On the syntax of relative clauses in Korean

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1. INTRODUCTION

A relative clause in Korean contains a gap and a predicate suffixed with an adnominal morpheme. For instance, in (1), the relative clause that modifies the head noun *kica* 'reporter' contains a subject gap (indicated by the underscore) and a verb suffixed with an adnominal morpheme (glossed as ADN).[1]

(1) [__ Kim-uywon-ul myengyehoysonha-n] kica
      Kim-senator-ACC defame-ADN   reporter
    'the reporter who defamed Senator Kim'

The two major approaches to the syntax of Korean relative clauses in the extant literature can be classified as the operator-movement analysis and the operator-binding analysis. Under the operator-movement analysis, the gap is a trace/copy of a null operator that has undergone movement (e.g., D.-W. Yang 1987, J.-I. Han 1992, H.-K. Yang 1990, C.-H. Han and Kim 2004). On the other hand, under the operator-binding analysis, the gap is an empty pronoun bound in-situ by a null operator (e.g., Sohn 1980, Kang 1988, Choo 1994, Kwon 2008). There are syntactic tests that linguists can use to tease apart the two analyses. For instance, if a gap cannot occur in an island, then the operator-movement analysis is supported; but if the gap can be

[1] Abbreviations used in this article include:

ACC	accusative	NOM	nominative
ADN	adnominal	NMZ	nominalizer
COMP	complementizer	PRES	present
COP	copula	PAST	past
DECL	declarative	TOP	topic
GEN	genitive		

An adnominal affix is distinct from a nominalizer: while a nominalizer on a verbal predicate changes the categorial status of the verb, as evidenced by the fact that case markers can attach to nominalized verbs, an adnominal affix enables the verbal predicate to modify a noun without changing its categorial status.

replaced with an overt pronoun, then the operator-binding analysis is supported. Although the predictions of these tests are clear, no consensus is found in the literature regarding the two approaches, as there is disagreement on what the facts are. This situation thus calls for adopting a controlled experimental methodology to obtain the relevant data. In this paper, I present findings from two magnitude estimation (ME) task experiments, which turn out to support the operator-movement analysis.

This article is organized as follows. In section 2, I first consider the head-raising analysis and observe that no convincing evidence has been found to support a head-raising analysis for Korean relative clauses. I then present and evaluate some of the main points of the operator-movement analysis and the operator-binding analysis proposed for relative clauses in Korean, and further clarify the predictions they make. In section 3, I present two ME task experiments and their findings: Experiment 1 tested whether a subject gap can occur in islands in relative clauses and whether it can be replaced with an overt pronoun, and Experiment 2 tested whether an object gap can occur in islands in relative clauses and whether it can be replaced with an overt pronoun. In both experiments, a gap could not occur in an island and could not be replaced with an overt pronoun. These results support the operator-movement analysis. Section 4 concludes with a summary and a brief discussion of the usefulness of experimental methodology in theoretical syntax.
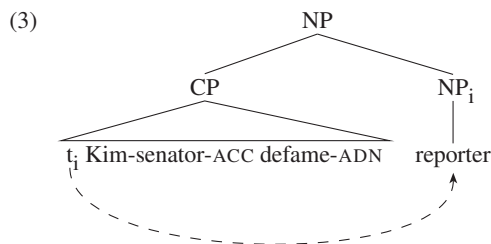
2. COMPETING ANALYSES

This section discusses three possible analyses on relative clauses applied to Korean and their predictions.

2.1 Head-raising analysis

The head-raising analysis of relative clauses has gained much ground for English (Kayne 1994, Bhatt 2002, Hulsey and Sauerland 2006). According to this analysis, the head noun modified by the relative clause originates internal to the relative clause and moves to the position external to the relative clause. Applied to Korean, in (1) (repeated below as (2)), the head noun *kica* 'reporter' originates in the subject position of the relative clause and moves to a position external to the relative clause, as illustrated in (3).

(2) [__ Kim-uywon-ul   myengyehoysonha-n] kica
        Kim-senator-ACC defame-ADN   reporter
     'the reporter who defamed Senator Kim'

(3)   NP
                          ┌─────────────────┴──────┐
                         CP   NPᵢ
                  ┌───────┴────────┐   │
               tᵢ Kim-senator-ACC defame-ADN   reporter

In English, the head-raising analysis is supported by the interpretation of idioms (Hulsey and Sauerland 2006), adjectival modifers (Bhatt 2002) and anaphors (Hulsey and Sauerland 2006). The argument goes as follows. In (4a), the idiomatic meaning coming from *make headway* is preserved. This means that *headway* must have started out as the object of the relative clause forming a chunk with *made*, before moving to the head noun position external to the relative clause. Example (4b) is ambiguous between the high adjectival reading in which *first* modifies *said* and the low adjectival reading in which it modifies *written*. The presence of the low reading is taken to be supporting evidence that *first book* originates in the object position of *written*. In (4c), the antecedent of *himself* is *John*. This indicates that the head noun *portrait* along with the PP *of himself* must have originated in the object position of *likes* where *John* c-commands *himself*, before moving to the head noun position.

(4)   a. Mary praised the headway that John had made.

      b. the first book that John said Tolstoy had written

      c. The portrait of himself that John likes is on the wall.

Applying the same tests to Korean, however, produces different results. In Korean, the phrase *miyekkwuk-ul masita* 'drink seaweed soup' is an object-verb idiom which means 'to fail a test or to lose an election'. Kwon (2008) showed that when *miyekkwuk* 'seaweed soup' is relativized, as in (5), the idiomatic meaning disappears, and only the literal meaning is available. This indicates that the head noun *miyekkwuk* 'seaweed soup' never formed a chunk with *masi* 'drink'.

(5)   [Kim-hwupo-ka t_i senke-eyse masi-n]   miyekkwuk$_i$
      Kim-candidate-NOM   election-at drink-ADN seaweed soup
      'the seaweed soup that Candidate Kim drank in the election'

Similar results obtain with other object-verb idioms in Korean. Phrases *olipal-ul naymilta* 'stick out duck's foot' and *chim-ul samkhita* 'swallow saliva' are idioms which mean 'to lie' and 'to want to eat delicious food', respectively. Relativizing the object in each phrase results in the loss of the idiomatic meaning.

(6)   a. [Toli-ka t_i naymi-n]   olipal$_i$
          Toli-NOM   stick out-ADN duck foot
          'the duck foot that Toli stuck out'

      b. [Toli-ka t_i samkhi-n]   chim$_i$
          Toli-NOM   swallow-ADN saliva
          'the saliva that Toli swallowed'

As a reviewer pointed out, demonstrating that there are object-verb idioms that disallow relativization of the object is not a strong argument against a head-raising analysis, as such idioms can be found in English as well: for example, when *kick the bucket* is relativized, as in *the bucket that John kicked last week*, the idiomatic meaning disappears (Nunberg et al. 1994). Tests with adjectival modifiers and anaphors, however, provide stronger arguments against the head-raising analysis for Korean.

In addition to the idiom test, Kwon (2008) applied the adjectival modifier test to Korean and showed that in relative clauses with an adjective on the head noun, as

in (7), only the high reading is available, where *chespenccay* 'first' modifies *malha* 'say'. This again indicates that the head noun does not originate in the clause embedded in the relative clause.

(7) [[Tolstoy-ka t_i ssu-ess-tako]   John-i   malha-n] chespenccay chayk$_i$
     Tolstoy-NOM   write-PAST-COMP John-NOM say-ADN first   book

     'the first book that John said Tolstoy had written' (high reading only)
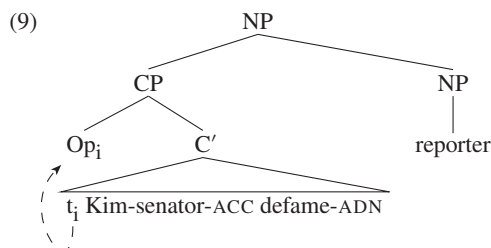
Turning to the anaphor test, in (8), *John* cannot be an antecedent of *caki* 'self', suggesting that the head noun phrase *caki-uy chosanghwa* 'self-GEN portrait' was never in a c-command domain of *John*.

(8) *[John$_j$-i t_i cohaha-nun] [caki-uy$_j$ chosanghwa-ka]$_i$ pyek-ey kellye iss-ta.
     John-NOM   like-ADN   self-GEN portrait-NOM   wall-at hang be-DECL

     'The portrait of himself that John likes is on the wall.'

Taking these results together, it can be stated that no evidence has been found to support a head-raising analysis of Korean relative clauses. Thus, for the remainder of the article, I will put this alternative aside and assume that the head noun originates external to the relative clause and that the gap in the relative clause is not a copy or a trace of the head noun.

2.2 Operator-movement analysis

According to the operator-movement analysis of relative clauses, the gap in the relative clause is a trace/copy of a null operator which has moved to [Spec,CP] of the relative clause. For instance, in (2), a null operator originates in the subject position of the relative clause and moves to [Spec,CP], as illustrated in (9) (D.-W. Yang 1987, J.-I. Han 1992, H.-K. Yang 1990, C.-H. Han and Kim 2004).

(9)
```
                         NP
              ┌──────────┴──────────┐
             CP                     NP
         ┌────┴────┐                │
        Op_i      C'             reporter
              ┌────┴──────────────────┐
             t_i Kim-senator-ACC defame-ADN
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This analysis predicts that a gap cannot occur inside an island in a relative clause. Nevertheless, data can be found in the literature that seem to show that this prediction is not borne out, as in (10) (J.-I. Han 1992, Na and Huck 1993) and (11) (Kwon 2008).

(10) [$_{RC1}$ Op$_i$ [$_{RC2}$ Op$_j$ t_i t_j cohaha-nun] kangaci-ka cwuk-un] ai
                          like-ADN   dog-NOM die-ADN kid

      'the kid [$_{RC1}$ who$_i$ the dog [$_{RC2}$ which$_j$ [he]$_i$ liked t_j] died]'

(11) [Op$_i$ Tom-i   [nay-ka etten cilmwun-ul t_i cwu-nun-ci]   a-nun]   haksayng
           Tom-NOM I-NOM which question-ACC   give-PRES-whether know-ADN student

      'the student who$_i$ Tom knows which question I gave t_i'

Example (10) is an example of what has been called in the literature a "double relative clause". Here, it looks like a relative clause has been formed out of another relative clause. The object NP that is associated with *kangaci-ka* 'dog-NOM' has relativized and then the subject NP that is associated with *ai* 'kid' has relativized. The problem for the operator-movement analysis is caused by the subject gap (t_i): it appears to be a trace left by an island-violating movement out of another relative clause.

It turns out, however, that there is a derivation of examples such as (10) from a double nominative construction, without an island-violating movement, as shown by C.-H. Han and Kim (2004). Korean allows double nominative constructions, as in (12), and the first nominative NP can be relativized, as in (13).

(12) Ku ai-ka kangaci-ka cwuk-ess-ta.
  that kid-NOM dog-NOM die-PAST-DECL
  'As for that kid, the dog died.'

(13) [$_{RC}$ Op$_i$ t$_i$ kangaci-ka cwuk-un] ai
     dog-NOM die-ADN kid
  'the kid whose dog died'

C.-H. Han and Kim argue that the source sentence for the double relative clause in (10) is a double nominative construction where the second nominative NP contains another relative clause with an empty *pro* that is coindexed with the first nominative NP, as in (14). The double relative clause is derived by relativizing the first nominative NP, resulting in (15). Crucially, the postulated *pro$_i$* here is not a gap bound by a relative operator (Op_i), but is an empty pronoun that forms an anaphoric dependency with the trace/copy of the first nominative NP (t_i). In this derivation, therefore, there is no trace left by movement out of a relative clause, an island, and so double relative clauses do not constitute counter-examples to the operator-movement analysis.

(14) Ku ai$_i$-ka [$_{RC}$ Op$_j$ pro$_i$ t$_j$ cohaha-nun] kangaci-ka cwuk-ess-ta.
  that kid-NOM   like-ADN dog-NOM die-PAST-DECL
  'As for that kid, the dog that he liked died.'

(15) [$_{RC1}$ Op$_i$ t$_i$ [$_{RC2}$ Op$_j$ pro$_i$ t$_j$ cohaha-nun] kangaci-ka cwuk-un] ai
         like-ADN dog-NOM die-ADN kid
  'the kid whose dog which he liked died'

Example (11), however, does not have a double nominative source, as observed by Kwon (2008). A double nominative construction corresponding to (11) is not well formed, as shown in (16). So, the relative clause in (11) could only be formed, under the operator-movement analysis, by moving a null operator out of a *wh*-complement clause.
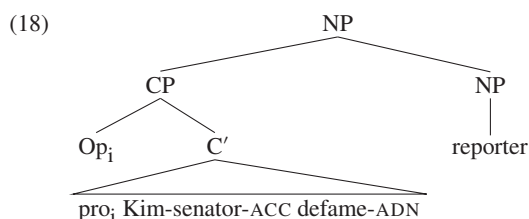
(16) *Haksayng$_i$-i Tom-i [nay-ka etten cilmwun-ul pro$_i$ cwunun-ci]
  student-NOM Tom-NOM I-NOM which question-ACC give-whether

  a-n-ta.
  know-PRES-DECL

Examples such as (11) then pose a real challenge to the operator-movement analysis. It must be noted, however, that researchers do not agree on the judgments on truly island-violating relative clauses such as (11). Though Kwon reports that such examples are acceptable, they would not be acceptable to C.-H. Han and Kim (2004), J.-I. Han (1992), D.-W. Yang (1987), and H.-K. Yang (1990). C.-H. Han and Kim, for example, provide a relative clause formed from an adjunct clause as in (17a), and report that it is not acceptable. This example would have to involve an island-violating movement, a movement out of an adjunct clause, as a corresponding double nominative construction cannot be formed from (17a), as shown in (17b).

(17) a. *[Op$_i$ [John-i   ku namca-lul t$_i$ manna-ss-ki   ttaymwuney] Sue-ka
            John-NOM that man-ACC   meet-PAST-NMZ because   Sue-NOM

         [hwakana-n]   sikan
         be angry-ADN time
         'the time when$_i$ Sue was angry [because John met that man t_i]'

      b. *Ku sikan-i   [John-i   ku namca-lul pro$_i$ manna-ss-ki   ttaymwuney]
         that time-NOM John-NOM that man-ACC   meet-PAST-NMZ because
         Sue-ka   hwakana-ss-ta.
         Sue-NOM be angry-PAST-DECL

2.3   Operator-binding analysis

The operator-binding analysis accounts for relative clauses with gaps in islands. According to this analysis, the gap in the relative clause is an empty pronoun bound in-situ by a null operator. For instance, in (2), the subject gap contains an empty pronoun which is bound by the null operator in [Spec,CP], as in (18). As there is no movement in this analysis, relative clauses are predicted to exhibit no island effects, thus accommodating examples such as (11). Under the operator-binding analysis, the gap contained in the *wh*-complement clause in (11) is an empty pronoun, and is bound by a null operator from [Spec,CP].

(18)

In addition, the operator-binding analysis makes the prediction that the gap in a relative clause should be replaceable with an overt pronoun, as an empty pronoun can be replaced with an overt pronoun in other syntactic contexts. In (19a), the empty pronoun can be replaced with *ku-lul* 'he-ACC', and it refers to some contextually salient male distinct from *Toli*. In (19b), the empty pronoun in the embedded

clause which is co-referential with the matrix subject can be replaced with *ku-ka* 'he-NOM'.[2]

(19) a. Toli-nun pro / ku-lul kosohay-ss-ta.
Toli-TOP he-ACC sue-PAST-DECL
'Toli sued him.'

b. Toli$_i$-nun [pro$_i$ / ku$_i$-ka thullye-ss-tako] sayngkakha-yess-ta.
Toli-TOP he-NOM wrong-PAST-COMP think-PAST-DECL
'Toli thought he was wrong.'

It has been observed that in relative clauses, the gap cannot be replaced with an overt pronoun in a simple clause, as in (20a). However, it has also been reported in the literature that this is possible if the gap is in a complex clause, contained in a non-island embedded clause, as in (20b) or in an island, as in (20c) (Lee 1984, Kwon 2008).

(20) a. [Op$_i$ hyengsa-ka pro$_i$ / *ku$_i$-lul enceyna sinloyha-n] kica
detective-NOM he-ACC always trust-ADN reporter
'the reporter who the detective always trusted' (Kwon 2008)

b. [Op$_i$ Mary-ka [Tom-i pro$_i$ / ku$_i$-lul kosohay-ss-tako] sayngkakha-n]
Mary-NOM Tom-NOM he-ACC sue-PAST-COMP think-ADN
wuncensa
driver
'the driver who Mary thought that Tom sued' (Kwon 2008)

c. [Op$_i$ [pro$_i$ / ku$_i$-ka etieyse swul-ul masi-ess-nunci] wuli-ka
he-NOM where liquor-ACC drink-PAST-whether we-NOM
cenhye alkileps-nun] Tolsoy
at all not know-ADN Tolsoy
'Tolsoy who we do not know at all where he drank liquor' (Lee 1984)

This state of affairs, then, does not fully support the operator-binding analysis. Under this analysis, the gap should be replaceable with an overt pronoun whether it occurs in a simple clause or a complex clause. Perhaps, the contrasting judgments on relative clauses formed from simple clauses and from complex clauses reported in the literature is a reflection of processing effects rather than grammatical effects. It could be that examples such as (20b) and (20c) seem more acceptable than (20a) because inserting an overt pronoun in the gap position in relative clauses formed from complex clauses eases the processing load, whereas inserting an overt pronoun in relative clauses formed from simple clauses results in a processing difficulty. This then suggests an approach in which the operator-binding analysis is the norm, with null pronouns preferably used in simple clauses and overt pronouns preferably used in complex clauses (including islands) for processing reasons.

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[2]In (19b), *pro* can also be replaced with an anaphor *caki* 'self'. In general, it is preferable to use *caki* over *ku* when a c-commanding antecedent of the overt pronominal is present in an A-position.

2.4   Interim summary

In summary, the two tests that can tease apart the operator-movement analysis and the operator-binding analysis, namely, (i) the placement of a gap in an island and (ii) the replaceability of the gap with an overt pronoun, have yet to produce clear results. This makes it difficult to draw any firm conclusions about the syntax of relative clauses in Korean. The problem is the conflicting judgments on crucial data reported in the literature across researchers and within a data set for a given test. This disagreement in judgments may have been caused by the method used to elicit judgments from native speakers. Introspection data from the researchers themselves or a few native speaker consultants may not provide a clear picture of the situation.[3] I thus adopted a controlled experimental methodology and obtained native speaker judgments on the two tests from two magnitude estimation task experiments, one on relative clauses with subject gaps, and the other on relative clauses with object gaps. I present the experimental design and the findings in section 3.

3.   MAGNITUDE ESTIMATION TASK EXPERIMENTS

An ME technique is standardly used in psychophysics to measure judgments of sensory stimuli such as light or sound intensity (Stevens 1975), and has been adapted to obtaining grammaticality judgments in linguistics (Bard et al. 1996, Cowart, 1997). In an ME task, participants are required to evaluate a series of new sentences with respect to a fixed reference sentence. They are first presented with a reference sentence, and are either asked to rate its acceptability as a sentence of the language or are given a score pre-determined by the experimenter that represents how acceptable it is. In the experiments presented here, the acceptability score of the reference sentence was pre-determined to be 100. Participants are then asked to rate the acceptability of each subsequent experimental sentence in proportion to the score assigned to the reference sentence. The experimental sentences are rated higher than the reference score if they are deemed to be more acceptable than the reference sentence, lower if they are deemed to be less acceptable, and the same as the reference score if deemed to be as acceptable as the reference sentence. Any number can be used as a score but not zero. For statistical analysis, each score is divided by the reference score to standardize the scale and then transformed into a log score to normalize distribution.

The ME technique has been shown to be useful in obtaining native speaker judgments on both acceptability and reference resolution and to be capable of yielding fine-grained distinctions in the acceptability of sentences (Bard et al. 1996, Cowart 1997, Keller and Asudeh 2001, Alexopoulou and Keller 2007). It also provides ratio data, which allows for the use of parametric statistics such as ANOVA in the data analysis.

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[3] All the research on the syntax of Korean relative clauses cited here so far is based on data elicited from a few native speaker consultants. Kwon (2008) uses experimental methodology to study the processing of subject gap and object gap relative clauses formed from non-islands, but her conclusions about the syntax of Korean relative clauses are not based on experimental data.

In this article, two ME task experiments were conducted to answer the two research questions in (21).

(21) *Research questions*:
    (i) Is relativization out of islands possible? That is, can there be a gap in an island in a relative clause?
    (ii) Can the gap in a relative clause be replaced with an overt pronoun?

Under the operator-movement analysis, the answer to both questions is *no*. Under the operator-binding analysis, the answer to both questions is *yes*. Under the processing-based operator-binding analysis, the answer to the first questions is *yes*, and the answer to the second question is *no* in relative clauses formed from simple clauses but *yes* in relative clauses formed from complex clauses, including islands. Experiment 1 tested relative clauses with subject gaps, and Experiment 2 tested those with object gaps.

3.1 Experiment 1: Subject gap relative clauses

This section presents the experiment and the findings on the subject gap relative clauses in Korean.

3.1.1 Participants

Twenty-three adult native speakers of Korean were tested. All of them had lived at most a total of 12 months outside of Korea at the time of testing. The age of the participants ranged from 19 to 35, with a mean age of 25.

3.1.2 Experimental design

Two (within-subjects) factors with two levels each were tested: clause type (whether the relative clause is formed from a non-island or an island) and gap type (whether the gap position is empty or filled with an overt pronoun). The experiment was thus divided into four different conditions, each condition testing sentences containing relative clauses formed from non-islands or islands, with the gap position filled with an overt pronoun or not. The experimental design is summarized in Table 1, along with the predicted acceptability ratings of the three competing analyses: operator-movement, operator-binding, and processing-based operator-binding.

Table 1: Summary of the experimental design and predictions

Clause type	Gap type	Predicted by Op-movement	Predicted by Op-binding	Predicted by processing-based Op-binding
Non-island	Empty	high	high	high
	pronoun	low	high	low (simple), high (complex)
Island	Empty	low	high	high
	pronoun	low	high	high

3.1.3 Materials

The sentence in (22) was used as a reference sentence. An ideal reference sentence in an ME task should be grammatical but a bit degraded. Such a sentence with a mid-range acceptability encourages participants to make as wide a distinction as possible between grammatical and ungrammatical test items. Example (22) fits this criterion: it is grammatical but it can lead to a processing difficulty, as it has embedding and long-distance scrambling with a pronoun whose reference has to be resolved, resulting in degraded acceptability.[4]

(22) Sacin-ul$_i$ [Kim-kica-ka   pwuin-eykey [kunye-ka oksang-eyse t$_i$ cciku-lako]
      picture-ACC Kim-reporter-NOM wife-to   she-NOM roof top-at   take-COMP
      ceyanha-yess-ta].
      suggest-PAST-DECL
      'Reporter Kim suggested to his wife that she should take the picture from the roof top.'

All test sentences are generated from the four test templates in (23). They are all transitive sentences, each with a subject gap relative clause in the underlined slot of the object.

(23) a. Kim-pwucang-un _____ kica-lul   haykoha-yess-ta.
          Kim-manager-TOP _____ reporter-ACC fire-PAST-DECL
          'Manager Kim fired the reporter who _____ .'

      b. Hakkwacang-un   _____ tayhaksayng-ul manna-ss-ta.
          department chair-TOP _____ undergrad-ACC meet-PAST-DECL
          'The department chair met the undergrad who _____ .'

      c. Kang-hyengsa-nun   _____ namca-lul simmwunha-yess-ta.
          Kang-detective-TOP _____ man-ACC   question-PAST-DECL
          'Detective Kang questioned the man who _____ .'

      d. Park-kamtok-un   _____ paywu-lul koyongha-yess-ta.
          Park-director-TOP _____ actor-ACC hire-PAST-DECL
          'Director Park hired the actor who _____ .'

Each test template is instantiated as 12 test sentences containing relative clauses formed from non-islands (simple clause, embedded clause, relative clause with a double nominative source) and islands (noun complement clause, adjunct clause, *wh*-complement clause), with and without an overt pronoun in the gap position. The test sentences generated from the test template in (23c) are given in (24). Each example instantiates two test sentences: one with an empty gap and another with an overt pronoun gap. All test sentences by condition are given in Appendix A.

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[4]A reviewer observes that the presence of the pronoun *kunye-ka* 'she-NOM' in the embedded clause makes the reference sentence used in the present study ungrammatical to him/her. The acceptability of the reference sentence could certainly vary across speakers. This however does not pose a problem as (i) statistical analysis is done on ratings that have been transformed to standardize the scale, and (ii) statistical analysis does not hinge on ratings of the test sentences in relation to the reference score, but on ratings in an experimental condition in relation to those in other conditions and the way in which these ratings contrast with one another.

(24) a. *Relative clause formed from a simple clause*:

Kang-hyengsa-nun [__/ku-ka   Kim-kyengkwan-ul posek   kakey-eyse ttayli-n]
Kang-detective-TOP   he-NOM Kim-inspector-ACC jewelry store-at   hit-ADN
namca-lul simmwunha-yess-ta.
man-ACC question-PAST-DECL
'Detective Kang questioned the man who hit Inspector Kim at the jewelry store.'

b. *Relative clause formed from an embedded clause*:

Kang-hyengsa-nun [__ / ku-ka   Kim-kyengkwan-ul nttayli-ess-tako
Kang-detective-TOP   he-NOM Kim-inspector-ACC hit-PAST-COMP

Park-pyenhosa-ka mit-nun]   namca-lul simmwunha-yess-ta.
Park-lawyer-NOM believe-ADN man-ACC question-PAST-DECL
'Detective Kang questioned the man who Lawyer Park thinks hit Inspector Kim.'

c. *Relative clause formed from a relative clause with a double nominative source*:

Kang-hyengsa-nun [__ / ku-ka   posek-ul   hwumchi-n kos-i
Kang-detective-NOM   he-NOM jewelry-ACC steal-ADN   place-NOM

paykwhacem-i-n]   namca-lul simmwun-yess-ta.
department store-COP-ADN man-ACC question-PAST-DECL
'Detective Kang questioned the man who the place he stole the jewelry from is the
department store.'

d. *Relative clause formed from a noun complement clause*:

Kang-hyengsa-nun [__ / ku-ka   Kim-kyengkwan-ul ttayli-ess-tanun sasil-i
Kang-detective-TOP   he-NOM Kim-inspector-ACC hit-PAST-ADN   fact-NOM
allyeci-n]   namca-lul simmwunha-yess-ta.
known-ADN man-ACC question-PAST-DECL

'Detective Kang questioned the man who the fact that he hit inspector Kim is
known.'

e. *Relative clause formed from an adjunct clause*:

Kang-hyengsa-nun [__/ku-ka   Kim-kyengkwan-ul ttayli-ese   Park-pyenhosa-ka
Kang-detective-TOP   he-NOM Kim-inspector-ACC hit-because Park-lawyer-NOM
nancheha-n]   namca-lul simmwunha-yess-ta.
perplexed-ADN man-ACC question-PAST-DECL
'Detective Kang questioned the man who Lawyer Park was perplexed because he
hit Inspector Kim.'

f. *Relative clause formed from a wh-complement clause*:

Kang-hyengsa-nun [__ / ku-ka   Kim-kyengkwan-ul ttayli-ess-nunci
Kang-detective-TOP   he-NOM Kim-inspector-ACC hit-PAST-whether

Park-kemsa-ka   kwungkumhayha-nun] namca-lul simmwunha-yess-ta.
Park-prosecutor-NOM wonder-ADN   man-ACC question-PAST-DECL
'Detective Kang questioned the man who Prosecutor Park wonders whether he hit
Inspector Kim.'

3.1.4 Procedure

The experiment was conducted using WebExp, a web-based software for conducting
linguisitic experiments (Keller et al. 2009). Participants were first introduced to the

Korean - ME1 - May 2011

Magnitude Estimation of Linguistic Acceptablity

Reference: _____

Rating: 100

Item: _____

Rating: [ ]

(Next)

Stage: Practice   Slide: 1 / 3

Figure 1: Screen shot of a line length practice trial

Korean - ME1 - May 2011

Magnitude Estimation of Linguistic Acceptablity

Reference: 사진을 김기자가 부인에게 그녀가 옥상에서 찍으라고 제안하였다.

Rating: 100

Item: 강형사는 그가 김경관을 보석 가게에서 때린 남자를 심문하였다.

Rating: [ ]

(Next)

Stage: Experiment   Slide: 66 / 68   Repetition: 66 / 68

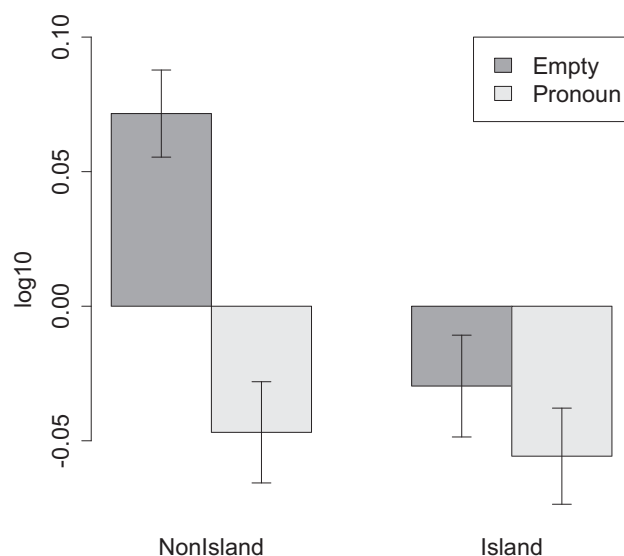**Figure 2:** Screen shot of a test trial

Figure 3: Mean average log transformed scores by condition: subject gap relative clauses

task with three practice trials with line length and three practice trials with sentence acceptability. Line length practice trials illustrate the task in an intuitive way. For this, participants were presented with a reference line with a fixed rating of 100 and were asked to rate the length of three new lines in proportion to the length of the reference line. An example screen shot of a line length practice trial is given in Figure 1.

Participants were then told that sentence acceptability can be judged in a similar way and were given three sentence acceptability practice trials. They then rated 48 test sentences along with 24 filler sentences in a random order. Filler sentences came from a separate experiment on long-distance anaphor binding in Korean. An example screen shot of a sentence acceptability trial is given in Figure 2.

3.1.5   Findings

For each condition, the dependent measure was the average of log transformed scores for each participant. Mean average scores for all four conditions are shown in Figure 3. The mean average of the non-island/empty condition is well above zero, which means that, on average, participants rated sentences in this condition higher than the reference sentence. The mean average scores of all other conditions are well below zero, showing that, on average, participants rated sentences in these conditions lower than the reference sentence.

A two-way repeated measures ANOVA revealed the following effects. First, a main effect of clause type was found ($F(1, 22) = 13.97$, $p = .001$). That is, regardless of gap type, speakers are more likely to rate the acceptability of relative clauses formed from non-islands higher than that of relative clauses formed from islands. Second, a main effect of gap type was found ($F(1, 22) = 19.33$, $p < .001$). That is, regardless of clause type, speakers are more likely to rate the acceptability of relative clauses with empty gaps higher than that of relative clauses with overt pronoun gaps. Third, an interaction between clause type and gap type was found ($F(1, 22) = 9.29$, $p = .006$). This means that speakers are significantly more likely to rate the acceptability of non-island relative clauses with empty gaps higher than that of non-island relative clauses with overt pronoun gaps. In addition, post-hoc pairwise comparisons with Bonferroni adjustment were conducted on all pairs of conditions. It was found that while the mean acceptability rating in non-island/empty condition is significantly different from the ratings in non-island/pronoun ($t(275) = 7.70$, $p < .001$), island/empty ($t(275) = 5.72$, $p < .001$), and island/pronoun ($t(275) = 7.99$, $p < .001$) conditions, the mean ratings between all other pairs of conditions are not different from each another. This indicates that the relative clauses formed from non-islands with empty gaps are most acceptable to speakers.

3.1.6 Discussion

We can now answer the research questions raised in (21) (repeated here as (25)).

(25) *Research questions*:
    (i) Is relativization out of islands possible? That is, can there be a gap in an island in a
       relative clause?
    (ii) Can the gap in a relative clause be replaced with an overt pronoun?

The findings of Experiment 1 indicate that relativization out of islands is not possible, and that the gap in a relative clause cannot be replaced with an overt pronoun. These results thus support the operator-movement analysis.

A more detailed breakdown of the data by clause type, however, reveals some results that seem surprising at first sight. Figure 4 presents the mean average scores for relative clauses formed from simple clauses, embedded clauses, relative clauses with a double nominative source, noun complement clauses, adjunct clauses, and *wh*-complement clauses, with empty gaps and overt pronoun gaps. It shows that all mean averages of relative clauses formed from non-islands (simple clauses, embedded clauses, and relative clauses with a double nominative source) with empty gaps are above zero, and all mean averages of relative clauses with overt pronoun gaps are below zero, whether they are formed from islands or non-islands. Also, the mean averages of relative clauses formed from adjunct clauses and *wh*-complement clauses (instances of islands) with empty gaps are below zero. These results are all consistent with the operator-movement analysis. In contrast, relative clauses formed from noun complement clauses with empty gaps do not behave as expected. Under the operator-movement analysis, as noun complement clauses are islands, relative clauses in this category should pattern with those formed from adjunct clauses and *wh*-complement
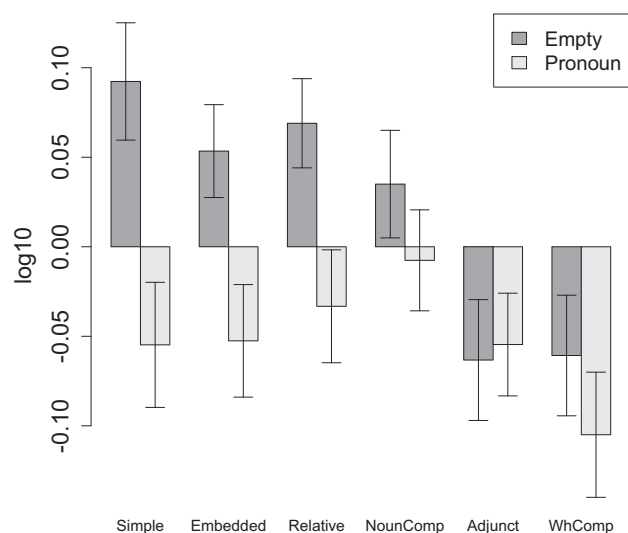
Figure 4: Detailed mean average log transformed scores: subject gap relative
clauses

clauses. But a visual inspection of the graph indicates that this expectation is not
borne out.

Ten pairwise comparisons with Bonferroni adjustment, as listed in Table 2, con-
firmed that relative clauses in the noun-complement/empty category pattern with
those in the non-island/empty categories and not with island/empty categories.

Table 2: Pair-wise comparisons of subject gap relative clauses

Pair 1	simple clause/empty gap	embedded clause/empty gap
Pair 2	embedded clause/empty gap	relative clause /empty gap
Pair 3	relative clause/empty gap	noun complement clause/empty gap
Pair 4	noun complement clause/empty gap	adjunct clause/empty gap
Pair 5	adjunct clause/empty gap	*wh*-complement clause/empty gap
Pair 6	simple clause/pronoun gap	embedded clause/pronoun gap
Pair 7	embedded clause/pronoun gap	relative clause/pronoun gap
Pair 8	relative clause/pronoun gap	noun complement clause/pronoun gap
Pair 9	noun complement clause/pronoun gap	adjunct clause/pronoun gap
Pair 10	adjunct clause/pronoun gap	*wh*-complement clause/pronoun gap

Among the ten pairs, only noun complement clause/empty gap and adjunct clause/empty
gap categories were significantly different from each other ($t(91) = 3.99, p < .001$).

Thus, the data show that all non-island relative clauses with empty gaps pattern together, all relative clauses formed from adjunct clauses and *wh*-complement clauses pattern together, and all relative clauses with overt pronoun gaps pattern together. All these observations are consistent with the operator-movement analysis. However, relative clauses formed from noun complement clauses pattern with those formed from non-islands, in contrast to the expectations of the operator-movement analysis.

While these findings are surprising, there is a possible explanation for them. Kwon (2008) observes that relativization from noun complement clauses may have a double nominative derivational source, similar to the derivation of apparent double relative clauses. For instance, according to Kwon, although the relative clause in (26a) appears to have a gap in a noun complement clause, its derivational source could be a double nominative construction, as in (26b). Here, the second nominative NP contains a noun complement clause with *pro* in an object position that is co-indexed with the first nominative NP. The relative clause in (26a) is then derived by relativizing the first nominative NP, as in (26c). Importantly, this *pro* is not an operator-bound gap, but is an empty pronoun forming an anaphoric dependency with the trace/copy of the first nominative NP (t_i).

(26) a. [[John-i ___ cakkokha-n   sasil-i]   pimil-i-n]   kok
          John-NOM   compose-ADN fact-NOM secret-COP-ADN song
          'the song which the fact that John composed it is a secret'

      b. Ku kok$_i$-i   [John-i   pro$_i$ cakkokha-n   sasil-i]   pimil-i-ta.
          that song-NOM John-NOM   compose-ADN fact-NOM secret-COP-DECL
          'As for that song, the fact that John composed it is a secret.'

      c. [Op$_i$ t$_i$ [John-i   pro$_i$ cakkokha-n   sasil-i]   pimil-i-n]   kok
                  John-NOM   compose-ADN fact-NOM secret-COP-ADN song
          'the song which the fact that John composed it is a secret'

Turning to the test sentences used in the present experiment, it is possible to construct corresponding double nominative sentences from relative clauses formed from noun complement clauses. For instance, from the relative clause in (27a), the double nominative sentence in (27b) can be constructed. In (27b), the second nominative NP contains a noun complement clause with *pro* in a subject position that is coindexed with the first nominative NP. By relativizing this nominative NP, as in (27c), the relative clause in (27a) can be derived. Again, the postulated *pro* is not bound by a relative operator (Op_i), but forms an anaphoric dependency with the trace/copy of the first nominative NP (t_i). As this derivation does not involve movement out of an island, relative clauses in the noun-complement/empty category are patterning with those formed from other non-islands with empty gaps.

(27) a. [[___ Kim-kyengkwan-ul ttayli-ess-tanun sasil-i]   allyeci-n]   namca
              Kim-inspector-ACC hit-PAST-ADN   fact-NOM known-ADN man
          'the man who the fact that he hit inspector Kim is known.'

b. Ku namca$_i$-ka [pro$_i$ Kim-kyengkwan-ul ttayli-ess-tanun sasil-i]
   that man-NOM   Kim-inspector-ACC hit-PAST-ADN   fact-NOM

   allyeci-ess-ta.
   known-PAST-DECL

   'As for that man, the fact that he hit Inspector Kim is known.'

c. [Op$_i$ t$_i$ [pro$_i$ Kim-kyengkwan-ul ttayli-ess-tanun sasil-i]   allyeci-n]   namca
              Kim-inspector-ACC hit-PAST-ADN   fact-NOM known-ADN man

   'the man who the fact that he hit inspector Kim is known.'

A reviewer observes that under the double nominative analysis of relative clauses formed from relative clauses and noun complement clauses, a prediction arises that the missing arguments in the source relative clauses and noun complement clauses should be replaceable with overt pronouns, as these are *pro*'s. However, according to Figure 4, in overt pronoun conditions, although relative clauses formed from relative clauses and noun complement clauses are rated higher than those formed from simple, embedded, adjunct or *wh*-complement clauses, they are not rated as high as non-island relatives with empty gaps. One possible explanation for the decreased acceptability ratings here may have to do with the form of the overt pronoun used in our test sentences. Generally, the pronominal form that best replaces third-person *pro* in source double nominative sentences is *caki* ('self'), not *ku* ('he'). This is illustrated with a double nominative with a relative clause in (28) (a derivational source of (15)), and a double nominative with a noun complement clause in (29) (a derivational source of (27c)).

(28) Ku ai$_i$-ka   [Op$_j$ caki$_i$-ka   / ??ku$_i$-ka / pro$_i$ t$_j$ cohaha-nun] kangaci-ka cwuk-ess-ta.
     that kid-NOM   self-NOM / he-NOM / pro   like-ADN   dog-NOM die-PAST-DECL

     'As for that kid, the dog that he liked died.'

(29) Ku namca$_i$-ka [caki$_i$-ka / ??ku$_i$-ka / pro$_i$ Kim-kyengkwan-ul ttayli-ess-tanun sasil-i]
     that man-NOM self-NOM / he-NOM / pro Kim-inspector-ACC hit-PAST-ADN   fact-NOM

     allyeci-ess-ta.
     known-PAST-DECL

     'As for that man, the fact that he hit Inspector Kim is known.'

The fact that replacing *pro* with *caki* is much more acceptable than *ku* in the above sentences is part of a larger phenomenon where *caki* is preferred over *ku* when a c-commanding antecedent of an overt pronominal is present in an A-position, as was observed in footnote 2. This in turn could be responsible for the degraded acceptability ratings in the overt pronoun conditions with possible double nominative derivational source. Note, however, that the low acceptability ratings in other overt pronoun conditions with relative clauses formed from simple, embedded, adjunct, or *wh*-complement clauses cannot be attributed to this effect as the overt pronoun does not have a sentence-internal c-commanding antecedent in an A-position.[5]

---

[5]It remains to be tested experimentally whether *caki* can occur in place of the postulated *pro* in relative clauses with a double nominative derivational source, and whether *caki* improves the acceptability of relative clauses formed from simple, embedded, adjunct, or *wh*-complement clauses.

To sum up the results of Experiment 1, relativization is possible only from non-islands. The apparent gap in noun complement clauses need not be associated with the relative operator, and instead can be treated as an empty pronoun that forms an anaphoric dependency with the first nominative NP of a double nominative clause. Furthermore, the gap associated with a relative operator cannot be filled with an overt pronoun in either simple relative clauses or complex relative clauses. These results are predicted by the operator-movement analysis, but not by the operator-binding analysis or the processing-based operator-binding analysis.

3.2   Experiment 2: Object gap relative clauses

This section presents the experiment and the findings in the object gap relative clauses in Korean.

3.2.1   *Participants*

Twenty-three adult native speakers of Korean, different from those who participated in Experiment 1, were tested. The same criteria as in Experiment 1 were applied in recruiting the participants. The age of the participants ranged from 19 to 33, with the mean age at 24.

3.2.2   *Experimental design and procedure*

Experiment 2 had the same experimental design as Experiment 1. It tested two (within-subjects) factors with two levels each, clause type (whether the relative clause is formed from a non-island or an island) and gap type (whether the gap position is empty or filled with an overt pronoun), resulting in four conditions. It was conducted using WebExp (Keller et al. 2009), following the same procedure as Experiment 1. Participants were first given three line length practice trials, followed by three sentence acceptability practice trials. They then rated 32 test sentences along with 24 filler sentences in a random order. Just as in Experiment 1, the filler sentences came from a separate experiment on long-distance anaphor binding in Korean.

3.2.3   *Materials*

Experiment 2 used the same reference sentence as Experiment 1, the sentence in (22). It also used the same test templates as in Experiment 1 to generate all test sentences. But in contrast to Experiment 1, the test sentences in Experiment 2 contained an object gap in relative clauses, and each test template was instantiated as eight (not 12) test sentences containing relative clauses formed from simple clauses, embedded clauses, adjunct clauses, and *wh*-complement clauses, with and without an overt pronoun in the gap position. Sentences with relative clauses formed from relative clauses and noun complement clauses were not included this time, as they could be given an alternative analysis with a double nominative derivational source. Example (30) contains the test sentences generated from the test template in (23a). Each example instantiates two test sentences: one with an empty gap and another with an overt pronoun gap. All test sentences by condition are given in Appendix B.

(30) a. *Relative clause formed from a simple clause*:

Kim-pwucang-un [Han-uywon-i caknyen-ey myengyeyhoyson-ulo ___/ku-lul
Kim-manager-TOP Han-senator-NOM last year-at defamation-for he-ACC
kosoha-n] kica-lul haykoha-yess-ta.
sue-ADN reporter-ACC fire-PAST-DECL
'Manager Kim fired the reporter who Senator Han sued last year for defamation.'

b. *Relative clause formed from an embedded clause*:

Kim-pwucang-un [Han-uywon-i myengyeyhoyson-ulo ___ / ku-lul
Kim-manager-TOP Han-senator-NOM defamation-for he-ACC
kosoha-yess-tako pyencipcang-i sayngkakha-nun] kica-lul haykoha-yess-ta.
sue-PAST-COMP editor-NOM think-ADN reporter-ACC fire-PAST-DECL
'Manager Kim fired the reporter who the editor thinks that Senator Han sued for defamation.'

c. *Relative clause formed from an adjunct clause*:

Kim-pwucang-un [Han-uywon-i myengyeyhoyson-ulo ___/ku-lul kosoha-yese
Kim-manager-TOP Han-senator-NOM defamation-for he-ACC sue-because
phyencipcang-i pwunkayha-n] kica-lul haykoha-yess-ta.
editor-NOM angry-ADN reporter-ACC fire-PAST-DECL
'Manager Kim fired the reporter who the editor is angry because Senator Lee sued him for defamation.'

d. *Relative clause formed from a wh-complement clause*:

Kim-pwucang-un [Han-uywon-i myengyeyhoyson-ulo ___ / ku-lul
Kim-manager-TOP Han-senator-NOM defamation-for he-ACC
kosoha-yess-nunci phyencipcang-i kwungkumhayha-nun] kica-lul
sue-PAST-whether editor-NOM wonder-ADN reporter-ACC
haykoha-yess-ta.
fire-PAST-DECL
'Manager Kim fired the reporter who the editor wondered whether Senator Han sued him for defamation.'

3.2.4 Findings

Mean average of log transformed scores for all four conditions are shown in Figure 5. It can be seen by inspecting the graph visually that the mean average of non-island/empty condition is higher than the other three conditions.

A two-way repeated-measures ANOVA revealed the following effects: main effects of clause type ($F(1, 22) = 8.44$, $p = .008$) and gap type ($F(1, 22) = 12.60$, $p = .002$), and an interaction between the two factors ($F(1, 22) = 7.69$, $p = .011$). This means that, just as in Experiment 1, speakers are significantly more likely to rate the acceptability of relative clauses formed from non-islands higher than that of relative clauses formed from islands, and more likely to rate the acceptability of non-island relative clauses with empty gaps higher than that of non-island relative clauses with overt pronoun gaps.

Moreover, post-hoc pairwise comparisons with Bonferroni adjustment on all pairs of conditions revealed that only the non-island/empty condition is significantly
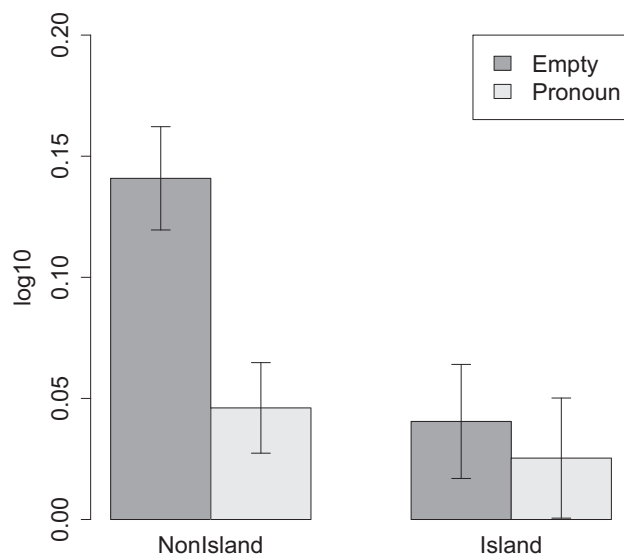
Figure 5: Mean average log transformed scores by condition: object relative clauses

different from the non-island/pronoun ($t(183) = 4.58$, $p < .001$), the island/empty ($t(183) = 4.85$, $p < .001$), and the island/pronoun ($t(183) = 5.04$, $p < .001$) conditions. All other pairs of conditions are not different from each other. Thus, just as in Experiment 1, the relative clauses formed from non-islands with empty gaps are most acceptable to speakers.

3.2.5 Discussion

The findings of Experiment 2 are that, just like subject gap relative clauses, object gap relative clauses cannot be formed out of islands and cannot contain an overt pronoun in the gap position. These results further support the operator-movement analysis.

Comparing the graphs in Figures 3 and 5, however, shows that the mean average scores of sentences with object gap relative clauses are higher in all conditions than sentences with subject gap relative clauses. This raises the question of whether object gap relative clauses are generally more acceptable than subject gap relative clauses. This question cannot be directly answered from the data we have because the ratings in the two experiments are from two different sets of participants. The difference in ratings between the two experiments may simply be a function of the fact that one set of participants happened to be more generous raters than the other set. Nevertheless, a mixed model ANOVA, a statistical test that takes this sort of variance into account,

can be used here to give us some idea regarding the relation between acceptability and grammatical function of gaps in relative clauses.

I thus applied the test to the data from Experiment 1 and Experiment 2, treating grammatical function of the gap as a between-subjects factor. The test revealed no effect of the grammatical function of the gap. This means that there is no significant difference between the acceptability ratings of object gap and subject gap relative clauses across all four conditions. According to the test, therefore, non-island subject gap relative clauses with empty gaps have acceptability ratings just as high as those of the corresponding object gap relative clauses, and non-island object gap relative clauses with overt pronoun gaps and island object gap relative clauses with or without overt pronoun gaps have acceptability ratings just as low as those of the corresponding subject gap relative clauses.

Ideally, as suggested by a reviewer, to get a better picture of differences or similarities between the subject gap and the object gap relative clauses, a separate experiment should be conducted in which each participant rates both types of relative clauses. I leave this for future research.

4. CONCLUSION

From the two ME task experiments on the subject gap and the object gap relative clauses, no evidence was found that the gap associated with the relative operator can occur inside islands or that it can be replaced with an overt pronoun. These results are predicted by the operator-movement analysis, but not by the operator-binding analysis.

The results obtained here are thus different from the grammaticality judgments reported by researchers who do not advocate the operator-movement analysis for Korean relativization. The question arises as to what the source of the differing judgments is. As observed in subsection 2.4, it may be due to the method used to elicit judgments from native speakers. But it could also be a reflection of real dialectal or speaker variation. Kwon (2008), for example, consistently reports judgments that support the processing-based operator-binding analysis. A reviewer also reported judgments according to the processing-based operator-binding analysis on the test sentences used in the present experiments, given in Appendices A and B. Therefore, as suggested by a reviewer, the results I obtained may be epiphenomenal, arising from the fact that the majority of the speakers who participated in the two experiments provided judgments according to the operator-movement analysis. Viewed this way, the present study found that there is a group of speakers of Korean who employ the operator-movement analysis to form relative clauses, and does not refute the possibility that there may be different groups of speakers of Korean who employ a version of the operator-binding analysis.

One source of complication may be that some speakers who adopt the operator-movement analysis may allow the insertion of an overt pronoun in place of a gap in island relatives as a resumptive strategy, as has been proposed for English relative clauses; small-scale elicitation and corpus studies have shown that resumptive

pronouns can be used to rescue relative clauses whose derivation would otherwise involve movement out of islands (Ross 1967, Kayne 1981, Kroch 1981, Prince 1990). It is worth pointing out that experimental work on English relative clauses, however, consistently found that the gap cannot be replaced with a resumptive pronoun, in relative clauses formed from islands as well as those formed from non-islands (McDaniel and Cowart 1999, Alexopoulou and Keller 2007, Heestand et al. 2011, Keffala and Goodall 2011, C.-H. Han et al. 2012). The findings from the experiments reported here show that in Korean, at least for a group of speakers, island-violating relative clauses cannot be rescued by resumption either. The fact that an effect of resumption was not observed in experimental studies on English as well as the study reported here may be because participants in an experiment adopt a more formal prescriptive style than speakers in small-scale elicitation and corpus studies. Nevertheless, it is revealing that my experimental findings from Korean are similar to the findings from English, a language where there is a general consensus that a movement dependency is employed in relative clauses.

On a more general level, the present study demonstrated the applicability of controlled experimentation to issues in theoretical syntax. In the case at hand, even though the syntactic tests to be used to tease apart competing analyses were clear, the acceptability judgements of the relative clauses described in the literature were not. By adopting an experimental methodology, a picture emerged that provided further evidence for the operator-movement analysis. In the future, the present study can be replicated or modified using the same ME technique, or different methods such as a Likert scale, where participants rate the acceptability of sentences using a scale from 1 (not acceptable) to 7 (acceptable), or forced choice, where participants simply rate a sentence as grammatical or ungrammatical. Incorporating experimental methods in obtaining acceptability judgments, especially in cases where the facts are under debate, can only enrich the empirical basis of theoretical syntax.

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APPENDIX A. TEST SENTENCES FOR EXPERIMENT 1

A.1 Non-island/empty; non-island/pronoun

(A.1) Kim-pwucang-un ___/ ku-ka   Han-uywon-ul   caknyen-ey myengyeyhoysonha-n
      Kim-manager-TOP   he-NOM Han-senator-ACC last year-at defame-ADN
      kica-lul   haykoha-yess-ta.
      reporter-ACC fire-PAST-DECL
      'Manager Kim fired the reporter who defamed Senator Han last year.'

(A.2) Hakkwacang-un   ___/ ku-ka   Lee-kyoswu-lul   pomhakki-ey   moyokha-n
      department chair-TOP   he-NOM Lee-professor-ACC spring semester-in insult-ADN
      tayhaksayng-ul mana-ss-ta.
      undergrad-ACC meet-PAST-DECL
      'The department chair met the undergrad who insulted Professor Lee in the spring
      semester.'

(A.3) Kang-hyengsa-nun ___ / ku-ka   Kim-kyengkwan-ul posek   kakey-eyse ttayli-n
      Kang-detective-TOP   he-NOM Kim-inspector-ACC jewelry store-at   hit-ADN
      namca-lul simmwunha-yess-ta.
      man-ACC question-PAST-DECL
      'Detective Kang questioned the man who hit Inspector Kim at the jewelry store.'

(A.4) Park-kamtok-un   ___/ ku-ka   ceycakca-lul acwu cal a-nun   paywu-lul
      Park-director-TOP   he-NOM producer-ACC very well know-ADN actor-ACC
      koyongha-yess-ta.
      hire-PAST-DECL
      'Director Park hired the actor who knows the producer very well.'

(A.5) Kim-pwucang-un ___/ ku-ka   Han-uywon-ul   myengyeyhoysonha-yess-tako
      Kim-manager-TOP   he-NOM Han-senator-ACC defame-PAST-COMP

      phyencipcang-i sayngkakha-nun kica-lul   haykoha-yess-ta.
      editor-NOM   think-ADN   reporter-ACC fire-PAST-DECL
      'Manager Kim fired the reporter who the editor thinks defamed Senator Han.'

(A.6) Hakkwacang-un   ___/ ku-ka   Lee-kyoswu-lul   moyokha-yess-tako cokyo-ka
      department chair-TOP   he-NOM Lee-professor-ACC insult-PAST-COMP TA-NOM
      cwucangha-nun tayhaksayng-ul manna-ss-ta.
      insist-ADN   undergrad-ACC meet-PAST-DECL
      'The department chair met the undergrad who the TA insists insulted Professor Lee.'

(A.7) Kang-hyengsa-nun ___/ku-ka   Kim-kyengkwan-ul ttayli-ess-tako Park-pyenhosa-ka
      Kang-detective-TOP   he-NOM Kim-inspector-ACC hit-PAST-COMP Park-lawyer-NOM
      mit-nun   namca-lul simmwunha-yess-ta.
      believe-ADN man-ACC question-PAST-DECL
      'Detective Kang questioned the man who Lawyer Park thinks hit Inspector Kim.'

(A.8) Park-kamtok-un ___ / ku-ka   ceycakca-lul cal a-n-tako
       Park-director-TOP   he-NOM producer-ACC well know-PRES-COMP

       cokamtok-i   sayngkakha-nun paywu-lul koyongha-yess-ta.
       assistant director-NOM think-ADN   actor-ACC hire-PAST-DECL

       'Director Park hired the actor who the assistant director thinks knows the producer
       well.'

(A.9) Kim-pwucang-un ___/ ku-ka   nyusu-lul potoha-n   pangpep-i   uysimsulewu-n
       Kim-manager-TOP   he-NOM news-ACC report-ADN method-NOM questionable-ADN

       kica-lul   haykoha-yess-ta.
       reporter-ACC fire-PAST-DECL

       'Manager Kim fired the reporter who the method how he reported the news is ques-
       tionable.'

(A.10) Hakkwacang-un   ___ / ku-ka   nakceycemswu-lul pat-un   ttay-ka
       department chair-TOP   he-NOM failing grade-ACC receive-ADN time-NOM

       pomhakki-i-n   tayhaksayng-ul manna-ss-ta.
       spring semester-COP-ADN undergrad-ACC meet-PAST-DECL

       'The department chair met the undergrad who the time when he received a failing
       grade is in the spring semester.'

(A.11) Kang-hyengsa-nun ___ / ku-ka   posek-ul   hwumchi-n kos-i
       Kang-detective-NOM   he-NOM jewelry-ACC steal-ADN   place-NOM

       paykwhacem-i-n   namca-lul simmwun-yess-ta.
       department store-COP-ADN man-ACC question-PAST-DECL

       'Detective Kang questioned the man who the place he stole the jewelry from is the
       department store.'

(A.12) Park-kamtok-un ___ / ku-ka   ceycakca-lul cheum manna-n   ttay-ka
       Park-director-TOP   he-NOM producer-ACC first   meet-ADN time-NOM

       sipnyencen-i-n   paywu-lul koyongha-yess-ta.
       10 years ago-COP-ADN actor-ACC hire-PAST-DECL

       'Director Park hired the actor who the time when he first met the producer is 10 years
       ago.'

A.2 Island/empty; island/pronoun

(A.13) Kim-pwucang-un ___ / ku-ka   Han-uywon-ul   myengyeyhoysonha-yess-tanun
       Kim-manager-TOP   he-NOM Han-senator-ACC defame-PAST-ADN
       sasil-i   pimil-i-n   kica-lul   haykoha-yess-ta.
       fact-NOM secret-COP-ADN reporter-ACC fire-PAST-DECL
       'Manager Kim fired the reporter who the fact that he defamed Senator Han is a secret.'

(A.14) Hakkwacang-un   ___/ku-ka   Lee-kyoswu-lul   moyokha-yess-tanun sasil-i
       department chair-TOP   he-NOM Lee-professor-ACC insult-PAST-ADN   fact-NOM
       pimil-i-n   tayhaksayng-ul manna-ss-ta.
       secret-COP-ADN undergrad-ACC meet-PAST-DECL
       'The department chair met the undergrad who the fact that he insulted Professor Lee
       is a secret.'

(A.15) Kang-hyengsa-nun ⎯ / ku-ka   Kim-kyengkwan-ul ttayli-ess-tanun sasil-i   .
       Kang-detective-TOP   he-NOM Kim-inspector-ACC hit-PAST-ADN   fact-NOM

       allyeci-n   namca-lul simmwunha-yess-ta.
       known-ADN man-ACC question-PAST-DECL

       'Detective Kang questioned the man who the fact that he hit inspector Kim is known.'

(A.16) Park-kamtok-un ⎯ / ku-ka   ceycakca-lul cal a-n-tanun   sasil-i
       Park-director-TOP   he-NOM producer-ACC well know-PRES-ADN fact-NOM

       nollawu-n   paywu-lul koyongha-yess-ta.
       surprising-ADN actor-ACC hire-PAST-DECL

       'Director Park hired the actor who the fact that he knows the producer well is surpris-
       ing.'

(A.17) Kim-pwucang-un ⎯ / ku-ka   Han-uywon-ul   myengyeyhoysonha-yese
       Kim-manager-TOP   he-NOM Han-senator-ACC defame-because

       phyencipcang-i pwunkayha-n kica-lul   haykoha-yess-ta.
       editor-NOM   angry-ADN   reporter-ACC fire-PAST-DECL

       'Manager Kim fired the reporter who the editor is angry because he defamed Senator
       Han.'

(A.18) Hakkwacang-un   ⎯ / ku-ka   Lee-kyoswu-lul   moyokha-yese yele
       department chair-TOP   he-NOM Lee-professor-ACC insult-because many

       haksayngtul-i nola-n   tayhaksayng-ul manna-ss-ta.
       students-NOM surprise-ADN undergrad-ACC meet-PAST-DECL

       'The department chair met the undergrad who many students are surprised because he
       insulted Professor Lee.'

(A.19) Kang-hyengsa-nun ⎯ / ku-ka   Kim-kyengkwan-ul ttayli-ese   Park-pyenhosa-ka
       Kang-detective-TOP   he-NOM Kim-inspector-ACC hit-because Park-lawyer-NOM
       nancheha-n   namca-lul simmwunha-yess-ta.
       perplexed-ADN man-ACC question-PAST-DECL

       'Detective Kang questioned the man who the lawyer Park was perplexed because he
       hit Inspector Kim.'

(A.20) Park-kamtok-un ⎯/ku-ka   ceycakca-lul cal al-ase   cokamtok-i
       Park-director-TOP   he-NOM producer-ACC well know-because assistant director-NOM
       nolla-n   paywu-lul koyongha-yess-ta.
       surprised-ADN actor-ACC hire-PAST-DECL

       'Director Park hired the actor who the assistant director is surprised because he knows
       the producer well.'

(A.21) Kim-pwucang-un ⎯ / ku-ka   Han-uywon-ul   myengyeyhoysonha-yess-nunci
       Kim-manager-TOP   he-NOM Han-senator-ACC defame-PAST-whether
       phyencipcang-i kwungkumhayha-nun kica-lul   haykoha-yess-ta.
       editor-NOM   wonder-ADN   reporter-ACC fire-PAST-DECL

       'Manager Kim fired the reporter who the editor wondered whether he defamed Senator
       Han.'

(A.22) Hakkwacang-un   __ / ku-ka   Lee-kyoswu-lul   moyokha-yess-nunci talun
department chair-TOP   he-NOM Lee-professor-ACC insult-PAST-whether other
haksayngtul-i molu-nun   tayhaksayng-ul manna-ss-ta.
students-NOM not know-ADN undergrad-ACC meet-PAST-DECL

'The department chair met the undergrad who the other students do not know whether
he insulted Professor Lee.'

(A.23) Kang-hyengsa-nun   __ / ku-ka   Kim-kyengkwan-ul ttayli-ess-nunci
Kang-detective-TOP   he-NOM Kim-inspector-ACC hit-PAST-whether

Park-kemsa-ka   kwungkumhayha-nun namca-lul simmwunha-yess-ta.
Park-prosecutor-NOM wonder-ADN   man-ACC question-PAST-DECL

'Detective Kang questioned the man who Prosecutor Park wonders whether he hit
Inspector Kim.'

(A.24) Park-kamtok-un   __ / ku-ka   ceycakca-lul cal a-nunci
Park-director-TOP   he-NOM producer-ACC well know-whether

cokamtok-i   kwungkwumhayha-nun paywu-lul koyongha-yess-ta.
assistant director-NOM wonder-ADN   actor-ACC hire-PAST-DECL

'Director Park hired the actor who the assistant director wondered whether he knew
the producer well.'

APPENDIX B. TEST SENTENCES FOR EXPERIMENT 2

B.1 Non-island/empty; non-island/pronoun

 (B.1) Kim-pwucang-un Han-uywon-i   caknyen-ey myengyeyhoyson-ulo __ / ku-lul
Kim-manager-TOP Han-senator-NOM last year-at defamation-for   he-ACC
kosoha-n kica-lul   haykoha-yess-ta.
sue-ADN reporter-ACC fire-PAST-DECL

'Manager Kim fired the reporter who Senator Han sued last year for defamation.'

 (B.2) Hakkwacang-un   Lee-kyoswu-ka   pomhakki-ey   sihem-eyse __ / ku-lul
department chair-TOP Lee-professor-NOM spring semester-at exam-at   he-ACC
nakceysiki-n tayhaksayng-ul manna-ss-ta.
fail-ADN   undergrad-ACC meet-PAST-DECL

'The department chair met the undergrad who Professor Lee failed in the exam in the
spring semester.'

 (B.3) Kang-hyengsa-nun Kim-kyengkwan-i   posek kakey-eyse __ / ku-lul cheyphoha-n
Kang-detective-TOP Kim-inspector-NOM jewelry store-at   he-ACC arrest-ADN
namca-lul simmwunha-yess-ta.
man-ACC question-PAST-DECL

'Detective Kang questioned the man who Inspector Kim arrested at the jewelry store.'

 (B.4) Park-kamtok-un ceycakca-ka cwuinkong   yek-ulo cekkukcekulo __ / ku-lul
Park-director-TOP producer-NOM main character role-for actively   he-ACC
chwuchenha-n   paywu-lul koyongha-yess-ta.
recommend-ADN actor-ACC hire-PAST-DECL

'Director Park hired the actor who the producer recommended actively for the main
character role.'

(B.5) Kim-pwucang-un Han-uywon-i   myengyeyhoyson-ulo __ / ku-lul
       Kim-manager-TOP Han-senator-NOM defamation-for   he-ACC

       kosoha-yess-tako pyencipcang-i sayngkakha-nun kica-lul   haykoha-yess-ta.
       sue-PAST-COMP   editor-NOM   think-ADN   reporter-ACC fire-PAST-DECL
       'Manager Kim fired the reporter who the editor thinks that Senator Han sued for
       defamation.'

(B.6) Hakkwacang-un   Lee-kyoswu-ka   __ / ku-lul nakceysiki-ess-tako cokyo-ka
       department chair-TOP Lee-professor-NOM   he-ACC fail-PAST-COMP   TA-NOM
       sayngkakha-nun tayhaksayng-ul manna-ss-ta.
       think-ADN   undergrad-ACC meet-PAST-DECL
       'The department chair met the undergrad who the TA thinks Professor Lee failed.'

(B.7) Kang-hyengsa-nun Kim-kyengkwan-i __/ku-lul ttayli-ess-tako Park-pyenhosa-ka
       Kang-detective-TOP Kim-inspector-NOM   he-ACC hit-PAST-COMP Park-lawyer-NOM
       mit-nun   namca-lul simmwunha-yess-ta.
       believe-ADN man-ACC question-PAST-DECL
       'Detective Kang questioned the man who Lawyer Park believes Inspector Kim hit.'

(B.8) Park-kamtok-un   ceycakca-ka   __ / ku-lul chwuchenha-yess-tako
       Park-director-TOP producer-NOM   he-ACC recommend-PAST-COMP

       cokamtok-i   mit-nun   paywu-lul koyongha-yess-ta.
       assistant director-NOM believe-ADN actor-ACC hire-PAST-DECL
       'Director Park hired the actor who the assistant director believes the producer recom-
       mended.'

B.2 Island/empty; island/pronoun

(B.9) Kim-pwucang-un Han-uywon-i   myengyeyhoyson-ulo __ / ku-lul kosoha-yese
       Kim-manager-TOP Lee-senator-NOM defamation-for   he-ACC sue-because
       phyencipcang-i pwunkayha-n kica-lul   haykoha-yess-ta.
       editor-NOM   angry-ADN   reporter-ACC fire-PAST-DECL
       'Manager Kim fired the reporter who the editor is angry because Senator Lee sued
       him for defamation.'

(B.10) Hakkwacang-un   Lee-kyoswu-ka   sihem-eyse __ / ku-lul   nakceysiki-ese
       department chair-TOP Lee-professor-NOM exam-at   he-ACC fail-because
       yele haksayngtul-i nola-n   tayhaksayng-ul manna-ss-ta.
       many students-NOM surprise-ADN undergrad-ACC meet-PAST-DECL
       'The department chair met the undergrad who many students were surprised because
       Professor Lee failed him on the exam.'

(B.11) Kang-hyengsa-nun Kim-kyengkwan-i __/ku-lul ttayli-ese Park-kemsa-ka
       Kang-detective-TOP Kim-inspector-NOM   he-ACC hit-because Park-prosecutor-NOM
       soksanghayha-nun namca-lul simmwunha-yess-ta.
       upset-ADN   man-ACC question-PAST-DECL
       'Detective Kang questioned the man who Prosecutor Park is upset because Inspector
       Kim hit him.'

(B.12) Park-kamtok-un   ceycakca-ka   cekkukcekulo __ / ku-lul   chwuchenha-yese
Park-director-TOP producer-NOM actively   he-ACC recommend-because
cokamtok-i   nola-n   paywu-lul koyongha-yess-ta.
assistant director-NOM surprise-ADN actor-ACC hire-PAST-DECL
'Director Park hired the actor who the assistant director is surprised because the pro-
ducer was actively recommending him.'

(B.13) Kim-pwucang-un Han-uywon-i   myengyeyhoyson-ulo __ / ku-lul
Kim-manager-TOP Han-senator-NOM defamation-for   he-ACC

kosoha-yess-nunci phyencipcang-i kwungkumhayha-nun kica-lul   haykoha-yess-ta.
sue-PAST-whether editor-NOM   wonder-ADN   reporter-ACC fire-PAST-DECL
'Manager Kim fired the reporter who the editor wondered whether Senator Han sued
him for defamation.'

(B.14) Hakkwacang-un   Lee-kyoswu-ka   sihem-eyse __/ku-lul nakceysiki-ess-nunci
department chair-TOP Lee-professor-NOM exam-at   he-ACC fail-PAST-whether
talun haksayngtul-i molu-nun   tayhaksayng-ul manna-ss-ta.
other students-NOM not know-ADN undergrad-ACC meet-PAST-DECL
'The department chair met the undergrad who other students do not know whether
Professor Lee failed him on the exam.'

(B.15) Kang-hyengsa-nun Kim-kyengkwan-i   __ / ku-lul   cheyphoha-yess-nunci
Kang-detective-TOP Kim-inspector-NOM   he-ACC arrest-PAST-whether

Park-kemsa-ka   a-nun   namca-lul simmwunha-yess-ta.
Park-prosecutor-NOM know-ADN man-ACC question-PAST-DECL
'Detective Kang questioned the man who Prosecutor Park knows whether Inspector
Kim arrested him.'

(B.16) Park-kamtok-un   ceycakca-ka   __ / ku-lul   chwuchenha-yess-nunci
Park-director-TOP producer-NOM   he-ACC recommend-PAST-whether

cokamtok-i   kwungkumhayha-nun paywu-lul koyongha-yess-ta.
assistant director-NOM wonder-ADN   actor-ACC hire-PAST-DECL
'Director Park hired the actor who the assistant director wondered whether the pro-
ducer recommended him.'