Linguistic Research 35(1), 97-116
DOI: 10.17250/khisli.35.1.201803.004

The scope ambiguity in the Korean Left-Node Raising construction*

Jungmee Lee
(Sungkyunkwan University)

Lee, Jungmee. 2018. The scope ambiguity in the Korean Left-Node Raising construction. *Linguistic Research* 35(1), 97-116. This paper examines the ambiguity that arises from the Left-Node Raising (LNR) construction in Korean. I argue that the ambiguity is induced by the scopal relation between a coordinate phrase and a quantifier-type pivot: the quantificational meaning of a pivot can scope over the coordinate phrase, or it can take a narrow scope within each conjunct. I show that previous proposals such as the ATB-scrambling analysis (Nakao 2010) and the multi-dominance analysis (Chung 2010) have not addressed the ambiguity or have some empirical problems. I develop a compositional analysis of the scopal ambiguity within the framework of Combinatory Categorial Grammar (e.g. Steedman 1996; Steedman 2000; Baldridge 2002; Steedman and Baldridge 2011; Steedman 2012), and propose that it can be extended to the English and Korean RNR sentences with a quantificational pivot. **(Sungkyunkwan University)**

Keywords Left-Node Raising, scope ambiguity, (non-)distributive scope, coordinate phrase, Right-Node Raising, Combinatory Categorial Grammar, Korean

1. Introduction

The so-called Right-Node Raising (RNR) construction contains two or more than two conjuncts, with their shared part at the end of the whole sentence (henceforth, called a pivot). This is illustrated with the following English RNR sentence in which the pivot *a box* is construed as the objects of the verbs *made* and *moved* in both conjuncts.[1]

(1) [John made], and [Mary moved], **a box.**

---

* I am grateful to three anonymous reviewers for their insightful feedback.

1 Throughout this paper, I represent the conjuncts of a LNR/RNR sentence within square brackets, and put its pivot in boldface.

Previous authors (Yatabe 2001; Park and Lee 2009; Nakao 2010; Chung 2010) have observed that there exists an independent construction in Korean and Japanese which exhibits the exact mirror-image of the RNR construction: a pivot occurs at the left periphery of a whole sentence, and it is interpreted at all conjuncts. They refer to it as the Left-Node Raising (LNR) construction. The following Korean sentence in (2) illustrates a LNR construction whose conjuncts are conjoined by means of the verbal conjunction marker *-ko* 'and'.[2, 3, 4]

(2) **Sangca-lul** [John-i mantul]-ko [Mary-ka olmki-ess-ta].
box-Acc John-Nom make-and Mary-Nom move-Past-Decl
'John made, and Mary moved, a box.'

Kubota and Levine (2015) make a crucial observation on the interpretation of a quantifier that occurs outside of a coordinate phrase in English. They notice that two different scopal readings can arise in principle, as roughly represented below: (i) the quantifier can outscope the whole coordinate phrase (called the 'non-distributive' reading), or (ii) the quantifier has a narrow scope in each conjunct (called the 'distributive' reading).[5, 6]

---

2 A bare noun in Korean can express an indefinite meaning, as exemplified below:

(i) a. Chelswu-ka ecey mwues-ul ha-yess-e?
Chelswu-Nom yesterday what-Acc do-Past-Decl
'What did Chelswu do yesterday?'
b. Sangca-lul mantul-ess-e.
box-Acc make-Past-Decl
'He made a box.'

In (i-b), the bare noun *sangca-lul* 'box-Acc' is interpreted as an indefinite noun.

3 The coordinating connective *kuliko* 'and' can optionally occur right after the conjunction *-ko* in the Korean verbal coordination.

4 In the verbal coordinate sentence in Korean, two conjuncts are morphologically asymmetric: (i) a mood morpheme is allowed to occur only in the final conjunct but not in the non-final conjuncts, and (ii) tense can occur in both conjuncts but it is optional in the non-final conjuncts. For instance, if the declarative mood *-ta* occurs in the non-final conjunct, the coordinate sentence is ungrammatical, as shown below:

(i) Sangca-lul [John-i mantul-(ess)-(*ta)]-ko [Mary-ka olmki-ess-ta].
box-Acc John-Nom make-Past-Decl-and Mary-Nom move-Past-Decl
'John made, and Mary moved, a box.'

5 Kubota and Levine (2015) manipulate the following parameters that can possibly affect the

(3) a. $\exists x[p(x) \wedge q(x)]$ [Non-distributive reading]
b. $\exists x.p(x) \wedge \exists y.q(y)$ [Distributive reading]

In this paper, I show that the same pattern of the scopal readings is observed in the LNR constructions in Korean. For example, (2) is scopally ambiguous, as illustrated with the following two possible scenarios for it:

(4) a. Context 1: After John made a box in the basement, Mary moved it to the garden.
b. Context 2: John and Mary were busy preparing to move. While John was making a large box, Mary was moving a small box.

In other words, the LNR sentence in (2) yields two readings: (i) there is one box, and it is made by John and moved by Mary (as in Context 1), or (ii) there is one box made by John, and there is another box moved by Mary (as in Context 2). Crucially, each of these readings corresponds to the non-distributive vs. distributive reading in (3). While previous researchers (Nakao 2010; Chung 2010) have focused on the syntactic structure of the LNR construction, it has not been fully addressed why the ambiguity arises from it. In this paper, I argue that the ambiguity is due to the interaction between a conjunction and a quantificational pivot in the LNR

available readings: (i) downward entailing (DE) vs. non-DE quantifiers, (ii) conjunction vs. disjunction, and (iii) constituent vs. non-constituent coordination. Crucially, they reach a generalization that both the 'distributive' and 'non-distributive' readings are available, irrespective of these parameters.

6 The distributive reading might be hard to obtain in some examples, but Kubota and Levine (2015) point out that it is due to the pragmatic blocking effect. If a scopal element occurs in each conjunct (instead of a RNR structure with the scopal element shared by all conjuncts), it receives only the distributive reading. From the fact that the speaker does not use the disambiguated structure, the addressee obtains a conversational implicature such that the speaker intends to express the non-distributive reading with the RNR sentence. This is why the non-distributive reading is preferred over the distributive reading. But this pragmatic effect can be overriden, as shown in the following examples from Kubota and Levine (2015).

(i) a. A mob boss [was assassinated in Boston earlier last month] and [executed for murder in New York this weekend].
b. I gave an exam [to my advanced calculus seminar on Monday] and [to my basket-weaving class on Thursday]. (Kubota and Levine 2015:527)

The two sentences in (i) can receive the distributive reading, but the non-distributive reading is not available for pragmatic reasons.

construction, which is analogous to the scopal ambiguity exhibited by the English RNR construction (e.g. Kubota and Levine 2015). I develop a formal analysis of the scopal ambiguity within the framework of Combinatory Categorial Grammar (e.g. Steedman 1996; Steedman 2000; Baldridge 2002; Steedman and Baldridge 2011; Steedman 2012), and show that the proposed CCG analysis can be extended to RNR sentences in English and Korean as well.

The paper proceeds as follows. In Section 2, I first show that the Korean LNR construction cannot be analyzed as involving a null pronominal, and then review previous proposals such as the ATB-scrambling (Nakao 2010) and the multi-dominance analysis (Chung 2010). In Section 3, I provide a CCG analysis of the scopal ambiguity in the LNRs. Section 4 concludes the paper.

2. Previous analyses

The English Right-Node Raising construction has received various analyses in the literature: movement (Maling 1972; Postal 1974, 1998; Hudson 1976; Sabbagh 2007), multi-dominance (Wilder 1999), ellipsis (Wexler and Culicover 1980; Kayne 1994; Hartmann 2000, 2003). The LNR constructions have been analyzed in a similar line. Nakao (2010) proposes that the LNR construction in Japanese undergoes across-the-board scrambling. Chung (2010) extends Wilder's (1999, 2008) multiple dominance analysis to the Korean LNR construction. In this section, I first review the previous claim (Yatabe 2001; Park and Lee 2009; Nakao 2010; Chung 2010) that the LNR construction cannot be analyzed by postulating a zero pronoun in the final conjunct. Then, I move on to Nakao's (2010) ATB-scrambling analysis and Chung's (2010) multi-dominance analysis.

2.1 *Pro*–analysis

One of the possible analyses of the LNR examples like (2) is to view them in terms of null anaphora and scrambling. According to this view, the bold-faced expression *Sangca-lul* 'box-Acc' in (2), for instance, is not shared by two conjuncts, but it is scrambled to the left periphery within the first conjunct and the second conjunct contains a zero pronoun referring back to the scrambled element. This *pro*-analysis is roughly represented with the trace *t* (as the result of the scrambling)

in the first conjunct and the zero pronoun *pro* in the second conjunct, as follows:

(5) [**Sangca-lul**$_i$ John-i t_i mantul]-ko [Mary-ka ***pro***$_i$ olmki-ess-ta].
box-Acc John-Nom make-and Mary-Nom ove-Past-Decl
'John made, and Mary moved, a box.'

Previous researchers on the Korean and Japanese LNR construction (Yatabe 2001; Park and Lee 2009; Nakao 2010; Chung 2010) argue against this *pro*-analysis, drawing on disparities between Korean and Japanese zero pronouns in general and those postulated in the LNRs. One of their differences pertains to the morphological realization of case and honorification markers: while a zero pronoun in general allows for a case/honorification mismatch with its antecedent, the null anaphor postulated in the final conjunct of the LNR construction does not. Consider the occurrence of case markers below: (6a) is the Korean LNR sentence represented according to the *pro*-analysis, and (6b) is its corresponding two separate sentences.

(6) a. *[**Mary-eykey**$_i$ John-i t_i kkoch-ul sacwu]-ko
Mary-Dat John-Nom flower-Acc buy-and
[Tom-i ***pro***$_i$ wuiloha-yess-ta].
Tom-Nom comfort-Past-Decl
'(To) Mary, John bought a flower, and Tom comforted.'
b. **Mary-eykey**$_i$ John-i t_i kkoch-ul sacwu-ess-ta.
Mary-Dat John-Nom flower-Acc buy-Past-Decl
Tom-un ***pro***$_i$ wuiloha-yess-ta.
Tom-Top comfort-Past-Decl
'John bought a flower to Mary. Tom comforted (her).'
(adapted from the Japanese examples in Nakao 2010:157)

The LNR sentence in (6a) is ungrammatical, but its corresponding two sentences in (6b) are perfectly grammatical. This grammaticality difference cannot be accounted for in terms of the *pro*-analysis. Instead, the above contrast indicates that the LNR construction exists as an independent construction that contains a left-peripheral element shared by all conjuncts. Consequently, the case morphology realized with the pivot should be licensed in each conjunct. For example, (6a) is grammatically

incorrect, because the dative noun phrase *Mary-eykey* 'Mary-Dat' occurring as a pivot can be licensed by the ditransitive predicate *sacwu-* 'buy' (in the non-final conjunct), but not by the transitive predicate *wuiloha-* 'comfort' (in the final conjunct).[7] In sum, the *pro*-analysis is empirically problematic, which in turn indicates that the LNR construction exists as an independent construction.[8]

2.2 Nakao's (2010) ATB-scrambling

Nakao (2010) argues that the Japanese LNR construction is derived by the across-the-board scrambling from the clausal coordination, as represented below with traces: the pivot *Sanca-lul* is base-generated in each conjunct, but it is scrambled to the left periphery in the across-the-board way.

(7) **Sangca-lul**$_i$ [John-i t_i mantul]-ko [Mary-ka t_i olmki-ess-ta].
box-Acc John-Nom make-and Mary-Nom move-Past-Decl
'John made, and Mary moved, a box.'

---

7 See Park and Lee (2009) and Chung (2010) for more Korean LNR examples which are related to case/honorification morphemes.

8 See Yatabe (2001) for further evidence against the *pro*-analysis of the Japanese LNR construction. For example, he shows that infinitival complements, compound fragments, non-compositional idioms in Japanese cannot be separated with their parts being left unpronounced as a zero pronoun. This is illustrated with the occurrence of the Japanese infinitival complement *yonde ageta* 'read-Ger give-Past' in the LNR sentence in (i), which contains the nominal conjunction marker *to* 'and'. The contrast between (ii-b) and (ii-c), as a response to the interrogative in (ii-a), indicates that *yonde* 'read-Ger' in *yonde ageta* 'read-Ger give-Past' cannot be replaced with a zero pronoun. If the final conjunct of the LNR sentence in (i) contained a zero pronoun referring back to *yonde* 'read-Ger' in the preceding conjunct, then it would incorrectly predict that (i) is ungrammatical.

(i) Yonde [ageta hito]-to [agenakatta hito]-ga ita.
read-Ger 'give'-Past person-and 'give'-Neg-Past person-Nom be-Past
'There were people who gave (him/her) the favor of reading (it) (to him/her) and people who didn't.'

(ii) a. Yonde ageta?
read-Ger 'give'-Past
'Did (you) give (him/her) the favor of reading (it) (to him/her)?'

b. Iya, yonde agenakatta.
no read-Ger 'give'-Neg-Past
'No, (I) did not give (him/her) the favor of reading (it) (to him/her).'

c.*Iya, agenakatta.
no 'give'-Neg-Past
Intended: 'No, (I) did not give (him/her) the favor of reading (it) (to him/her).'

Previous researchers such as Saito (1989, 1992, 2004, 2005), Fukui (1993), Kuroda (1988) have argued that scrambling is an optional operation, and it is semantically vacuous.[9] By contrast, Bošković and Takahashi (1998) propose that a scrambled element is base-generated in its surface position, and undergoes obligatory LF movement in order to receive a theta-role. These two approaches differ in terms of the base-generated position of the scrambled element, but crucially they share the view that a sentence with scrambled elements has the same truth-conditional meaning as its 'reconstructed' version. Accordingly, if the LNR sentence in Korean undergoes scrambling, then it should have the same meaning as its 'reconstructed' version.

However, the same ambiguity is not induced from the 'reconstructed' version of the LNR sentence. The following 'reconstructed' version of (2) is not ambiguous, but it is available only with the distributive reading:

(8) #Context 1: After John made a box in the basement, Mary moved it to the garden.
Context 2: John and Mary were busy preparing to move. While John was making a large box, Mary was moving a small box.
[John-i sangca-lul mantul]-ko [Mary-ka sangca-lul
John-Nom box-Acc make-and Mary-Nom box-Acc
olmki-ess-ta].
move-Past-Decl
'John made a box, and Mary moved a box.'

(8) can be uttered felicitously in Context 2. However, in order for the speaker to utter (8) felicitously in Context 1, he or she must use a definite description such as *ku sangca-lul* 'that box-Acc' (with a demonstrative) in the second conjunct. This unavailability of the non-distributive reading in the 'reconstructed' version of the Korean LNR sentence poses a crucial problem for the ATB-scrambling analysis.

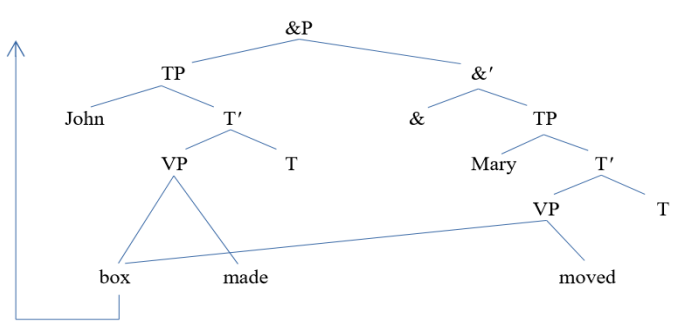
2.3 Chung's (2010) multiple dominance analysis

Chung (2010) proposes a multiple dominance analysis of the Korean LNR

9 See Miyagawa (1997) for the claim that scrambling is motivated by some discourse functions like focus.

construction. Assuming that coordination is structurally asymmetrical, the pivot is analyzed as being shared by both conjuncts but undergoing obligatory movement to the left periphery. Chung's proposed analysis of the LNR example like (2) is represented in the following tree diagram:

(9)



In (9), the first and the second conjunct occur in the Specifier and the Complement position of the Conjunction Phrase (&P), respectively. The pivot *box* is dominated by the VPs in both conjuncts, and then it obligatorily moves to the left periphery.[10]

In Chung's multi-dominance analysis, the scopal ambiguity observed in the LNR construction is not fully addressed. Particularly, the readings of examples like (2) remain unexplained in Chung (2010). He discusses the 'internal reading' that arises from LNR sentences with symmetrical predicates such as *ttokkathun* 'the same' and *talun* 'different'. Consider the interpretation of the following LNR sentence:[11]

(10) a. Ttokkathun sangca-lul [John-i mantul]-ko [Mary-ka olmki-ess-ta].
the.same box-Acc John-Nom make-and Mary-Nom move-Past-Decl

10 Nakao (2010) points out the lack of empirical support for the *obligatoriness* of the pivot's movement in the multi-dominance analysis. Chung (2010) argues that the movement is not an *ad hoc* stipulation but follows from the revision of Kayne's (1994) Linear Correspondence Axiom (LCA) proposed by Wilder (1999, 2008).

11 For reasons of space, I do not discuss how the proposed analysis can be applied to LNR sentences containing symmetrical predicates like (10) in this paper. But see Lee (2018) for further discussion.

'John made, and Mary moved, the same box.'

b. Talun sangca-lul [John-i mantul]-ko [Mary-ka
different box-Acc John-Nom make-and Mary-Nom
olmki-ess-ta].
move-Past-Decl
'John made, and Mary moved, different boxes.'

If (10a) is uttered out of the blue, it expresses that the two properties denoted by the conjuncts are possessed by the same entity which also has the property of being a box. (10b) is interpreted along the same line: there are two different boxes one of which was made by John and the other of which was moved by Mary. These readings with symmetrical predicates are called the 'internal reading'.[12] Chung (2010) argues that the internal reading can be captured by the multi-dominance analysis, under the assumption that the symmetrical predicate must be c-commanded by a plural entity. Chung claims that the symmetrical predicate in (10) is c-commanded by *John* and *Mary* at the same time, and these two singular nouns denote plurality. However, no exact mechanism has been proposed that formalizes the correlation between the c-command relation and the internal reading. How this analysis of the internal reading can be extended to the LNR sentences like (2) is left unaddressed in Chung (2010).[13]

3. Proposed analysis

I propose a formal analysis of the ambiguity arising from the Korean LNR construction within the framework of Combinatory Categorial Grammar (e.g. Steedman 1996; Steedman 2000; Baldridge 2002; Steedman and Baldridge 2011; Steedman 2012). I introduce the basic categories/types and the combinatory rules in

12 One more reading is available from examples like (10). Suppose that (10) is uttered right after the utterance "Tom made a red box last week". In this context, the property of being made by John and moved by Mary can be attributed to the contextually-salient box which is introduced in a prior discourse, i.e. the red box made by Tom. This reading is called the 'external reading'.

13 One of the reviewers suggested a Quantifier Raising (QR) approach to the scopal ambiguity of the LNR sentences. How the QR approach can be incorporated in the scrambling or the multi-dominance analyses has not been addressed in the literature. In this paper I do not discuss its applicability under either the scrambling or the multi-dominance analyses, but leave it for future work.

CCG in Section 3.1, and then present the analyses of the distributive vs. non-distributive readings in Section 3.2. In Sections 3.3-3.4, I show that the proposed analysis can be extended to the RNR sentences in English and Korean.

3.1 Preliminaries

In this paper, linguistic expressions are written as ordered pairs with a syntactic category and a meaning translation into a formal language. I assume two syntactic categories NP (for noun phrases), S (for sentences), and two semantic types *e* (for entities) and *t* (for truth values).[14, 15] I adopt the so-called 'result leftmost' notation. For example, S\NP indicates that the expression is looking for an NP to its left in order to form a S, and S/NP is the corresponding rightward-combining functor.

The analysis proposed in this paper is couched within Combinatory Categorial Grammar (e.g. Steedman 1996; Steedman 2000; Baldridge 2002; Steedman and Baldridge 2011; Steedman 2012). CCG posits only one level of representation, such that the semantics of a sentence is read directly from the derivation of the surface syntax. This framework abandons the traditional notion of constituency in the surface syntax, and instead allows for each element in a sentence to form larger phrases in a flexible way. The flexibility in a syntactic derivation enables us to capture scopal ambiguity without assuming a covert movement operation such as Quantifier Raising (e.g. May 1977; Heim and Kratzer 1998).

The combinatory rules used for the proposed analysis are given in (11)-(14). First, functor categories can combine with their arguments via Functional Application rules in (11). The two variants in (11) differ in terms of the combinatory direction: the forward application in (11a) contains a rightward-combining functor, and the backward application in (11b) contains a leftward-combining functor.

(11) Functional Application

a.	$X/Y : f$	$Y : a$	$\Rightarrow$ $X : fa$	(>)
b.	$Y : a$	$X\backslash Y : f$	$\Rightarrow$ $X : fa$	(<)

14 Case is treated as the syntactic feature of NP, e.g. $NP_{[acc]}$ for the accusative-case marked NP.

15 The variables used in this paper are as follows: *x*, *y*, *z* (for the type *e*), *p*, *q* (for the type <e,t> denoting properties), *P*, *Q* (for the type <<e,t>,t> denoting a function from properties to truth values).

Secondly, functor categories can combine with another functor categories via Functional Composition rules in (12). The forward composition rule in (12a) contains two rightward-combining functors, and the backward composition rule in (12b) contains two leftward-combining functors.

(12) Functional Composition

a. $X/Y : f \quad Y/Z : g \quad \Rightarrow \quad X/Z : \lambda x.\ f(gx)$ **(>B)**

b. $Y\backslash Z : g \quad X\backslash Y : f \quad \Rightarrow \quad X\backslash Z : \lambda x.\ f(gx)$ **(<B)**

The composition rules in (12) are harmonic in that all the slashes are in the same direction. But the compositional rules can be non-harmonic, as shown in the Crossing Functional Composition in (13).

(13) Crossing Functional Composition

a. $X/_xY : f \quad Y\backslash_xZ : g \quad \Rightarrow \quad X\backslash_xZ : \lambda x.\ f(gx)$ **(>B$_x$)**

b. $Y/_xZ : g \quad X\backslash_xY : f \quad \Rightarrow \quad X/_xZ : \lambda x.\ f(gx)$ **(<B$_x$)**

Next, Type-Raising rules in (14) allow argument categories to be turned into functor categories:

(14) Type-Raising

a. $X : a \quad \Rightarrow \quad T/(T\backslash X) : \lambda f.\ fa$ **(>T)**

b. $X : a \quad \Rightarrow \quad T\backslash(T/X) : \lambda f.\ fa$ **(<T)**

In addition to the Type-Raising in (14), I assume one more type-lifting rule in this paper. In traditional accounts, for example, extensional transitive predicates are assumed to lexically denote relations between entities. However, Partee and Rooth (1983) point out that a predicate can be adjusted to take a quantifier type, i.e. <<e,t>,t>, as its arguments whenever a higher type is required in the derivation. This view is extended by Hendriks (1993). He assumes that predicates in natural language have multiple semantic types. Under this approach, scope ambiguity in natural language sentences is accounted for in terms of semantic type-lifting rules which make it possible for one of the arguments of a predicate to outscope the predicate and the other arguments. One of the type-lifting rules is the Type-Raising in (14), and the other is the Argument-Raising in (15):

(15) Argument-Raising **(AR)**
Any expression of type <a,c> can be lifted to type <<<a,b>,b>,c>.

In this paper, I follow Partee and Rooth's (1983) and Hendriks's (1993) assumptions on the flexible types of predicates, and account for the scopal ambiguity in terms of the Argument Raising rule.

3.2 Distributive vs. non-distributive ambiguity in Korean LNR constructions

This section provides a CCG analysis of the distributive vs. non-distributive ambiguity of the simple LNR sentence in (2). I argue that the ambiguity is induced by two possible scopes between the quantifier-type pivot and the conjunction operator.

First, consider the syntactic and semantic derivation of the coordinate phrase in (2) below:[16, 17]

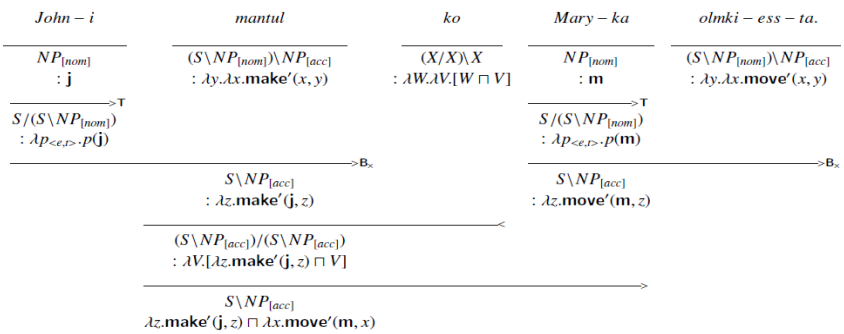


Figure 1: Derivation of the coordinate phrase in (2)

The subject NP in the first conjunct is raised to a higher type via the forward raising, and then it combines with the transitive verb *mantul*- 'make' via the crossing forward composition. The resulting phrase, which is of category $S\backslash NP_{[acc]}$ and of type <e,t>, is

16 For reasons of simplicity, this paper does not represent the syntax and semantics of tense and mood occurring in the final conjunct of Korean LNR sentences. But see Lee and Tonhauser (2010) for relevant discussion.

17 I analyze a conjunction marker such as *and* (in English) and *-ko* (in Korean) as a generalized conjunction operator (Partee and Rooth 1983), and use the symbol ⊓ for it.

taken by the conjunction *-ko* via the backward application. The final conjunct is derived in the same way, i.e. type-raising of the subject and crossing composition with the verb. The *ko*-marked conjunct, which is of category (S \$NP_{[acc]}$)/(S\$NP_{[acc]}$) and of type <<e,t>,<e,t>>, takes the final conjunct as its argument, and it produces a coordinate phrase of category S\$NP_{[acc]}$ and of type <e,t>.

Given the above derivation of the coordinate phrase, the non-distributive reading of (2) is derived as follows:

$$\dfrac{\dfrac{\textit{Sangca} - \textit{lul}}{\begin{array}{c} S/(S\backslash NP_{[acc]}) \\ : \lambda p.\exists x[\mathbf{box'}(x) \wedge p(x)] \end{array}} \quad \dfrac{\textit{John} - \textit{i mantul} - \textit{ko Mary} - \textit{ka olmki} - \textit{ess} - \textit{ta.}}{\begin{array}{c} S\backslash NP_{[acc]} \\ \lambda z.\mathbf{make'}(\mathbf{j}, z) \sqcap \lambda x.\mathbf{move'}(\mathbf{m}, x) \end{array}}}{\begin{array}{c} S \\ : \exists x[\mathbf{box'}(x) \wedge \mathbf{make'}(\mathbf{j}, x) \wedge \mathbf{move'}(\mathbf{m}, x)] \end{array}} >$$

Figure 2: Derivation of the non-distributive reading in (2)

In Figure 2, the coordinate phrase, which is of category S\$NP_{[acc]}$ and of type <e,t>, is taken as an argument by the pivot, which is of category S/(S\$NP_{[acc]}$) and type <<e,t>,t>. According to the final translation, the quantificational meaning of the pivot outscopes the whole coordination, and thus it correctly yields the non-distributive reading such that there exists at least one box that has both properties of being made by John and being moved by Mary.

The derivation of (2) for its distributive reading is given in Figure 3.

$$\dfrac{\dfrac{\textit{Sangca} - \textit{lul}}{\begin{array}{c} S/(S\backslash NP_{[acc]}) \\ : \lambda p.\exists x[\mathbf{box'}(x) \wedge p(x)] \end{array}} \quad \dfrac{\dfrac{\textit{John} - \textit{i mantul} - \textit{ko Mary} - \textit{ka olmki} - \textit{ess} - \textit{ta.}}{\begin{array}{c} S\backslash NP_{[acc]} \\ \lambda z.\mathbf{make'}(\mathbf{j}, z) \sqcap \lambda x.\mathbf{move'}(\mathbf{m}, x) \end{array}}}{\begin{array}{c} S\backslash(S/(S\backslash NP_{[acc]})) \\ \lambda P.P.\mathbf{make'}(\mathbf{j}) \sqcap \lambda Q.Q.\mathbf{move'}(\mathbf{m}) \end{array}}\,\mathrm{AR}}{\begin{array}{c} S \\ : \exists x[\mathbf{box'}(x) \wedge \mathbf{make'}(\mathbf{j}, x)] \wedge \exists y[\mathbf{box'}(y) \wedge \mathbf{move'}(\mathbf{m}, y)] \end{array}} <$$

Figure 3: Derivation of the distributive reading in (2)

In Figure 3, the key difference from the derivation of the non-distributive reading is that the argument category of the coordinate phrase is raised from e-type to

<<e,t>,t>-type, so that the conjunction operator can take a wide scope over the quantifier-type pivot at a later step of the derivation. This correctly yields a distributive reading such that there are at least two separate boxes one of which is made by John and the other of which is moved by Mary.

3.3 Parallel scope ambiguity in the English RNR construction

The proposed analysis can be extended to the English RNR construction as well. Consider the English RNR sentence in (1) and its possible two derivations in Figures 4 and 5:

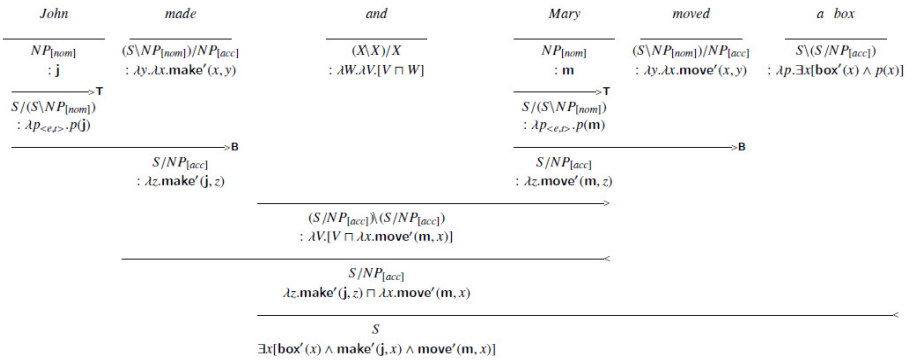


Figure 4: Derivation of the non-distributive reading of (1)

In Figure 4, the two subjects in the coordinate phrase are type-raised, and then they compose with the verbs. The conjunction combines the final conjunct first, and then the non-final conjunct via application rules. Then, the coordinate phrase is taken as an argument by the shared object: that is, the quantificational force of the pivot outscopes the conjunction operator. This derivation yields the non-distributive reading, as shown in the final translation.

Figure 5 is the same as Figure 4, except for the argument-raising of the coordinate phrase. The argument-raising makes it possible for the coordinate phrase to take a wide scope over the pivot. Consequently, it gives rise to the distributive reading, as shown in the final translation below:

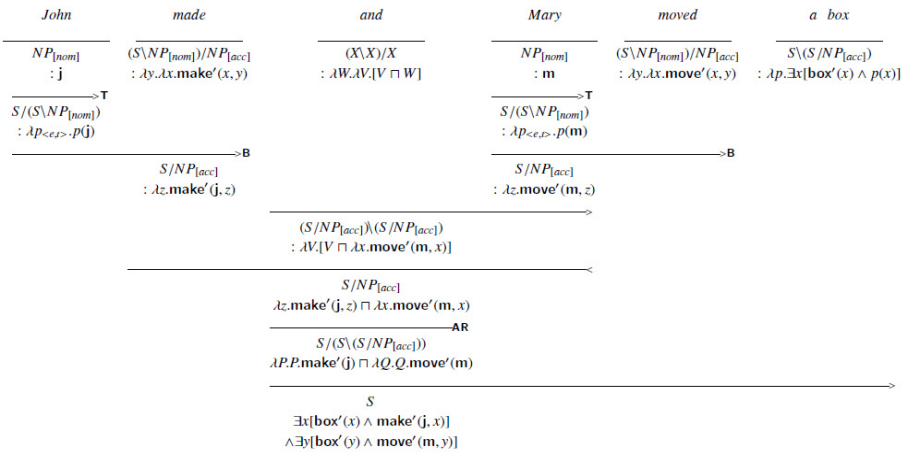


Figure 5: Derivation of the distributive reading of (1)

3.4 Parallel scope ambiguity in the Korean RNR construction

The RNR sentences in Korean have a verb as their pivots, because Korean is a verb-final language. When a scope-bearing element occurs at the right periphery along with a verb, the Korean RNR sentences yield the same distributive vs. non-distributive ambiguity, as illustrated with two possible scenarios below:

(16) Context 1: John and Mary were given a piece of large paper, and asked to draw a picture together with any instrument. [Non-distributive reading]
Context 2: John and Mary were given separate pieces of paper, and asked to draw a picture on them with any instrument. [Distributive reading]
[John-i mwulkam-ulo] kuliko [Mary-ka yenphil-lo]
John-Nom paints-with and Mary-Nom pencil-with
kulim-ul kuli-ess-ta.
picture-Acc draw-Past-Decl
‘John drew with paints, and Mary drew with a pencil, a picture.’

Crucially, the proposed CCG analysis can be extended to Korean RNR sentences such as (16). First, the derivation of the coordinate phrase in (16) is given below:

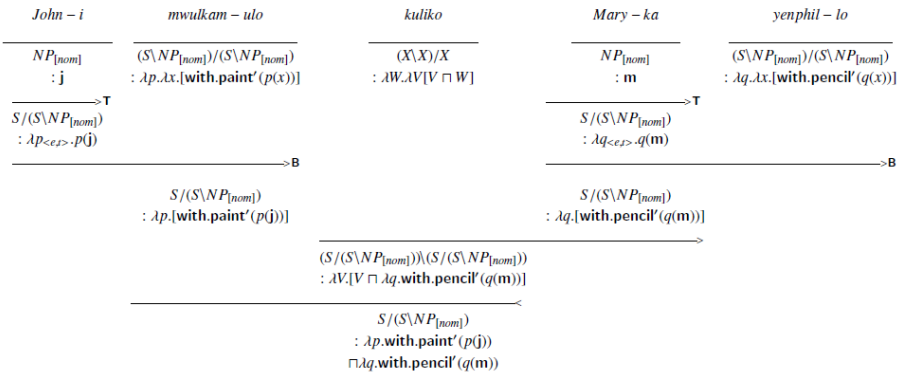


Figure 6: Derivation of the coordinate phrase in (16)

In Figure 6, the type-raised subject in each conjunct is composed with the VP-modifier, and the conjunction *kuliko* first combines with the final conjunct and then with the non-final conjunct via the application rules.

If the coordinate phrase takes the pivot as its argument, the distributive reading arises from (16), as shown below:

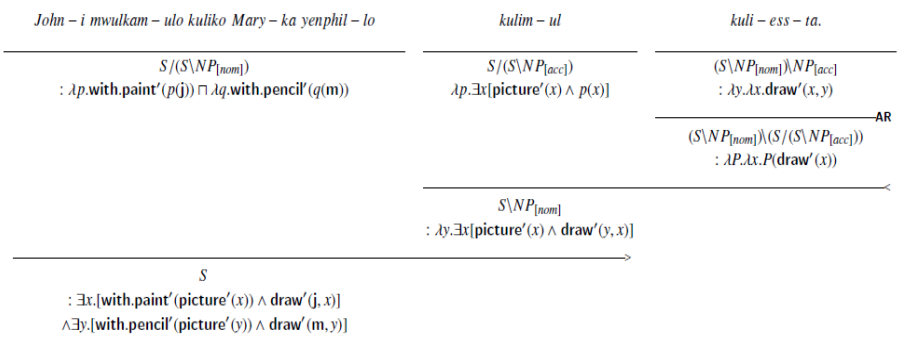


Figure 7: Derivation of the distributive reading in (16)

In Figure 7, the object argument of the transitive verb *kuli-ess-ta* ‘draw’ is raised, and

then it combines with the quantifier-type object via the backward functional application. The resulting pivot of category $S\backslash NP_{[nom]}$ and of type <e,t> is taken by the coordinate phrase which is of category $S/(S\backslash NP_{[nom]})$ and type <<e,t>,t>. According to the final translation, the conjunction operator takes a wide scope over the existential quantificational force, giving rise to the distributive reading.

In contrast, the non-distributive reading is yielded by the reversed scope between the coordinate phrase and the pivot, as shown in Figure 8.

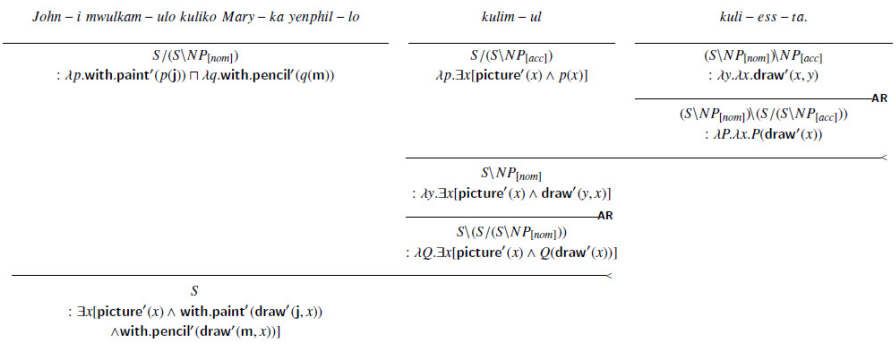


Figure 8: Derivation of the non-distributive reading in (16)

In Figure 8, the argument category of the whole pivot *kulim-ul kuli-ess-ta* 'draw a picture' is raised, so that the resulting phrase of category $S\backslash(S/(S\backslash NP_{[nom]}))$ and of type <<<e,t>,t>,t> can outscope the coordinate phrase of category $S/(S\backslash NP_{[nom]})$ and of type <<e,t>,t>. The final translation exactly corresponds to the non-distributive reading that arises from (16).

4. Conclusion

This paper investigated the ambiguous readings of the Korean LNR sentences. I first showed that the scopal ambiguity in the LNR construction has not been fully addressed in Chung's (2010) multi-dominance analysis and poses empirical problems for Nakao's (2010) ATB-scrambling analysis. I argued that the ambiguity is attributed to the scopal relation between a coordinate phrase and a quantifier-type

pivot: (i) the non-distributive reading arises if the quantificational meaning of a pivot outscopes the coordinate phrase, and (ii) the distributive reading arises if the conjunction operator takes a wide scope over the quantifier-type pivot. I analyzed these two scopal readings within the framework of Combinatory Categorial Grammar, and argued that the proposed analysis can be extended to the English and Korean RNR sentences with a quantificational pivot.

References

Baldridge, Jason. 2002. *Lexically specified derivational control in Combinatory Categorial Grammar*. PhD Dissertation, University of Edinburgh.

Bošković, Zeljko and Daiko Takahashi. 1998. Scrambling and last resort. *Linguistic Inquiry* 29: 347-366.

Chung, Daeho. 2010. Left node raising as a shared node raising. *Studies in Generative Grammar* 20: 549-576.

Fukui, Naoki. 1993. Parameters and optionality. *Linguistic Inquiry* 24: 399-420.

Hartmann, Katharina. 2000. *Right node raising and gapping: Interface Conditions on Prosodic Deletion*. Amsterdam: John Benjamins.

Hartmann, Katharina. 2003. Background matching in right node raising constructions. In Kerstin Schwabe and Susanne Winkler (eds.), *The interfaces: Deriving and interpreting (omitted) structures*, 121-151. Amsterdam: John Benjamins.

Heim, Irene and Angelika Kratzer. 1998. *Semantics in generative grammar*. Oxford: Blackwell.

Hendriks, Herman. 1993. *Studied flexibility: Categories and types in syntax and semantics.* PhD Dissertation, University of Amsterdam.

Hudson, Richard. 1976. Conjunction reduction, gapping, and right-node-raising. *Language* 52: 535-562.

Kayne, Richard. 1994. *The Antisymmetry of syntax*. Cambridge, MA.: MIT Press.

Kubota, Yusuke and Robert Levine. 2015. Against ellipsis: Arguments for the direct licensing of 'noncanonical' coordinations. *Linguistics and Philosophy* 38: 521-576.

Kuroda, Shige-Yuki. 1988. Whether we agree or not: A comparative syntax of English and Japanese. *Linguisticae Investigationes* 12: 1-47.

Lee, Jungmee and Judith Tonhauser. 2010. Temporal interpretation without tense: Korean and Japanese coordination constructions. *Journal of Semantics* 27: 307-341.

Lee, Jungmee. 2018. Ambiguity with summative and symmetrical predicates in Korean Left-Node Raising constructions. Unpublished manuscript.

Maling, Joan. 1972. On gapping and the order of constituents. *Linguistic Inquiry* 1: 101-108.

May, Robert. 1977. *The Grammar of quantification*. PhD Dissertation, MIT, Cambridge, Massachusetts.

Miyagawa, Shigeru. 1997. Against optional scrambling. *Linguistic Inquiry* 28: 1-26.

Nakao, Chizuru. 2010. Japanese left node raising as ATB-scrambling. *University of Pennsylvania Working Papers in Linguistics* 16: 156-165. Available at: [https://repository.upenn.edu/pwpl/vol16/iss1/18]

Park, Myung-Kwan and Wooseung Lee. 2009. A RNR analysis of left node raising constructions in Korean. *Studies in Generative Grammar* 19: 505-528.

Partee, Barbara and Mats Rooth. 1983. Generalized quantifiers and type ambiguity. In Rainer Bäuerle, Christoph Schwarze, and Arnim von Stechow (eds.), *Meaning, use, and interpretation of language*, 361-383. Berlin: Walter de Gruyter.

Postal, Paul M. 1974. *On raising*. Cambridge, MA: MIT Press.

Postal, Paul M. 1998. *Three investigations of extraction*. Cambridge, MA: MIT Press.

Sabbagh, Joseph. 2007. Ordering and linearizing rightward movement. *Natural Language and Linguistic Theory* 25: 349 – 401.

Saito, Mamoru. 1989. Scrambling as semantic vacuous A´-movement. In Mark Baltin and Anthony Kroch, (eds.), *Alternative conceptions of phrase structure*, 182-200. Chicago: University of Chicago Press.

Saito, Mamoru. 1992. Long distance scrambling in Japanese. *Journal of East Asian Linguistics* 1: 69-118.

Saito, Mamoru. 2004. Japanese scrambling in a comparative perspective. In David Adger, George Tsulas, and Cecile de Cat, (eds.), *Peripheries: Syntactic edges and their effects*, 143-163. Dordrecht: Kluwer Academic Publishers.

Saito, Mamoru. 2005. Further notes on the interpretation of scrambling chains. In Jan Sabel, and Mamoru Saito (eds.), *The free word order phenomenon*, 335-376. Berlin: Mouton de Gruyter.

Steedman, Mark. 1996. *Surface structure and interpretation*. Cambridge, MA: MIT Press.

Steedman, Mark. 2000. Information structure and the syntax-phonology interface. *Linguistic Inquiry* 31: 649-689.

Steedman, Mark. 2012. *Taking scope*. Cambridge, MA: MIT Press.

Steedman, Mark. and Baldridge, Jason. 2011. Combinatory Categorial Grammar. In Robert Borsley, and Kersti Börjars (eds.), *Non-transformational syntax*, 181-224. Oxford: Wiley-Blackwell.

Wexler, Ken and Peter Culicover. 1980. *Formal principles of language acquisition*. Cambridge, MA: MIT Press.

Wilder, Chris. 1999. Right node raising and the LCA. In Sonja Bird, Andrew Carnie, Jason D. Haugen, and Peter Norquest (eds.), *Proceedings of West Coast Conference in Formal Linguistics*, 586-598. Somerville, Massachusetts: Cascadilla Press.

Wilder, Chris. 2008. Shared constituents and linearization. In Kyle Johnson (ed.), *Topics in ellipsis*, 229-258. New York: Cambridge University Press.

Yatabe, Shûichi. 2001. The syntax and semantics of left-node raising in Japanese. In Dan Flickinger, and Andreas Kathol (eds.), *The Proceedings of the 7th International Conference on Head-Driven Phrase Structure Grammar*, 325-344. Stanford: CSLI Publications.

Jungmee Lee
Department of English Language and Literature
Sungkyunkwan University
25-2 Sungkyunkwan-ro, 40402 Faculty Hall, Jongno-gu, Seoul 03063, Korea
E-mail: jungmeelee@skku.edu

Received: 2017. 09. 18.
Revised: 2018. 02. 06.
Accepted: 2018. 02. 06.