Double Relativitization of Different Grammatical Functions in Korean[*]

Jeong-Me Yoon
(Myongji University)

Contrary to the claim that only the subject of a clause can undergo double relativization (DR) in Korean (Han 1992), in this paper, I show that it is possible for all GFs to undergo DR but that not all GFs can undergo DR equally easily. I then address the questions (i) what kind of factors determine the DR possibilities of different GFs and (ii) what their nature is and how they can be explained. I claim that one of the important factors determining them is the GFs of the head nouns of the relative clauses from which DR takes place, to be more precise, the GF relations between the higher and the lower head nouns of double relative constructions (DRCs), and that the reason why this is so can be explained in terms of processing. DRCs, in principle, are ambiguous and based on the observation that the interpretation preferences of DRCs are generally determined in the lower relative clauses, I approach the task of explaining the DR possibilities of different GFs by explaining the interpretation preferences of the lower relative clauses. My claims are that they can be explained in terms of ambiguity resolution and that the two major factors figuring importantly in this are (i) the argument vs. adjunct status of the gap and (ii) the distance between gap and filler.

Keywords: double relativization, CNPC violations, processing, subject preference, ambiguity resolution

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1. Introduction

Unlike many other languages like English, Korean allows double relativization (DR, henceforth), i.e., apparent relativization out of another relative clause, as shown below.[1]

(1) a. [[e_i e_j ip-ko iss-nun]   os$_j$-i   yeppun-n] ai$_i$
          wear-Prog-Adn clothes-Nom pretty-Adn child
      'the child$_i$ [who$_i$ the clothes$_j$ [which$_j$ e_i is wearing e_j] is pretty]'
   b. [[e_i e_j salangha-nun] yeca$_j$-ka cwuk-un] namca$_i$
          love-Adn woman-Nom die-Adn   man
      'the man$_i$ [who$_i$ the woman$_j$ [whom$_j$ e_i loved e_j] died]'

The acceptability of double relative constructions (DRCs henceforth) like (1) shows that relativization in Korean is not subject to the syntactic locality conditions like the Complex NP Island Constraint (CNPC), and many syntactic studies of DRCs in Korean have focused on the problems this raises to the theories of locality.

DR in Korean, however, is not without restrictions. It has been observed in many languages that A'-movement out of islands can violate island constraints, but that such movement is subject to various lexico-semantic, pragmatic and/or processing restrictions (Allwood 1976, Kuno 1976, 1987, Engdahl 1980, Erteschik-Shir 1981, Kluender 1992, etc.). Given that DR is an instance of A'-movement out of a CNP island, we expect that DR will be subject to various restrictions of the aforementioned nature. More specifically for DR in Korean, it has been observed that it is subject to various restrictions holding for multiple subject constructions (MSCs, from now on) (Han and Kim 2004, J.-M. Yoon 2011, 2015). Given that MSCs are known to be subject to various lexico-semantic and/or interpretive restrictions such as the predicate type conditions (J.-M.Yoon 1989, Suh 2003, J.-M. Yoon 2011) or the Characteristic Property Condition (Jang 1998, J. Yoon 2004, J.-M. Yoon 2011), this means that DR in Korean is also subject to such restrictions.

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1) I will represent the null elements in DRCs simply as *e* in order to avoid the question whether DRCs, syntactically, involve movement or base-generation.

Among various restrictions for DR in Korean, what I will focus on in this paper is the GF-related ones. As far as I know, it was Han (1992) who first noted that there exist some sort of GF-related restrictions for DR in Korean. She claimed that only the subject can undergo DR and that DR is possible only when the relative clause from which DR takes place is in the subject position (I will call Han's claim Subject Condition), and this claim was upheld, either implicitly or explicitly, by other re-searchers like Han and Kim (2004) and myself (J.-M. Yoon 2011).

(2) <u>Subject Condition for DR</u>
   (i) Non-subjects cannot relativize out of another relative clause.
   (ii) DR is possible only when the relative clause from which DR takes place is in the subject position.

One problem with the Subject Condition, however, is that there exist many apparent counterexamples to it. We can also ask why such a re-striction should hold for DR in Korean. Of the two clauses of the Subject Condition, in this paper, I will focus on the first. Taking it as the starting point, in this paper, I will reinvestigate the GF-related restrictions for DR in Korean. To be more specific, I will address the following questions:

(i) Is the Subject Condition (to be more precise, the first clause of the Subject Condition) a valid generalization, i.e., is it really the case that only the subject can undergo DR in Korean?
(ii) In case the Subject Condition turns out not to be valid, is it the case that all GFs can undergo DR equally easily or that different GFs show different DR possibilities?
(iii) In case there is a variation in the DR possibilities of different GFs, what kinds of factors determine them, what the nature of those factors is, and how they can be explained.

As the answers for the first and second questions, I will show that it is possible for all GFs to undergo DR in Korean but that not all GFs can undergo DR equally easily. Concerning the more important question of what determines the different DR possibilities of different GFs, I will

suggest that one of the important factors is the GF of the head noun of the relative clause from which DR takes place, in other words, the GF of the lower head noun of a DRC, and that the reason for this can be explained in terms of processing. To be more specific, based on the observation that the interpretation preferences of DRCs, which can be viewed as an indicator of how readily an element can undergo DR, are generally determined in the lower relative clauses, I will propose to explain the DR possibilities of different GFs via explaining the interpretation preferences of the lower relative clauses. My claims are that the interpretation preferences of the lower relative clauses can be explained in terms of ambiguity resolution and that the two factors playing important roles in this are (i) the argument vs. adjunct status of the gap, which translates into the ease of gap detection and (ii) the distance between gap and filler, an important factor determining the processing cost of a filler-gap construction.

2. Rexamining the Subject Condition

Han (1992) proposed the Subject Condition for DR based on the degradedness of DRCs like (3a-b): in (3a), what underwent DR is the DO, and in (3b), DR took place out of a relative clause modifying the DO.

(3) a. ??[[e_i e_j ip-ko iss-nun] ai$_i$-ka   yeppu-n] os$_j$
             wear-Prog-Adn child-Nom pretty-Adn clothes
      'the clothes$_j$ [which$_j$ the child$_i$ [who$_i$ e_i is wearing e_j] is pretty]'
    b. ?*[Minho-ka [e_i e_j ip-ko iss-nun] os$_j$-ul po-n]   ai$_i$
        M-Nom   wear-Prog-Adn clothes-Acc see-Adn child
      'the child$_i$ [whom$_i$ Minho saw the clothes$_j$ [which$_j$ he$_i$ was wearing e_j]]'

A similar claim was made by Han and Kim (2004), although not explicitly. In order to do away with the problem of the absence of CNP island effects caused by DR in Korean, they claimed that all well-formed DRCs in Korean are derived from the MSC counterparts without violating the CNPC. For example, in their account, DRC (1a) is derived from (4) by relativizing the outer subject *ku ai*.

(4) Ku ai$_i$-ka   [pro$_i$ e$_j$ ip-ko iss-nun] os$_j$-i   pissa-ta.
     that child-Nom   wear-Prog-Adn clothes-Nom expensive-Dcl
     'As for that child, the clothes he is wearing is expensive.'

One prediction of this account is that DRCs in Korean will be subject to various restrictions holding for MSCs, which, in turn, means that they will be subject to the Subject Condition. This is because a basic property of MSCs often taken for granted is that the outer, non-argument subject is related to the subject position of the complex predicate formed by the rest of the sentence.[2]

I also suggested that the Subject Condition is one of the restrictions for DR, although for a different reason (J.-M. Yoon 2011, 2015). In contrast to Han and Kim, my claim was that DRCs do violate the CNPC and that it, in fact, is the very reason why DRCs are subject to various restrictions. Taking the processing approach to island effects, I suggested that various restrictions for DRCs, including the Subject Condition, are processing in nature and made an attempt to explain them in terms of processing.

Contrary to these claims, a closer look into the data reveals that there exist many counterexamples to the Subject Condition.[3]

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2) For example, the ungrammaticality of MSCs like (ia-c) below illustrates this: in (ia), the outer subject is related to the possessor of the DO; in (ib), it is linked to the DO of the relative clause modifying the inner subject; in (ic), it is linked to the IO of the relative clause modifying the inner subject.

    (i) a. ?*Minho$_i$-ka salamtul-i   [e$_i$ apeci]-lul conkeyngha-n-ta
            M-Nom   people-Nom father-Acc   respect-Prs-Dcl
            'As for Minho, people respect his father.'
       b. ?*Ku os$_j$-i   [e$_i$ e$_j$ ip-ko iss-nun] ai$_i$-ka   yeppu-ta.
          that clothes-Nom   wear-Prog-Adn child-Nom pretty-Dcl
          'As for that clothes, the child who is wearing it is pretty.'
       c. *Ku ai$_i$-ka   [Minho-ka e$_i$ e$_j$ cwu-n] senmwul$_j$-i   pissa-ta.
         the child-Nom M-Nom   give-Adn present-Nom expensive-Dcl
         'As for the child, the present Minho gave to him is expensive.'

3) Let me note that for crucial judgments on which I base my claims in this paper, I have referred not just to my own judgments but also to the result of an informal survey which tested the DR possibilities of different GFs in Korean. 43 undergraduate students participated in the survey and the acceptability scores were given in 1-5 scale. A few things are worth noting. First, the survey was intended just as a supplement to my own intuitions and judgments for some unclear cases: it did not follow the strict experimental methods and not all relevant cases could be tested for various reasons.

First, the following data show that it is not impossible for non-subjects to undergo DR: what undergoes DR in (5) is the DO; it is the IO in (6); and it is an adjunct PP in (7).[4)]

(5) [[e_i e_j chilyoha-n] uysa$_i$-ka   cwuk-un] hwanca$_j$
         treat-Adn   doctor-Nom die-Adn   patient
    'the patient$_j$ [whom$_j$ the doctor$_i$ [who$_i$ e_i treated e_j] has died]'

(6) [[Minho-ka e_i e_j ponay-n] phyenci$_j$-ka epseci-n]   yeca$_i$
      M-Nom   send-Adn lettter-Nom disappear-Adn woman
    'the woman$_i$ [whom$_i$ the letter$_j$ [which$_j$ Minho sent e_j to e_i] has disappeared]'

Secondly, the average acceptabilities of DRCs acquired in the survey, in general, tended to be lower than expected. For example, the acceptability score for DRC (1), a prototypical DRC in Korean that is reported to be acceptable in the syntactic literature, was 3.95, and many of the DRCs which I find acceptable got the scores much lower than this. The generally low level of acceptability scores, I surmise, is due to the difficulty of processing DRCs. DRCs have a complex structure with two filler-gap dependencies and they thus are difficult to process. We can suppose that the generally high level of processing loads of DRCs translate into the low acceptability scores.

4) The average acceptability score in the survey was 2.73 for (5), 3.91 for (6) and 3.77 for (7). A reviewer raises a question about the DR possibility of DOs based on the fact that the acceptability score of (5) is much lower than the acceptability scores of others and that he himself finds (5) degraded. Despite this, there are a few reasons I took (5) as showing the DR possibility of DOs. First, there are people, including me and also another reviewer, who find (5) not very degraded, especially when it is compared to other DRCs involving DR of DOs such as (3a) or (16). Secondly, the acceptability score for (i) below, which is minimally different from (5) but involves DR of the subject, was also quite low in the survey: it was 2.75, not much higher than (5).

(i) [[e_i e_j chilyoha-n] hwanca$_i$-ka   cwuk-un] uysa$_j$
         treat-Adn   patient-Nom die-Adn   doctor
    'the doctor$_i$ [who$_i$ the patient$_j$ [whom$_j$ e_i treated e_j] has died]'

Note that this is not expected given that it is generally assumed that subjects can undergo DR. It is not clear at the moment why DRCs like (5) and (i) got low acceptability scores in the survey but one thing they show is that the acceptability scores obtained from the survey of average native speakers cannot be always taken at face value: there can be any number of reasons for why they are high or low. Third and more importantly, what I want to show through the data like (5) is not that DR of DOs is perfectly possible or it is as easy as that of other GFs such as subjects but that it is not impossible although difficult. To be more specific, I wanted to show that DR of DOs is possible provided that various factors conspire to make it possible. In fact, in sections 3-4, I will show that DR of DOs, in general, is difficult for various processing reasons and that the reason why (5) does not sound as degraded as other DRCs involving DOs is due to the strong lexical bias imposed by words like *yusa* 'doctor' and *hwanca* 'patient'.

(7) [[e$_i$ e$_j$ golph-lul chi-nun] salamtul$_i$-i motwu cengchika-tul-i-n]   golphcang$_j$5)
         golf-Acc play-Adn people-Nom all   politician-Pl-be-Adn golf course
   'the golf course$_j$ [on which$_j$ the people$_i$ [who$_i$ are playing golf on e$_j$] are all politi-
   cians]'

This means that the first clause of the Subject Condition cannot be maintained.

   Secondly, the following data show that the second clause of the Subject Condition cannot be maintained, either: (8a-b) are acceptable although DR took place out of a relative clause not in the subject position.

(8) a. [Kim kyowswu-ka [e$_i$ e$_j$ swukangha-nun] haksayng-tul$_i$-eykey motwu
        Prof. Kim-Nom   take-Adn   students-Pl-to   all
        F-lul cwu-n]   swuep$_j$
        F-Acc give-Adn class
        'the class$_j$ [which$_j$ Prof. Kim gave an F to all the students$_i$ [who$_i$ e$_i$ were taking e$_j$]]'
   b. [kyengchal-i [e$_i$ e$_j$ kwutokha-nun] tokca-tul$_i$-ul motwu cheyphoha-n]
        police-Nom   subscribe-Adn reader-Pl-Acc all   arrest-Adn
        capci$_j$
        magazine
        'the magazine$_j$ [which$_j$ the police arrested all the people$_i$ [who$_i$ e$_i$ subscribed to e$_j$]]'

To summarize, what the above data show is that the Subject Condition cannot be maintained as it is: it is neither the case that only the subject can undergo DR nor the case that DR is possible only from the subject position. Of the two clauses of the Subject Condition, what I will focus on in this paper is the first clause, i.e., the claim that only the subject can undergo DR. Although it is possible for GFs other than the subject to undergo DR, it may not be the case that all GFs can undergo DR equally easily. So, in the following section, I will further explore the DR possibilities of different GFs, focusing on the effect that the GF of the head noun of the relative clause from which DR takes place (i.e., the GF of the lower head noun of a DRC) has over them.

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5) Note that Korean lacks an overt relative pronoun and that when the object of a prepo-
   sition undergoes relativization, the preposition is dropped.

3. Interpretation Preferences of DRCs and DR Possibilities of Different GFs

By examining the interpretation preferences of DRCs, in this section, I will show that an important factor determining the DR possibility of a GF is the GF of the lower head noun of a DRC.

3.1. DR of Subjects

The following data show that DR of the subject is possible whatever GF the head noun of the relative clause from which DR takes place plays in the lower relative clause.

(9) a. [[e e ip-ko iss-nun]   os-i   mesci-n] sinsa
          wear-Prog-Adn clothes-Nom stylish-Adn gentleman
      'the gentleman$_i$ [who$_i$ the clothes$_j$ [which$_j$ e$_i$ is wearing e$_j$] is stylish]'
   b. [[e e salangha-nun] yeca-ka   cwuk-un] namca
          love-Adn   woman-Nom die-Adn   man
      'the man$_i$ [who$_i$ the woman$_j$ [whom$_j$ e$_i$ loved e$_j$] died]'

(10) [[e e phyenci-lul ponay-n] namca-ka salaci-n]   yeca
          letter-Acc   send-Adn man-Nom disappear-Adn woman
      'the woman$_i$ [who$_i$ the man$_j$ [whom$_j$ e$_i$ sent a letter to e$_j$] has disappeared]'

(11) a. [[e e yechin-ul   manna-n] kongwen$_j$-i epseci-n]   namca
          girlfriend-Acc meet-Adn park-Nom disappear-Adn man
      'the man$_i$ [who$_i$ the park$_j$ [where$_j$ e$_i$ met a girlfriend e$_j$] has disappeared]'
   b. [[e e mayil   sanchaykka-nun] kongwen-i maywu alumtap-un]   yeca
          everyday go walking-Adn park-Nom very   beautiful-Adn woman
      'the woman$_i$ [who$_i$ the park$_j$ [which$_j$ e$_i$ goes for a walk to e$_j$] is very beautiful]'

DRCs (9a-b) show that the subject can undergo DR out of a relative clause headed by the DO; (10) shows that the subject can undergo DR out of a relative clause headed by the IO; and finally, (11a-b) show that the subject can undergo DR out of a relative clause headed by an adjunct. In addition to the fact that the subject can undergo DR whatever GF the lower head noun plays, one thing important we must note about these data, in particular, about (9b) and (10), is that the subject seems

to have some advantage in DR over other GFs. It is for the following reasons.

Note that in addition to the meaning shown above, (9b) and (10) have another possible interpretation, i.e., (12a) and (12b), respectively.

(12) a. ??'the man$_j$ [who$_j$ the woman$_i$ [who$_i$ e$_i$ loved e$_j$] died]'[6]
    b. ??'the woman$_j$ [whom$_j$ the man$_i$ [who$_i$ e$_i$ sent a letter to e$_j$] has disappeared]'

This is because there are two gaps in the lower relative clauses of these DRCs and that they each can be linked either to the lower head noun or to the higher head noun: (12a) is the reading we get when the higher head noun in (9b) is linked to the DO gap and (12b) is the one we get when the higher head noun in (10) is linked to the IO gap. These readings, however, are difficult to get. This shows that although it is not the case that only the subject can undergo DR, it enjoys some advantage over other GFs in DR. Note that this is a reasonable conclusion to draw given that there is no bias, either lexical or pragmatic, towards a specific reading in these DRCs, unlike in (9a) or (11).

3.2. Double Relativization of Direct Objects

We have already noted in (5) that DR of DOs is not impossible. (5), however, is a rather special case, where a strong lexical bias (i.e., the choice of words like *uysa* 'doctor' and *hwanca* 'patient') forces interpreting the higher head noun as the DO of the lower verb, and we generally find DOs difficult to undergo DR. We have already noted in (9b) that it is difficult to interpret the higher head noun of a DRC as the DO of the lower verb. DRCs like (13) further illustrate this: the preferred reading for (13) is reading (i), where the higher head noun is interpreted as the subject of the lower verb *chachta* 'look for.'

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6) Let me note that throughout the paper, ? or * marking on the meaning of a DRC indicates that it is difficult for the given DRC to have such a reading. In contrast, # marking on an interpretation, as in (15), will indicate that such a reading is possible but semantically anomalous. To be more specific, # marking on the interpretation indicates that the linking between filler and gap resulting in such an interpretation is possible but that it is semantically degraded.

(13) [[e e chach-ko iss-nun] salam-i   salaci-n]   namca
        look for-Prog-Adn person-Nom disappear-Adn man
  (i) 'the man$_i$ [whom$_i$ the person$_j$ [whom$_j$ e$_i$ was looking for e$_j$] has disappeared' >
  (ii) ?'the man$_j$ [whom$_j$ the person$_i$ [who$_i$ e$_i$ was looking for e$_j$] has disappeared]'

The difficulty of double relativizing DOs is more clearly seen in the inter-
pretation preferences of DRCs like (14) below.

(14) [[ttucayngi-ka e e sokayha-n]   namca-ka cwuk-un] yeca
        matchmaker   introduce-Adn man-Nom die-Adn woman
  (i) 'the woman$_j$ [whom$_j$ the man$_i$ [whom$_i$ the matchmaker introduced e$_i$ to e$_j$]
      has died]' >
  (ii) ?*'the woman$_i$ [whom$_i$ the man$_j$ [whom$_j$ the matchmaker introduced e$_i$ to e$_j$]
      has died]'

The only reading available for (14) is reading (i), where the higher head
noun is interpreted as the IO with the lower head noun interpreted as
the DO, and the other reading, i.e., reading (ii), is very difficult to get.
This, again, shows the difficulty of double relativizing DOs.
   Finally, (15a-b) below also show the difficulty of double relativizing
DOs.

(15) a. [[Minho-ka e e manna-n] kongwen-i epseci-n]   yeca[7]
          M-Nom   meet-Adn park-Nom disappear-Adn woman
    (i) '#the woman$_j$ [where$_j$ the park$_i$ [which$_i$ Minho met e$_i$ e$_j$] has
        disappeared]'
    (ii) ??'the woman$_i$ [whom$_i$ the park$_j$ [where$_j$ Minho met e$_i$ e$_j$] has
        disappeared]'
  b. [[taythonglyeng-i e e manna-n] hoyuycang-i   phakoytoy-n]
      president-Nom   meet-Adn conference room-Nom destroyed-Adn
      kwukbin
      head of state
    (i) '#the head of state$_j$ [where$_j$ the conference room$_i$ [which$_i$ the President
        met e$_i$ e$_j$] has been destroyed]'
    (ii) ??'the head of state$_i$ [whom$_i$ the conference room$_j$ [where$_j$ the President
        met e$_i$ e$_j$] has been destroyed]'

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7) In the survey, the average acceptability score of (15a) was very low as 1.65.

Note that despite the fact that the lower head nouns of these DRCs, due to their semantic nature, cannot be interpreted as the DOs of the lower verbs, people have a strong tendency to interpret them as the DOs, as in reading (i), and that it is difficult to interpret the higher head nouns as the DOs, as in reading (ii). As a result, these DRCs sound degraded: reading (i) is semantically anomalous and reading (ii) is difficult to get.

Taken together, what the above data show is that although it is not impossible to double relativize DOs, especially with the help of a strong lexical or discourse bias as in (5), DR of DOs seems generally difficult whatever GF the lower head noun plays. I will call this DO dispreferene in DR, and it is an important generalization awaiting an explanation. In addition, what is worth noting is the fact that although it is generally difficult to double relativize DOs, there exist some differences depending on what GF the lower head noun plays. We have seen that it is more difficult to interpret the higher head noun as the DO when the lower head noun functions as the IO ((14)) or as the adjunct ((15)) than as the subject of the lower verb ((13)).

Further support for this observation comes from the contrast between (5) and (16a-b).

(16) a. [[phayn-tul-i e e ponay-n] paywu-ka cwuk-un] senmwul
         fan-Pl-Nom   send-Adn actor-Nom die-Adn gift
       ?*'the gift$_i$ [which$_i$ the actor$_j$ [whom$_j$ the fans sent e$_i$ to e$_j$] has died]'
    b. [[wang-i e e ponay-n] nala-ka   wiki-ey ppaci-n] sasin
        king-Nom   send-Adn actor-Nom crisis-to fall-Adn delegate
       ??'the delegate$_i$ [who$_i$ the country$_j$ [which$_j$ the king sent e$_i$ to e$_j$] has fallen into danger]'

Although the lexical choices in (16a-b) force interpreting the higher head nouns as the DOs and the lower head nouns as the IOs, such a reading is very difficult for these DRCs. Compare this with (5), where the DO dispreference in DR was cancelled by a strong lexical bias. This clearly shows that the GF relations between the higher head nouns (i.e., the elements that undergo DR) and the lower head nouns (i.e., the head nouns of the relative clauses from which DR takes place) is an important factor affecting the DR possibility of an element, independently of other factors such as a lexical or pragmatic bias.

3.3. DR of Indirect Objects

We have already seen in (6) that DR of the IO from a relative clause headed by the DO is possible. DR of the IO, however, was difficult when it was from a relative clause headed by the subject, as in (10). What remains to be seen is if DR of the IO is possible from a relative clause headed by an adjunct, and the degradedness of DRCs (17a-b) below shows that it is difficult.[8]

> (17) a. [[ttucayngi-ka   e e ton manh-un namca-lul sokayha-n]   kkaphey-ka
>   matchmaker-Nom rich-Adn   man-Acc introduce-Adn cafe-Nom
>   epseci-n]   yeca
>   disappear-Adn woman
>   ?'the woman$_i$ [whom$_i$ the cafe$_j$ [where$_j$ the matchmaker introduced
>   a rich man to e$_i$ e$_j$] has disappeared]'
>   b. [[ku namca-ka e e phyenci-lul ponay-n] wucheykwuk-i epeci-n] yeca
>   the man-Nom   letter-Acc   send-Adn place disappear-Adn   woman
>   ?'the woman$_i$ [whom$_i$ the post office$_j$ [where$_j$ the man sent a letter to e$_i$ e$_j$]
>   has disappeared]'

Note that it is difficult for these DRCs to have the given readings, i.e., the readings in which the lower head nouns are interpreted as the locative adjuncts and the higher head nouns are interpreted as the IOs of the lower verbs, despite the fact that the choice of words in them strongly forces such readings. This, again, shows that the GF of the head noun of the relative clause from which DR takes place is an important factor determining whether an element of a specific GF can undergo DR, independently of lexical or pragmatic factors.

3.4. DR of Adjuncts

The following data show that DR of adjuncts is possible regardless of the GFs of the head nouns of the relative clauses from which DR takes place.

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8) In the survey, the average acceptability scores of DRCs (17a-b) were 2.12 and 2.3, respectively.

(18) [[e e siksa-lul ha-nun]   salamtul-i   motwu cengchika-tul-i-n]   sikdang
　　　　meal-Acc have-Adn people-Nom all   politician-Pl-be-Adn restaurant
'the restaurant$_j$ [in which$_j$ the people$_i$ [who$_i$ e$_i$ are having meals e$_j$] are
all politicians]'

(19) [[taythonlyeng-i e e ceptayha-nun] salamtul-i motwu kwukbin-i-n]
　　　president　　　　 entertain　　 people-Nom all   head of state-be-Adn
yenhoycang
banquet room
'the banquet room$_j$ [where$_j$ the people$_i$ [who$_i$ the President entertains e$_i$ e$_j$]
are all heads of states]'

(20) [[Kim kyoswu-ka e e A-lul cwu-n]   haksayng-tul-i   motwu yengcay-i-n]
　　　professor Kim-Nom A-Acc give-Adn student-PL-Nom all   genius-be-Adn
swuep
class
'the class$_j$ [where$_j$ the students$_i$ [whom$_i$ Prof. Kim gave an A to e$_i$ e$_j$]
were all geniuses]'

In (18), a locative adjunct underwent DR out of a relative clause headed by the subject; in (19), DR takes place out of a relative clause headed by the DO; in (20), DR takes place out of a relative clause headed by the IO.[9][10]

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9) The average acceptability scores of (18)-(20), respectively, were 3.77, 3.65 and 3.23.

10) One caveat about the DR of adjuncts, in contrast to DR of arguments, is that some further restrictions seem to hold for it. For example, we observe that the head nouns of the lower relative clauses of these DRCs tend to be plural. The degradedness of the following DRC, which is minimally different from (18), shows this.

(i) ??[[e e siksa-lul ha-nun]   salam-i   cengchika-i-n]   sikdang
　　　　have a meal-Adn person-Nom politician-be-Adn restaurant
'the restaurant$_j$ [where$_j$ the person$_i$ [who$_i$ e$_i$ is having a meal e$_j$] is a politician]'

What also seems to make a difference is the lexical cohesion between the head noun of the higher relative clause and the other words in a DRC. The degradedness of (ii), in contrast to (20), illustrates this.

(ii) ??[[Kim kyoswu-ka e e senmwul-ul cwu-n] haksayng-tul-i motwu yengcay-i-n] sikdang
　　　　professor Kim-Nom gift-Acc give-Adn student-PL-Nom all   genius-be-Adn restaurant
'the restaurant$_j$ [where$_j$ the student$_i$ [whom$_i$ Prof. Kim gave a present to e$_i$ e$_j$] were all geniuses]'

We can attribute the degradedness of (ii) to the fact that unlike in (20), where there is a strong lexical cohesion between the higher head noun and the words in the lower relative clause (*swuep* 'class', *kyoswu* 'professor', *A*), there is no such lexical cohesion in (ii) (*sikdang* 'restaurant', *kyowswu* 'professor', *senmwul* 'present'). I believe that these kinds

When it comes to the interpretation preferences of DRCs involving an adjunct, note that they are difficult to test since these DRCs tend not to be ambiguous due to the choices of words in them. For example, (18)-(20) are all not ambiguous. Of course, it is not impossible to come up with an ambiguous DRC involving an adjunct, for example, (21) below, and for such a case, we can test the interpretation preference.

(21) [[ku-ka e e phyenci-lul ponay-n] kos-i   salaci-n]   kos
        he-Nom   letter-Acc   send-Adn place-Nom disappear-Adn place
  (i) 'the place$_j$ [where$_j$ the place$_i$ [which$_i$ he sent a letter to e$_i$ e$_j$]
       has disappeared]'
  (ii) ??'the place$_i$ [which$_i$ the place$_j$ [where$_j$ he sent a letter to e$_i$ e$_j$]
        has disappeared]'

Although it is not easy to grasp the meaning of (21), it appears, at least to me, that the preferred reading is reading (i), where the higher head noun is interpreted as a locative adjunct of the lower verb with the lower head noun interpreted as the IO, and the opposite reading seems more difficult. This, again, seems to show that relativizing the IO out of a relative clause headed by a locative adjunct is difficult, an observation I made based on (17a-b): we saw that despite the fact that the lexical biases in these DRCs force interpreting the higher head nouns as the IOs, such a reading is difficult.

3.5. Summary

We have seen in this section that different GFs show different DR possibilities in Korean. Crucially, I have shown that one important factor determining whether or not an element of a specific GF can undergo DR is the GF of the head noun of the relative clause from which DR takes place, in other words, the GF-relation between the higher head noun and the lower head noun of a DRC. To be more specific, I have shown that (i) subjects can undergo DR whatever GFs the lower head nouns play and that they enjoy some advantage over other GFs in DR; (ii) DOs are generally difficult to undergo DR regardless of the GFs of

of further restrictions DR of adjuncts manifests can be also explained in terms of process-ing, but due to the scope limit of this paper, I will not discuss them in this paper.

the lower head nouns; (iii) DR of IOs is possible when the lower head nouns function as DOs but it is difficult when they function as subjects or adjuncts; and (iv) adjuncts can undergo DR regardless of the GFs of lower head nouns but that the interpretation preferences of DRCs involving adjuncts are difficult to test since they tend not to be ambiguous.[11]

Granted, the question is how these observations can be explained, and in what follows, I will seek a processing-based explanation. The reason for this is because the above observations, as I see them, are mainly about preferences or tendencies, rather than absolute impossibilities or ungrammaticalities. This means that they can be better explained in terms of processing than in terms of syntax.[12]

4. Ambiguity Resolution in the Lower Relative Clauses of DRCs

I propose to explain the interpretation preferences of DRCs observed in section 3 in terms of ambiguity resolution, one of the central research topics in processing theories. As the first step towards this, I will first show that the interpretation preferences of DRCs are generally determined

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11) Due to the difficulty of testing, the interpretation preferences of DRCs involving adjuncts will not be discussed much in this paper.

12) A reviewer suggests that there can be a syntactic explanation for the GF-related observations about DR in Korean I made in this section. To be specific, he suggests that one way to explain them syntactically is to adopt Han and Kim's (2004) proposal that DRCs are derived from MSCs without violating the CNPC and assume a kind of constraint banning mixed dependencies. Although a possibility, I did not opt for it due to various problems such a proposal, in particular, deriving DRCs from MSCs, has (see J.-M Yoon (2011, 2015) for the discussion on them). Although there is a possibility of applying the constraint banning mixed dependencies directly to DRCs, without resorting to MSCs, note that such an account will also face a problem since in order for the generalization that dependencies do not mix to be valid, the dependencies in DRCs should be calculated between the gaps and the head nouns, not between the gaps and the null operators in SpecCP positions of relative clauses. Combined with the fact that the observations I am trying to explain in this paper are largely about preferences or tendencies, what these problems suggest to us is that even if there is some truth in the generalization about mixed dependencies, it is more of a processing generalization than a syntactic one like the Path Containment Condition (Pesetsky 1982). However, I do not completely rule out the possibility that the GF-related restrictions for DR I observe in this paper, at least part of them, turn out to be syntactic in nature. Settling this issue will require a more comprehensive and thorough examination of the relevant data, and in this paper, I will simply pursue a processing account.

in the lower relative clauses. I will then approach the task of explaining the interpretation preferences of DRCs by explaining the interpretation preferences of the lower relative clauses.

4.1. Interpretation Preferences of the Lower Relative Clauses

In order to see that the interpretation preferences of DRCs are generally determined in the lower relative clauses, let us reexamine (9b), repeated as (22) below.

(22) [[e e salangha-nun] yeca-ka   cwuk-un] namca
              love-Adn   woman-Nom die-Adn   man
   (i) 'the man$_i$ [who$_i$ the woman [whom$_j$ e$_i$ loved e$_j$] died]'
   (ii) ??'the man$_j$ [who$_j$ the woman$_i$ [who$_i$ e$_i$ loved e$_j$] died]'

As already noted, two readings, in principle, are possible for (22) and of the two, what is preferred is reading (i), where the higher head noun is interpreted as the subject with the lower head noun interpreted as the DO of the lower verb, and the opposite reading is difficult to get.

We can easily see that the interpretation preference of (22) is consistent with that of its lower relative clause, given in (23) below.

(23) [e e salangha-nun] yeca
           love-Adn   woman
   (i) 'the woman$_j$ [whom$_j$ e$_i$ loves e$_j$]'
       (='the woman whom somebody loves')
   (ii) ?'the woman$_i$ [who$_i$ e$_i$ loves e$_j$]'
       (=?'the woman who loves somebody')

There are two gaps in (23), and two interpretations, accordingly, are possible depending on which gap the head noun is linked to. Although both readings are possible, reading (i), where the head noun is linked to the DO gap with the unbound subject gap interpreted as an indefinite pronoun, is clearly preferred over reading (ii), where the head noun is linked to the subject

gap with the unbound DO gap interpreted as an indefinite pronoun.[13]

The following data provide further support to the observation that the interpretation preferences of DRCs are consistent with those of the lower relative clauses.

First, the interpretation preference of (14), repeated as (24a) below, is also consistent with the interpretation preference of its lower relative clause shown in (24b).

(24) a. [[ttucayngi-ka e e sokayha-n]   namca-ka cwuk-un] yeca
         matchmaker   introduce-Adn man-Nom die-Adn   woman
    (i) 'the woman$_j$ [whom$_j$ the man$_i$ [whom$_i$ the matchmaker introduced
        e$_i$ to e$_j$] has died]'
    (ii) ?*'the woman$_i$ [whom$_i$ the man$_j$ [whom$_j$ the matchmaker
         introduced e$_i$ to e$_j$] has died]'
  b. [ttucayngi-ka e e sokayha-n]   namca
      matchmaker   introduce-Adn man
    (i) 'the man whom the matchmaker introduced to somebody'
    (ii) ??'the man to whom the matchmaker introduced somebody'

As noted, of the two possible readings of (24a), the possible and preferred reading is reading (i), where the higher head noun is interpreted as the IO, and reading (ii), where it is interpreted as the DO, is almost impossible. This is consistent with the fact that the preferred reading of (24b) is reading (i), where the head noun is interpreted as the DO, and that reading (ii), where it is interpreted as the IO, is very difficult to get.

Secondly, the interpretation preference of (15a), repeated as (25a), is also consistent with that of the lower relative clause given in (25b).

(25) a. [[Minho-ka e e manna-n] kongwen-i epseci-n]   yeca
         M-Nom   meet-Adn park-Nom disappear-Adn woman
    (i) '#the woman$_j$ [where$_j$ the park$_i$ [which$_i$ Minho met e$_i$ e$_j$] has disappeared]'
    (ii) ?*'the woman$_i$ [whom$_i$ the park$_j$ [where$_j$ Minho met e$_i$ e$_j$] has
         disappeared]'
  b. [Minho-ka e e manna-n] kongwen
    (i) '#the park which Minho met (somewhere)'
    (ii) ??'the park where Minho met somebody'

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13) Note that readings like these are possible since Korean allows a discourse-bound null
    pro in all GF positions.

As noted, although the choice of words in (25a) strongly favors reading (ii), it is difficult to get. Instead, we get the feeling that *kongweon,* the lower head noun, is the DO of the verb, as in reading (i), despite its semantic anomaly. This is consistent with the fact that people have a strong tendency to interpret the head noun *kongwen* in (25b) as the DO as in reading (i) and that it is difficult to interpret the head noun as a locative adjunct as in reading (ii).

   Third, the interpretation preference of (11a) (repeated as (26a)) is also consistent with that of its lower relative clause.

(26) a. [[e e yechin-ul   manna-n] kongwen-i epseci-n]   namca
           girlfriend-Acc meet-Adn park-Nom disappear-Adn man
      (i) '#the man$_j$ [where$_j$ the park$_i$ [which$_i$ e$_i$ met a girlfriend e$_j$] has disappeared]'
      (ii) 'the man$_i$ [who$_i$ the park$_j$ [where$_j$ e$_i$ met a girlfriend e$_j$] has disappeared]'
   b. [e e yechin-ul   manna-n] kongwen
           girlfriend-Acc meet-Adn park
      (i) '#the park which met its girlfriend (somewhere)'
      (ii) 'the park where somebody met his girlfriend'

Again, the reading for (26a) that first comes to mind is reading (i), the semantically anomalous reading, where the lower head noun is interpreted as the subject of the verb *mannata*. (26a), however, differs from (25a) in that it allows reading (ii), where the higher head noun is interpreted as the subject as in reading (ii). Again, this is consistent with the interpretation preference of its lower relative clause. Although people have a tendency to interpret the head noun as the subject, there is no problem interpreting the head noun in (26b) as a locative adjunct, unlike in (25b).

   To summarize, what the above discussion shows is that the interpretation preferences of DRCs are consistent with those of the lower relative clauses.[14] In fact, we can say that the interpretation preferences of DRCs are determined in the lower relative clauses given that the lower relative clauses precede the higher relative clauses in Korean and thus that the lower relative clauses will be processed prior to the higher relative clauses. Granted, one way to explain the interpretation preferences of

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14) There are some cases which seem to pose a problem to this generalization and they
    will be discussed in section 5.

DRCs in Korean will be via explaining those of their lower relative clauses. I turn to this next.

4.2. Two Factors Affecting Ambiguity Resolution in the Lower Relative Clauses

Given that there are two linking possibilities in the lower relative clause of a DRC and that it can have two different meanings depending on which of the two gaps the head noun will be linked to, explaining its interpretation preference can boil down to ambiguity resolution. To be more specific, considering that the theories of ambiguity resolution generally take the form of principles or processes predicated over alternative structures, our task will amount to explaining why the structure in which the head noun is linked to the gap in one GF position is favored over the structure where it is linked to the gap in the other GF position. As an explanation, I will propose that the following two are the important factors that interact to resolve the GF-related ambiguities in the lower relative clauses of DRCs: one is the argument vs. adjunct status of the gap and the other is the distance between gap and filler.

4.2.1. Argument vs. Adjunct Status of Gaps and the Ease of Gap Detection

The first factor I will propose to affect ambiguity resolution in the lower relative clauses of DRCs is the argument vs. adjunct status of the gaps, which will determine how easily the gaps can be detected. To see how this difference affects processing, let us first examine the processing of single relative clauses like (27)-(28).

(27) [Minho-ka e_i manna-n] yeca$_i$
    M-Nom   meet-Adn woman
    'the woman Minho met'

(28) [Minho-ka e_i Sumi-lul manna-n] kongwen$_i$
    M-Nom   S-Acc   meet-Adn park
    'the park where Minho met Sumi'

Given that the DO is an element selected by the verb, the DO gap in (27) will be immediately detected when the parser encounters the verb, and according to the Active Gap Strategy[15] (Hsu and Bruening 2003, Ng 2008), the parser will actively look for the matching filler. As a result, when he encounters the head noun, he will readily link it to the DO gap.

The detection of an adjunct gap in (28) will be different. Given that adjuncts are not the elements selected by the verb, the parser is not likely to detect an adjunct gap even if he encounters the verb (Yamashita 1992, Nagai 1995), and accordingly there will be no active searching for the filler. Instead, we can suppose that the parser will detect the existence of an adjunct gap only when he encounters the head noun *kongwen* 'park': there is no gap to which it can be linked and semantically, it can be interpreted as a locative adjunct. This means that processing relative clauses such as (28) involving an adjunct gap will be different from processing those like (27) involving an argument gap: it will involve backtracking instead of active forward searching for the filler. This, in turn, means that processing a relative clause with an adjunct gap will be more difficult than processing a relative clause with an argument gap, with other things being equal.

Now let us examine how this processing difference between an argument gap and an adjunct gap will enable us to explain the interpretation preference of (25b). When the parser encounters the verb, he will immediately detect the DO gap but not the adjunct gap. Assuming the Active Gap Strategy, this means that the parser will actively look for the filler matching the DO gap, and this, I suggest, is why there is a strong preference for interpreting the head noun as the DO of the verb in (25b) despite the semantic anomaly.

To summarize, what the preceding discussion shows is that when one of the two potential gaps in a relative clause is an argument and the other an adjunct, there will be a strong processing tendency to link the head noun to an argument gap, and this, I suggested, is because adjunct gaps are more difficult to detect than argument gaps.

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15) What was originally proposed for the on-line processing of filler-gap relations is the Active Filler Strategy first proposed by Frazier (1987). Active Gap Strategy was proposed for languages like Chinese and Korean where gaps tend to precede the fillers.

(29) <u>Linking Preference Rule I for Ambiguous Relative Clauses</u>
When the two gaps in a relative clause are an argument and an adjunct, the head noun is more likely to be linked to an argument gap, with other things being equal.

4.2.2. Distance Between Gap and Filler

The argument vs. adjunct difference in gap detection alone, of course, will not be sufficient for explaining all the interpretation preferences in the lower relative clauses of DRCs since it cannot explain the cases where both gaps are arguments or adjuncts. For this, I propose that the distance between gap and filler is another factor affecting the resolution of ambiguity in the lower relative clause of a DRC.

Distance is one of the crucial factors determining the processing cost of a filler-gap dependency and longer dependencies are known to be more costly to process than shorter dependencies (Stabler 1994, Lewis 1996, Gibson 1998, Nakatani and Gibson 2010, etc.). Given this, the DO preference in (23) can be explained in the following way. Note that there are two gaps in (23) and that of the two, the DO gap is closer to the head noun than the subject gap when viewed from the perspective of the canonical word order of Korean, as shown in (30).[16]

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16) One problem with this explanation is that appealing to the canonical word in order to calculate the distance between filler and gap departs from the common methods of measuring distance in the working memory-based theories of processing (Stabler 1994, Lewis 1996, Gibson 1998, Nakatani and Gibson 2010, Gordon et al. 2001, Lewis and Vasishth 2005). For instance, in Gibson's (1998) dependency locality theory (DLT), distance is quantified by the number of new discourse referents that intervene between the two elements to be connected. I did not adopt this since it cannot explain the DO preference in relative clause structures like (23) with two gaps: the distance between the subject gap and the head noun in (23) is the same as the distance between the DO gap and the head noun as 2 (*salanghanun, yeca*). Note also that the DO preference as in (23) cannot be explained, either, by the cue-based theory (Lewis et al. 2006), another working memory-based account. This theory differs from the DLT in that the fundamental metric in processing is time, not distance. To be more specific, according to this theory, the subject gap and the DO gap in (23) are posited simultaneously when the verb is encountered, which means that we cannot say that linking the head noun to the DO gap will be easier than linking it to the subject gap. It is for these reasons that I am simply appealing to the canonical word order in order to measure the distance between gap and filler in relative constructions with two gaps such as (23). However, faced with this problem, we may want to pursue a different approach to the DO preference in relative clauses like (23). See fn 17 for this.

(30) Subj − Adjunct − IO − DO − V

Given that shorter dependencies are preferred over longer dependencies, this means that the head noun in (23) is more likely to be linked to the DO gap than the subject gap.

   In fact, given that the DO is closer to the head noun than any other GFs when seen from the perspective of the cannonical word order of Korean, we predict that there will be general DO preferences in the lower relative clauses of DRCs in Korean. To be more precise, we predict that when one of the two gaps in a relative clause is the DO gap, the head noun is likely to be linked to it regardless of the GF of the other gap, with other things being equal.[17] This, in turn, will provide an explanation for the general DO dispreference in DR, an important observation I made in section 3: given that there is a DO preference in the lower relative clause of a DRC, it follows that the head noun of the higher relative clause is not likely to be linked to the DO gap.

   The distance factor also enables us to explain the difference between (31a) and (31b), i.e., why (31a) has a well-formed interpretation, unlike (31b).[18]

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17) One alternative account we can pursue is to adopt the experience-based theories of processing (Keenan and Comrie 1977, Hale 2001, 2003, Gennari and MacDonald 2008, Levy 2008). In short, the crux of the experience-based theories is that a structure less frequent in the input is more difficult to process, and under these theories, an alternative explanation we can think of for the DO preference in (23) can be found in the difference in pro drop rates between the subject position and the DO position. Although Korean allows null pro in all GF positions, pro drop is known to be more common in the subject position than in the DO position: according to Kim (2000), the subject pro-drop rate in spoken Korean is about 69% while the object drop rate is about 46%. This means that when there are a subject gap and a DO gap as in (23), the subject gap is more likely to be interpreted as the pro than the DO gap, which, in turn, means that the head noun is more likely to be interpreted as the DO. A question for this approach, however, is if all the data I explain in terms of distance in this paper can be explained in terms of different pro drop rates for different GFs. Due to the limitations of this paper, I leave this to future studies.

18) The average acceptability score for (31a) in the survey was 4.18, while it was 2.16 for (31b).

(31) a. [e e Minho-lul manna-n] kongwen
              M-Acc   meet-Adn park
    (i) '#the park which met Minho (somewhere)'
    (ii) 'the park where somebody met Minho'
    b. [Minho-ka e e manna-n] kongwen (=(25b))
              M-Nom   meet-Adn park
    (i) '#the park which Minho met (somewhere)'
    (ii) ??'the park where Minho met somebody'

Recall that according to Linking Preference Rule I, the reason (31b) lacks any well-formed interpretation is because the head noun is more likely to be linked to the DO gap, i.e., the argument gap, as in reading (i) but that such a reading is semantically anomalous. If this is the case, however, questions arise concerning why (31a), the two gaps in which also are an argument gap and an adjunct gap, does not have the same problem.

    Answering this question will require reexamining the account I proposed for (31b). One potential problem for it is that although it certainly is the case that the preferred reading for (31b) is to interpret the head noun as the DO as in (i), there is a way (31b) can be acceptable, to be more precise, the linking as in (31b) can be possible. It is because even if the parser has expected the head noun to be the DO of the verb, due to Linking Preference Rule I, on the first parse, he can always backtrack, posit an adjunct gap, and relink the head noun to it once he realizes that *kongwon* 'park' cannot be interpreted as the DO of the verb *mannata* 'meet'. What the difficulty of (31b) having such an interpretation shows is that such reprocessing is difficult.[19] The question is why, and I propose to explain it in terms of the distance between gap and filler.

    Note that the two gaps the parser will come to posit as the result of reprocessing in (31b) are the DO gap and the adjunct gap, and of the two, the DO gap is closer to the head noun when viewed in terms of

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19) One explanation for this we can think of is the fact that reprocessing in general is known to be difficult and incurs heavy processing loads (Kimball 1973, etc.). This alone, however, will not be sufficient since it will not explain the difference between (31a) and (31b).

the canonical word order of Korean. This means that even if an adjunct gap is posited on the second parse, linking the head noun to it will be difficult due to the distance factor. This, I suggest, is why it is difficult to interpret *kongwen* as a locative adjunct in (31b). Note that (31a) is different. The two gaps that the parser will get as the result of reprocessing in this case are the subject gap and the adjunct gap, and of these two, the adjunct gap is closer to the head noun. As a result, linking the head noun to the adjunct gap in (31a) will not be a problem. This, I propose, is why (31a) can have reading (ii), unlike (31b).

To summarize, (32) is another linking preference rule I propose for ambiguous relative clauses, and it is based on the fact that shorter dependencies are easier to process than longer dependencies.

(32) Linking Preference Rule II for Ambiguous Relative Clauses
    When there are two gaps in a relative clause, the head noun is more likely
    to be linked to the closer one, with other things being equal.

4.3. Apparent Problems and the Special Nature of IO Gaps

In this section, I turn to the two cases that appear to be not explained by the two proposed processing factors and the related linking preference rules. They both involve IO gaps.

The first case concerns a relative clause like (33).

(33) [e   e phyenci-lul ponay-n] namca
    (i) 'the man who sent a letter to somebody' >
    (ii) 'the man to whom somebody sent a letter'

Although (33) allows both reading (i) and reading (ii), it appears that reading (i), where the head noun is interpreted as the subject, is favored, although not very strongly, over reading (ii), where it is interpreted as the IO. Note that this is not expected given the two processing factors and two linking preference rules I proposed: given that both the subject gap and the IO gap are argument gaps and that the IO gap is closer to the head noun than the subject gap, we expect that if there exists any preference, it should

be towards interpreting the head noun as the IO, not as the subject.

An explanation for this problem can be found if we recognize the fact that a ditransitive verb like *cwuta* 'give' can be used as a monotransitive verb taking only the DO. This can be seen if we consider (34a-b) below.

(34) a. Minho-ka Sumi-eykey ponay-ess-ta.
　　　　M-Nom　　S-Dat　　　　send-Pst-Dcl
　　　　'Minho sent something to Sumi'
　　 b. Minho-ka senmwul-ul ponay-ess-ta.
　　　　M-Nom　　present-Acc send-Pst-Dcl
　　　　'Minho sent a present.'

Note that sentence (34a), where the DO is missing with the IO present, instigates a question asking what was sent, suggesting that the syntactic presence of the DO is strongly presupposed in it. In contrast, sentence (34b), where the DO is present with the IO missing, sounds natural and does not necessitate a follow-up question about the person to whom the present was sent. This means that ditransitive verbs can be also used as mono-transitive verbs and that in such a case, the one object they take is the DO.

This property of ditransitive verbs, of course, is not specific to Korean. Ditransitive verbs like *give* and *send* in English can be also used as mono-transitive verbs, and in such a case, the single argument the verb takes should be the DO, not the IO, as we observe in the following.

(35) a. John gave a present.
　　 b. */#John gave Mary.

Note that unlike (35a), which is perfectly acceptable, (35b) is either un-grammatical or semantically odd: it is because *Mary* in (35b) can be in-terpreted only as the DO, not as the IO.

Coming back to (33), what the above discussion suggests to its parsing is that there is a possibility that the parser will treat the verb as monotransitive. If this is the case, the IO gap will not be posited and the head noun will naturally be linked to the only gap in the clause,

i.e., the subject gap. In contrast, if the parser treats the verb as ditransitive and posits the IO gap, then the head noun is more likely to be linked to the IO gap, given that the IO gap is closer to the head noun than the subject gap. The fact that the preferred reading for (33) is reading (i) shows that parsers are more likely to not posit an IO gap than to posit one in relative clauses like (33). I interpret this as showing that people have a tendency to posit gaps parsimoniously, to be more specific, only when not positing a gap will lead to a processing failure.[20]

(36) <u>Parsimony of Gap Positing</u>
     Posit gaps only when it is necessary.

Recognizing the fact that ditransitive verbs can be used as monotransitive verbs also enables us to explain the fact that relative clauses like (37) involving an IO gap and a locative adjunct gap do not show a strong interpretation preference.

(37) [ku namca-ka e e phyenci-lul ponay-n] kos
         the man-Nom   letter-Acc   send-Adn place
     (i) 'the place to which the man sent the letter (somewhere)'
     (ii) 'the place where the man sent the letter to somebody'

As shown above, the head noun *kos* 'place' in (37) can be interpreted either as the IO (reading (i)) or as a locative adjunct (reading (ii)) of the verb *ponayta* 'send.' A problem with this state of affairs is that the ready availability of reading (ii), again, is not expected if we fail to recognize the fact that ditransitive verbs can be used as monotransitive verbs. It is for the following reasons.

   If the verb is ditransitive, the IO gap will be posited but an adjunct gap, being not a selected element, will not be detected on the first parse. This means that the head noun will be linked to the IO gap, which is the only gap available, and as a result, reading (ii), where the head noun

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20) We have already noted that an adjunct gap, in general, is not posited unless its ex-
    istence is strongly implied by something. We can say that this also is consistent with
    the parsimony of positing gaps.

is linked to the adjunct gap, will not be possible. Reading (ii) will be also difficult even if the parser, motivated by the locative nature of the head noun, backtracks and posits an adjunct gap. Now there are two gaps, i.e., the IO gap and an adjunct gap, and the distance factor, again, will favor linking the head noun to the IO gap, other things being equal.

The availability of reading (ii), however, can be readily explained if we recognize the fact that ditransitive verbs can be used as monotransitive verbs. If so, the parser, given the parsimony of positing gaps, will not posit the IO gap. In fact, given that adjunct gaps are not generally posited on the first parse, he may not posit any gap for (37) until he encounters the head noun *kos*. He then will backtrack and reprocess the relative clause since there is no gap to link the head noun to. We can think of the two possibilities. First, he may reanalyze the verb as ditransitive and posit the IO gap. If so, the head noun *kos* will be interpreted as the IO, as in reading (i). Secondly, recognizing the locative nature of the head noun, the parser may posit a locative adjunct gap, maintaining the monotransitive status of the verb, and in this case, the head noun will be linked to the locative adjunct gap, as in reading (ii). In short, what the above discussion shows is that the apparent problems relative clauses like (33) and (37) pose to my proposal can be readily explained once we recognize the adjunct-like status of IO gaps with respect to processing.

Recognizing the adjunct-like status of IO gaps with respect to processing also enables us to explain an observation made in section 3 about the DR possibilities of DOs: we noted that it is more difficult to double relativize the DO out of a relative clause headed by the IO, as in (14) (repeated as (38)), than from a relative clause headed by the subject, as in (13) (repeated as (39)).

(38) [[ttucayngi-ka e e sokayha-n]   namca-ka cwuk-un] yeca
       matchmaker   introduce-Adn man-Nom die-Adn woman
    ?*'the woman$_i$ [whom$_i$ the man$_j$ [whom$_j$ the matchmaker introduced
    e$_i$ to e$_j$] has died]'

(39) [[e e chach-ko iss-nun] salam-i   salaci-n]   namca
          look for-Prog-Adn person-Nom disappear-Adn man
    'the man$_j$ [whom$_j$ the person$_i$ [who$_i$ e$_i$ was looking for e$_j$] has disappeared]'

We also noted that the DO dispreference in DR can be easily cancelled by a lexical or discourse bias in the latter but not in the former (e.g. (5) vs. (15)), which, again, suggests that there is a stronger DO dispreference in DRCs like (38) than in (39). This can be explained in the following way.

We have already noted that the general DO dispreference in DRCs is the result of the general DO preference in the lower relative clauses. Given this, the question we need to ask is why there is a stronger DO preference in the lower relative clause of (38) than in that of (39). This, again, can be explained once we recognize the fact that ditransitive verbs can be used as monotransitive verbs. Given that gaps are posited parsimoniously, the IO gap is not likely to be posited in the lower relative clause of (38), at least on the first parse. This means that there will be only one gap in the lower relative clause of (38), i.e., the DO gap, and naturally, the lower head noun will be linked to it. Compare (39) with this: in this case, two argument gaps, i.e., the subject gap and the DO gap, will be posited in its lower relative clause and the linking preference will be determined by the distance factor. Although some DO preferences are certainly expected even in this case, the preference, for sure, will not be as strong as in (38), where there exists only a single gap to which the head noun can be inked. This, I suggest, is why there is a stronger DO preference in the lower relative clause of a DRC when the other gap is the IO gap than when it is the subject gap, and this, in turn, will explain why there is a stronger DO dispreference in DR in the former than in the latter.[21]

4.4. Summary

To summarize, the discussion in this section shows that GF-related interpretation preferences in the lower relative clauses of DRCs can be explained in terms of the two processing factors and the two linking prefer-

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21) Note that this difference cannot be explained if we assume that the verb in (38) is ditransitive and thus that the parser will necessarily posit the IO gap. If so, the two gaps in (38) as well as in (39) are both argument gaps, and thus the interpretation preferences will be determined by the distance factor in both cases. The problem is that although the DO preference is expected in both cases, a stronger DO preference in (38) than in (39) is not expected. It is because there is no ground whatsoever to say that the distance between the IO gap and the head noun in (38) is longer than the distance between the subject gap and the head noun in (39).

ence rules deriving from them. First, I proposed that when one of the two gaps is an argument and the other an adjunct, the head noun is more likely to be linked to the argument gap than the adjunct gap, with other things being equal, and that this is because adjunct gaps are more difficult to detect than argument gaps. Secondly, I proposed that when there are more than one gap in a relative clause, the head noun is likely to be linked to the gap closer to it and that this is because shorter dependencies are easier to process than longer dependencies. In addition, what played a crucial role in explaining the interpretation preferences of the lower relative clauses is the adjunct-like status of IOs and people's tendency to posit gaps parsimoniously. Given that the interpretation preferences of DRCs are generally consistent with those of the lower relative clauses, this means that we now have explained much of the GF-related interpretation preferences of DRCs.

5. Processing of the Higher Relative Clauses

In the previous section, I showed that processing of the lower relative clauses of DRCs is crucial for explaining the interpretation preferences of DRCs. In this section, I turn to the processing of the higher relative clauses. There are some DRCs the interpretation preferences of which are not consistent with those of the lower relative clauses and by discussing them, I will show how the processing of the higher relative clauses can affect the interpretation preferences of DRCs.

The first case I will discuss are DRCs like (10), repeated as (40).

(40) [[e e phyenci-lul ponay-n] namca-ka salaci-n]   yeca
　　　　letter-Acc　send-Adn man-Nom disappear-Adn woman
　　(i) 'the woman$_i$ [who$_i$ the man$_j$ [whom$_j$ e$_i$ sent a letter to e$_j$] has disappeared]'
　　(ii) ?*'the woman$_j$ [whom$_j$ the man$_i$ [who$_i$ e$_i$ sent a letter to e$_j$] has disappeared]'

The two gaps in (40) are the subject and the IO, and we have already noted that it can have reading (i), in which the higher head noun is interpreted as the subject, but that it is difficult to have reading (ii), where

the higher head noun is interpreted as the IO. This means that (40) is an exception to my generalization that the interpretation preference of a DRC is consistent with that of the lower relative clause. It is because the preferred reading for its lower relative clause, as we have already seen in (33), is to interpret the head noun as the subject, as in reading (ii). So the question is why reading (ii) of (40) is difficult to get.

To find an explanation for this, let us examine how processing of (40) will proceed. First, given the parsimony of positing gaps, the parser is more likely to consider the verb monotransitive and posit only the subject gap. Naturally, he will link the lower head noun to the subject gap, as in reading (ii). If so, however, the parser will face a problem when he encounters the higher head noun: given that only the subject gap has been posited and that it has been linked to the lower head noun, there will be no gap to which the higher head noun can be linked. In order to fix this situation, the parser will have to backtrack and reprocess the structure.

There are two possibilities. First, the parser may posit an adjunct gap and try to link the head noun to it (as in reading (ii)). This possibility, however, will be immediately ruled out since the head noun *yeca*, due to its meaning, cannot be interpreted as an adjunct. Another possibility is to reanalyze the verb as ditransitive and posit the IO gap. Linking the higher head noun to the IO gap, however, has a problem, too. It is because once the IO gap is posited, there are two argument gaps in the lower relative clause and of the two, the IO gap is closer to the lower head noun than the subject gap. Given the distance factor, this means that the parser will have to undo the previous linking and relink the lower head noun to the IO gap, which will leave the subject gap as the match for the higher head noun (i.e., reading (i)).

In short, the problem with reading (ii) of (40) is that even if the parser starts out linking the lower head noun to the subject gap, he will end up with reading (i) due to reprocessing, and this, I suggest, is why the interpretation preference of (40) is not consistent with the interpretation preference of its lower relative clause.

A similar problem arises for DRCs like (41), which involve DR of the IO out of a relative clause headed by a locative adjunct.

(41) [[ku namca-ka e e phyenci-lul ponay-n] kos-i salaci-n]   yeca
     the man-Nom   letter-Acc send-Adn place disappear-Adn woman

    (i) '#the woman$_j$ [where$_j$ the place$_i$ [which$_i$ the man sent a letter to e$_i$ e$_j$] has disappeared'

    (ii) ?*'the woman$_i$ [whom$_i$ the place$_j$ [where$_j$ the man sent a letter to e$_i$ e$_j$] has disappeared]'

I find (41) acceptable in neither of the two possible readings given above. This is a problem since we have already seen that (37), the lower relative clause of (41), allows both the readings: the head noun can be interpreted either as the IO or as a locative adjunct. So the question is why (41) is acceptable in neither readings.

Again, let us examine how processing of (41) will proceed. Granting that parsers posit gaps parsimoniously, we can expect that the parser, on the first parse, will not posit any gap, taking the verb as monotransitive. When he encounters the lower head noun, there are two possibilities. Reanalyzing the verb as ditransitive, he may posit the IO gap and link the lower head noun to it, as in reading (i). Alternatively, seeing the locative nature of the head noun *kos*, he may posit an adjunct gap and link the head noun to it, as in reading (ii). In either case, the parser will have to backtrack again when he encounters the higher head noun *yeca*. Again, there is no gap to link it to, and the parser, again, will have to backtrack to the lower relative clause.

If the parser has interpreted the lower head noun as the IO as in reading (i), he will posit an adjunct gap and try to link the higher head noun to it. An immediate problem with this, however, is that *yeca*, due to its meaning, cannot be interpreted as an adjunct. Reading (i) thus will be ruled out as semantically anomalous. Alternatively, if the parser has interpreted the lower head noun as a locative adjunct, he can reanalyze the verb as ditransitive and link the higher head noun to the newly posited IO gap. The problem with this, however, is that now we have two gaps in the lower relative clause, i.e., the IO gap and the adjunct gap, and of the two, the IO gap is closer to the lower head noun. Given Linking Preference Rule II, this means that the parser will have to undo the previous linking between the lower head noun and the adjunct gap and relink

the lower head noun to the IO gap, which, in turn, means that the higher head noun will have to be linked to the adjunct gap (as in reading (i)). This, I suggest, is why it is difficult for (41) to have reading (ii) despite the fact that it is the reading consistent with the interpretation preference determined in the lower relative clause.

In short, the reason (41) lacks any well-formed interpretation is because in the case of reading (i), the linking underlying such a reading is possible but the resulting meaning is semantically anomalous and in the case of reading (ii), the linking underlying it is made difficult by the reprocessing instigated by the processing of the higher relative clause.

To summarize, the two cases I have discussed to show the effects of the processing of the higher relative clauses both involve IO gaps and it is due to the adjunct-like status of IO gaps with respect to processing. To be more specific, I showed that reprocessing of the lower relative clauses, instigated by the special nature of IO gaps, may alter the previous linking in the lower relative clause and that this is a reason why the interpretation preferences of some DRCs may not be consistent with those of the lower relative clauses.

Recognizing this possibility, in turn, enables us to provide an explanation for an observation made in section 3 about the DR possibilities of IOs: we saw that DR of IOs is difficult when the lower head noun functions as the subject ((40)) or an adjunct ((41)) in the lower relative clause but that it is not difficult when it functions as the DO ((38)). We have already seen why DR of IOs is difficult in DRCs like (40) and (41): it was due to relinking of the lower head noun. The reason why DR of IOs is easy in DRCs like (38) can be also explained. Again, given the parsimony of positing gaps, the parser, first, will posit only the DO gap and link the lower head noun to it. When he later encounters the higher head noun, he will backtrack and posit the IO gap. The difference of (38) from (40)-(41) is that of the two gaps, the DO gap is closer to the lower head noun than the IO gap, and thus, it can remain linked to the lower head noun, unlike in (40)-(41). This, I suggest, is why the IO can undergo DR without difficulty when the lower relative head noun functions as the DO unlike when it functions as the subject or an adjunct.

6. Conclusion

DR in Korean is known to be subject to various restrictions, and in this paper I have focused on the GF-related aspects. I have explored if there are any GF-related restrictions for it and if any, what their nature is and how they can be explained. Contrary to the previous claim that only the subject can undergo DR in Korean (Han 1992, etc.), I have shown that all GFs can undergo DR but that different GFs show different DR possibilities. Concerning how the DR possibilities of different GFs are determined, I have first shown, by examining the interpretation preferences of DRCs, that a crucial factor affecting them is the GFs of the head nouns of the relative clauses from which DR takes place, to be more precise, the GF relations between the lower and the higher head nouns of DRCs.

The next, real question is why this is the case and I have proposed a processing-based explanation. Based on the observation that the interpretation preferences of DRCs are generally determined in the lower relative clauses, I suggested that one way to explain them is via explaining the interpretation preferences of the lower relative clauses and proposed that they can be explained in terms of ambiguity resolution. The two factors I have proposed to play important roles in this are first, the argument vs. adjunct status of the gap and secondly, the distance between gap and filler, and I have shown how the two linking rules deriving from these factors, together with another processing rule dictating that gaps be posited parsimoniously, interact to determine the interpretation preferences of the lower relative clauses and ultimately, those of DRCs.

The success of the present account for the GF-related restrictions for DR in Korean, ultimately, will render support to the processing approach to various restrictions for DR in Korean. In my previous papers (J.-M. Yoon 2011, 2015), I proposed a processing-based account for them, but the account for the Subject Condition, which I assumed to be a valid condition for DR, remained rather unsatisfactory with many counter-examples ignored. What I have shown in this paper is that once the GF-related restrictions for DR are better identified, they can be more satisfac-

torily explained in terms of processing.

This paper, however, has a few limitations, too. First, concerning the interpretation preferences of DRCs, which are the main data of this paper, they need to be further verified by more objective and strict experimental studies. Although I tried to verify my own intuitions using the results of an informal survey, not all the relevant data could be tested for one reason or another and the survey did not follow the strict experimental methods. Secondly, concerning the distance factor, which plays an important role in my account, the method I have used to measure the distance between gap and filler deviates from the methods commonly used in the working memory-based accounts of processing.

Despite these limitations, this paper, I believe, can shed a new light on the study of DR in Korean, providing a starting point for further studies. Studies of DR in Korean have often focused on solving the problems the absence of CNP island effects raises to the theories of locality and various kinds of restrictions it possesses, in particular, the GF-related restrictions as discussed in this paper, have not received much attention. By drawing attention to these often neglected and thus not fully understood properties of DR in Korean, this paper hopes to enhance the general understanding of DR, one of the unique syntactic phenomena of Korean.

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Jeong-Me Yoon
Department of English Language and Literature
Myongji University, 50-3 Namgajwa dong, Seodaemun gu, Seoul, Korea
Email: jeongme@gmail.com