at the store.
11. Jane and I did the work together and he was satisfied with it.
12. I think Mike is a good person.
13. The newcomer keeps funny pictures in his room.
14. The girl helped her friend.
15. The robber and his cousin served Brian.

Appendix 3: Sentence Combining Test (Animacy Effects)

1. David knows Japanese songs. My Japanese friend often sings Japanese songs.
2. The police have seen the men. The men stole my car.
3. Look at the girl. The girl is feeding the cat.
4. The doctor found the patient. The secret cured the patient.
5. I heard the strange sound. The strange sound brought Cindy to the spot.
6. Some people are impressed by a person. Love asks a person to wait.
7. The doctor found the secret. The secret cured the patient.
8. David knows my Japanese friend. My Japanese friend often sings Japanese

songs.

9. I heard Cindy. The strange sound brought Cindy to the spot.
10. The police have seen my car. The men stole my car.
11. Some people are impressed by love. Love asks a person to wait.
12. Look at the cat. The girl is feeding the cat.