A Domain-Based Analysis of the English Right Node Raising Construction

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Park, Sang-Hee. 2008. A Domain-Based Analysis of the English Right Node Raising Construction. *SNU Working Papers in English Linguistics and Language* 7, 23-43. This study attempts to explore the syntactic and semantic properties of the English Right Node Raising Construction (RNRC). While previous approaches have problems in capturing these properties, the domain ellipsis analysis of Beavers and Sag (2004) based on Reape's (1994) word order domain theory has proven to provide more precise explanations for both the problems of other approaches and the right-peripherality of the right-node raised element. This study extends Beavers and Sag's (2004) investigation by providing explanations for yet problematic cases of RNRC, involving prosodic ellipsis and wide scope reading of the rightmost quantifier. **(Seoul National University)**

Keywords: Right Node Raising, ellipsis, word order domains, prosodic constituent, compaction-driven semantic composition, wide scope reading

1. Introduction

The English Right Node Raising Construction (RNRC) has been considered as a problematic phenomenon among various types of coordinate constructions. A typical example of RNRC is shown in (1a).

(1) a. Bill likes, and Joe hates *the movie*[1].
  b. *Bill likes the movie, and Joe hates.

There are two striking features of RNRC. First, the rightmost element within the left conjunct is missing, and its overt counterpart obligatorily appears within the right conjunct. Second, whatever the rule behind RNRC is, it always removes the element in the left conjunct. As it is shown in (1b), the rule cannot be applied in the reverse direction.

1) Throughout this paper, right-node raised elements will appear in italics.

In the next chapter, I will examine how RNRC can be explained under three previous approaches.

2. Three Possible Ways of Approaching RNRC

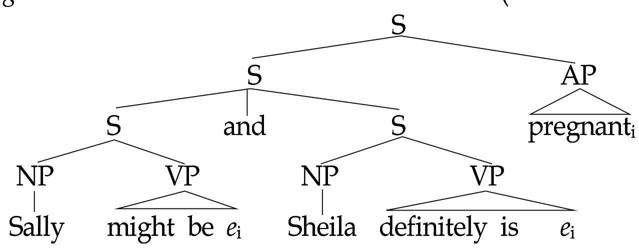
2.1 RNRC as a Movement

2.1.1 Ross (1967)

Ross (1967) assumes that RNRC is derived by the Across-the-Board (ATB) rule which takes a constituent on a right branch from every conjunct and adjoins one copy of it to the rightmost position. In Ross's analysis, for example, a sentence like (2a) is converted into (2b) by this rule.

(2) a. Sally might be pregnant, and everyone believes Sheila definitely is, pregnant.
  b. Sally might be, and everyone believes Sheila definitely is, *pregnant*. (Ross 1967: 175)

(3)



Under Ross's analysis, the existence of a gap in each conjunct is particularly important. Thus, if the rule does not remove a constituent from every conjunct in a coordinate structure, the resulting sentence would be ill-formed. The contrast between (4a) and (4b) below shows this strong requirement of the rule:

(4) a. Tom picked, and I washed, and Susie will prepare, *these grapes*.
  b. *Tom picked, and I washed some turnips, and Susie will prepare, *these grapes*. (Ross 1967: 177)

In the next subsection, I will discuss the problems of Ross's analysis.

2.1.2 Problems of Ross (1967)

The first problem of Ross's analysis is about the legitimacy of the rule itself, because the rightward ATB rule is inconsistent with his Coordinate Structure Constraint (CSC)[2]. Despite this contradiction between the two constraints, Ross gives no justification of why the ATB rule must be maintained yet.

Second, Ross's analysis cannot explain why the rightward ATB rule only removes the element at the rightmost position of each conjunct. Since leftward ATB movement in coordinate structures such as in (5a) can remove a constituent from any positions, the right-peripherality of the moved element in RNRC does not naturally follow his analysis in terms of the ATB rule.

(5) a. *Who*$_i$ did Kim see t_i coming and John see t_i leaving?
b. *Kim saw t_i leaving, but John didn't see t_i leaving, [*a friend of John*]$_i$.

Third, the relationship between the trace and its overt counterpart is not disturbed by syntactic Islands, which holds of leftward movement[3]. The following RNRC examples given in (6) show that the link between the trace and its overt counterpart holds beyond the Complex NP Island and the Adjunct Island:

(6) a. Mary buys, and Bill knows a man who sells, *pictures of Fred*. (Wexler and Culicover 1980: 299)
b. John gave a briefcase, and Harry knows someone who had given a set of steak knives, *to Bill*. (Levine 1985: 493)
c. John wonders when Bob Dylan wrote, and Mary wants to know when he recorded, *his great song about the*

2) The Coordinate Structure Constraint (Ross 1967: 161):
In a coordinate structure, no conjunct may be moved, nor may any element contained in a conjunct be moved out of that conjunct.

3) See also Wexler and Culicover (1980), Gazdar (1981), McCawley (1982), Levine (1985).

death of Emmett Till. (Ha 2006: 3)

Moreover, as Abbott (1976) points out, syntactic non-constituents can be right-node raised as follows:

(7) John offered, and Mary actually gave, a gold Cadillac to Billy Schwartz. (Abbott 1976: 649)

In sum, it is evident that RNRC cannot derived by movement, on the basis that the rule governing movement and the rule behind RNRC give rise to different consequences.

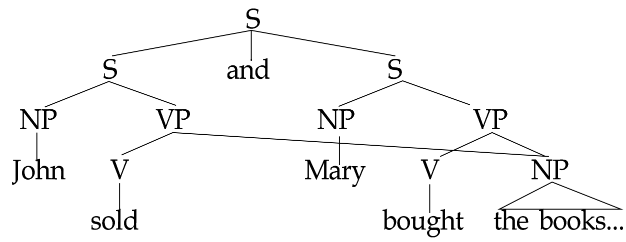
2.2 RNRC as a Multi-dominance

2.2.1 Phillips (2003)

Phillips's (2003) analysis of RNRC is based on the conception of multi-dominance; it is the assumption that phrase structures with nodes having more than one mother can be licensed by the grammar. Assuming this, Phillips proposes that RNRC is a coordination in which some rightmost elements are shared between conjuncts, such as in (8b).

(8) a. John sold and Mary bought *the books required for Linguistics 101.*

b.



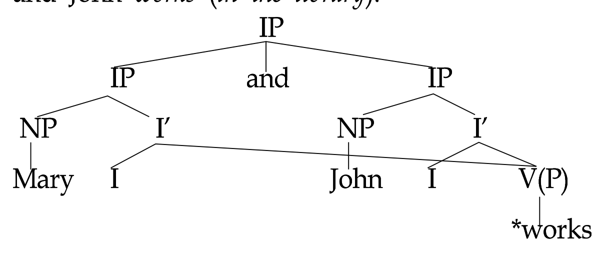
Another conceptual background of Phillips's analysis is his "incremental hypothesis". It is an assumption that phrase structure is built incrementally from left to right, and that in every stage of this process, a constituent can be built and possibly be destroyed by a newly established constituency. Based on this, Phillips proposes that conjuncts of RNRC are a sequence of strings that were constituent at one point of the derivation, which ends up as non-constituents in the final stage. Consider that the conjuncts in the following RNRC examples are all what can be constituents under Phillips's analysis.

(9) Wallace will give Gromit crackers before breakfast.
(10) a. [Wallace] and [Gromit] will give crackers before breakfast.
b. [Wallace will] and [Gromit probably won't] give crackers before breakfast.
c. [Wallace will give Gromit] and [Wendolene will give Preston] a shining new collar for walking about town.
d. [Wallace will give Gromit crackers] and [Wendolene will give Preston a dog food] before breakfast. (Phillips 2003: 48)

Assuming these conceptions, Phillips's analysis naturally captures the right-peripherality of RNRC, because when a new syntactic element is introduced to a coordinate phrase, it attaches to the rightmost position.

2.2.2 Problems of Phillips (2003)

One serious problem of Phillips's analysis is that it does not specify where the shared element would first be introduced to the multi-dominance structure. As a result, a sentence with coordinated NP subject can be misanalyzed as a sentential coordination in which the VP in each conjunct happens to share the mother. Thus, examples like (11a) would be wrongly predicted to be grammatical, because the agreement feature of I can be checked by the coordinated NP phrase and not by each NP it contains.

(11) a. *Mary and John *works* (*in the library*).
b.


Another problem is the theory of multi-dominance itself: how to linearize the shared element. For example, in (12), it gives rise to the problem of how to linearize *a large number of books*, since it can potentially appear either in the left or in the right conjunct.

(12) a. Mary sold and John bought *a large number of books*.
b. *Mary sold *a large number of books* and John bought.

Moreover, there is also the problem caused by the sloppy identity reading of the shared material. As it is noted by Ha (2006), a shared pronoun in RNRC can admit at least two distinct interpretations with respect to the R-expression it refers to. For example, the sentence in (13a) admits two different readings, roughly as in (13b) and in (13c). The availability of the reading of (13b) points to the fact that *his* is a bound variable[4], and needs to be bound by two distinct operators at the same time. However, Phillips's analysis can merely explain the reading of (13c), since it presupposes that a shared element is a single expression which appears only once at the relevant LF-representation.

(13) a. John likes but Bill hates his father.
b. John likes John's father, but Bill hates Bill's father.
c. John likes Bill's father, but Bill hates Bill's father.
(Ha 2006: 4)

It seems thus that the only way to explain the sloppy identity reading under Phillips's analysis is to hypothesize that the shared material can appear more than once at the relevant semantic representation. However, it is evident that this kind of approach cannot be preferred to other approaches assuming the standard syntax-semantics analogy.

2.3 RNRC as a PF-Reduction

2.3.1 Wilder (1997)

Wilder(1997) mainly proposes that the operation behind RNRC is Backward Deletion (BWD), which has the effect of deleting the phonetic

4) For more information about bound variables, see Williams (1977) and Reinhart (1983).

content of some rightmost element within the left conjunct. Under this analysis, the sentence in (14) seems to be derived by deleting the phonetic content of the rightmost DP in the left conjunct under the identity within its counterpart:

(14) John bought ~~the day's newspaper~~[5] and Sue read *the day's newspaper*. (Wilder 1997: 59)

Since BWD specifies possible deletion sites, Wilder's analysis correctly predicts the ungrammaticality of (15), in which deletion has been applied to the right conjunct:

(15) *John bought *the day's newspaper* and Mary read ~~the day's newspaper~~.

One crucial evidence for Wilder's analysis is examples with missing some part of a lexical word, such as in (16); here, some phonological contents of the word *input* and *undergenerates* are not realized, which suggests that the operation behind RNRC only affects phonological units:

(16) a. the in~~put~~ and the out*put* of this machine
b. Your theory under~~generates~~, and my theory over*generates*. (Wilder 1997: 86)

2.3.2 Problems of Wilder (1997)

Despite the advantages we observed in the previous subsection, Wilder's analysis has problems. First, BWD can be wrongly applied to sentences like (17a) to produce ungrammatical sentences like (17b):

(17) a. John is my favorite friend, and Mary is my favorite friend.
b. *John ~~is my favorite friend~~, and Mary *is my favorite friend*. (Chung 2006: (44))

Second, as noted by Yatabe (2001) and Sabbagh (2007), RNRC involving rightmost quantifier can have a wide scope reading, which does not

5) The use of strokes indicates the deletion of phonetic contents.

arise in its corresponding non-'RNRed' sentence. On the contrary, under the account in terms of BWD, the scope relations between two quantifiers in (18a) and (18b) below would be falsely predicted to be the same[6]:

(18) a. Some nurse gave a flu shot to, and administered a blood test for, *every patient*.
b. Some nurse gave a flu shot to every patient, and administered a blood test for every patient. (Sabbagh 2007: 365)

Third, phonological identity is not enough to license well-formed RNRC. Milward (1994) points out that identity of categories must be checked between the deleted element and its licensing counterpart. For example, in (19a), the deleted material and its counterpart are phonologically identical, but differ in syntactic categories. Besides, as the examples in (19b) and (19c) suggest, even when the categorial and phonological identities are met, BWD may still generate ill-formed strings:

(19) a. *John will ~~drive~~ and Mary built the *drive*. (Milward 1994: 936)
b. *At present the project managers ~~set the research priorities~~, but in the past the executive directors *set the research priorities*.
c. *Last year the major airlines ~~cut their prices quite dramatically~~, and every day numerous computer companies, *cut their prices quite dramatically*. (Pullum and Zwicky 1986)

Thus, it seems that RNRC cannot be derived under the PF-reduction approach.

3. Theoretical Background: Word Order Domains

While traditional analyses have agreed upon deriving linear order from terminals of syntactic trees, there has also been another tradition of

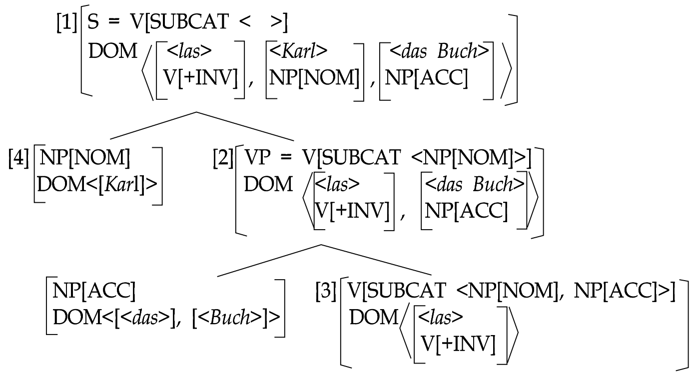
6) The same problem arises in all in-situ analyses including the multi-dominance approach. Under the movement approach, however, the moved quantifier can take scope over the entire coordinate structure, because it is structurally higher than the conjunction.

assuming a separate level of linguistic domain which is in charge of determining word order facts (Curry 1963; Gazdar et al. 1985; Dowty 1992; Reape 1994; Kathol and Pollard 1995; Kathol 2000)[7]. Word order domains developed within the framework of Head-Driven Phrase Structure Grammar (HPSG), advanced by Reape (1994), incorporates this ideas. In Reape's theory, such a level is carried by the feature DOM(ain), whose list-based value directly encodes the linear order of a given string.

To see how Reape's theory works, consider the following derivation of a German V1 sentence (Kathol and Pollard 1995: 174-175):

(20) a. Las Karl das Buch?
Read Karl the book
'Did Karl read the book?'

b.



In this representation, ordering requirements are specified within the value list of the feature DOM. For example, the linear order of elements of VP must appear as *las das Buch* at [2], since its domain specifies its values to appear in that order. However, when the domain list of this VP is combined with the single domain list of NP[4], syntactically non-adjacent elements are linearly ordered to produce *las Karl das Buch*.

In addition, the representation above displays two ways of integrating a sign's DOM value into that of its mother's. In some cases, NPs such as *das Buch* in (20b) give rise to a single domain object, in which no other domain objects can intervene the adjacency relations among the

7) In Dowty's (1992) terms, such a level represents the phenogrammatical structure, and the conventional phrase structure, the tectogrammatical structure, only represents hierarchical relations among syntactic elements.

elements within it. In other cases, a sign's order domain can be wholly contributed to its mother's domain list. Order freedom may arise when this option is chosen. As a result, the two elements within the domain list of VP[2] can appear non-adjacently when they are put in its mother's DOM list.

Two technical notes are in order. First, Kathol and Pollard (1995) note that the elements of the DOM list, i.e. the domain objects, contain the features SYNSEM and PHON[8], while signs are specified for the features SYNSEM, PHON, and DOM. This is because the DOM feature, necessary for signs, is superfluous for domain objects[9]. Second, to ensure a domain object to contain the relevant syntactic, semantic, and phonological content of the sign within which it is contained, the *compaction* operation is proposed (Kathol and Pollard 1995). Thus, when a sign is compacted into a domain object, the values of SYNSEM and PHON of that sign must appear within the new domain object.

4. Domain Ellipsis Analyses

In Section 2, we observed that none of the three previous approaches can correctly capture RNRC. Alternatively, I will show that the domain ellipsis approach can provide a more successful account on RNRC.

Theories for various coordinate structures within HPSG (Yatabe 2001; Crysmann 2003; Beavers and Sag 2004; Yatabe 2004; Chung 2006; Yatabe 2007) are based on the assumption that in apparent non-constituent coordinate constructions, the effect of losing the phonological content of some peripheral elements can be captured by eliding some domain objects which have the corresponding PHON values. In this way, RNRC can be treated as a syntactic constituent coordination, in which the phonological content of some rightmost elements within the left conjunct is missing.

In the following section, I will examine Beavers and Sag's (2004) analysis on RNRC and its problems.

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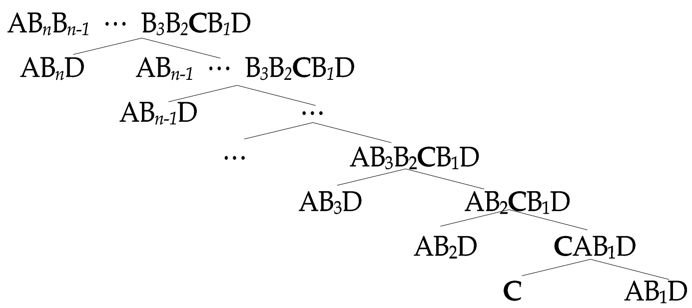
8) Since order domains contain ordering relations among elements, the PHON value of a phrasal sign will be determined by reading off the PHON value of domain objects of that sign in a left to right order.

9) In Reape's (1995) original proposal, domain objects are assumed to be signs.

4.1 Previous Analysis: Beavers and Sag (2004)

Beavers and Sag (2004) treat RNRC as an elliptical version of constituent coordination. Under this approach, various coordinate constructions are assumed to fall on the domain schema in (21). It produces binary branching coordinate structures of the form AB_nB_{n-1} ⋯⋯ $B_3B_2CB_1D$, where a conjunction C takes potentially infinite number of conjuncts of the form AB_iD.

(21)



(Beavers and Sag 2004: 19)

Depending on the type of coordination, the token identical elements within the domain lists A and D in each conjunct can be possibly empty. For example, when the involved coordination is ACC or coordination of unlikes such as in (22a) and (22b), the domain list D is empty and the right conjunct domain list A is elided. On the other hand, if the domain list A is empty and the left conjunct domain list D is elided, it is RNRC such as in (22c). The combination of ACC and RNRC such as in (22d) corresponds to the case where A and D are both elided. When A and D are both empty, constituent coordinate constructions given in (22e) are produced:

(22) a. John [gave his dog a bone] and [~~gave~~ his girlfriend a flower].
b. Chris [seems to be a Republican] and [~~seems to be~~ proud of it].
c. [Bill likes ~~the pizza~~] but [Mary dislikes *the pizza*].
d. John [told Mary that ~~Bill is a big fan of Nirvana~~], and [~~told~~ Kim that *Bill is a big fan of Nirvana*.

e. [Jan gave Tom a book] and [Mary sent John some cookies].

Beavers and Sag propose the following *conjunction-construction* (*cnj-cxt*)[10] to capture the various coordinate constructions in (22).

(23) *cnj-cxt* ⇒

$$\left[\begin{array}{ll} \text{MTR} & \left[\begin{array}{ll}\text{DOM} & \boxed{A}\oplus\boxed{B1}\oplus\boxed{C}\oplus\boxed{B2}\oplus\boxed{D}\\ \text{SYN} & \boxed{0}\end{array}\right] \\ \text{DTRS} & \left\langle \left[\begin{array}{ll} \text{DOM} & \begin{array}{l}\boxed{A}\left\langle \left[\begin{array}{ll}\text{FRM}&\boxed{F1}\\ \text{HD}&\boxed{H1}\end{array}\right],\ldots,\left[\begin{array}{ll}\text{FRM}&\boxed{Fn}\\ \text{HD}&\boxed{Hn}\end{array}\right]\right\rangle \oplus \boxed{B1}\, ne-list \\ \quad \oplus \left\langle \left[\begin{array}{ll}\text{FRM}&\boxed{G1}\\ \text{HD}&\boxed{I1}\end{array}\right],\ldots,\left[\begin{array}{ll}\text{FRM}&\boxed{Gm}\\ \text{HD}&\boxed{Im}\end{array}\right]\right\rangle\end{array} \\ \text{SYN}&\boxed{0}\\ \text{CRD} & - \end{array}\right], \left[\begin{array}{ll} \text{DOM} & \begin{array}{l}\boxed{C}\langle([\text{SYN } cnj])\rangle\oplus\left\langle \left[\begin{array}{ll}\text{FRM}&\boxed{F1}\\ \text{HD}&\boxed{H1}\end{array}\right],\ldots,\left[\begin{array}{ll}\text{FRM}&\boxed{Fn}\\ \text{HD}&\boxed{Hn}\end{array}\right]\right\rangle \\ \oplus\boxed{B2}\, ne-list \oplus \boxed{D}\left\langle \left[\begin{array}{ll}\text{FRM}&\boxed{G1}\\ \text{HD}&\boxed{I1}\end{array}\right],\ldots,\left[\begin{array}{ll}\text{FRM}&\boxed{Gm}\\ \text{HD}&\boxed{Im}\end{array}\right]\right\rangle\end{array} \\ \text{SYN}&\boxed{0}\\ \text{CRD} & + \end{array}\right]\right\rangle\end{array}\right]$$

for n, $m \geqq 0$ (Beavers and Sag 2004: 27)

In (23), the left conjunct DOM value corresponding to the right conjunct [D] and the right conjunct DOM value corresponding to the left conjunct [A] can be absent in the mother's DOM list. Various coordinate structures in (22) are licensed depending on which element is absent.

The use of the FORM (FRM) and the HEAD (HD) features in (23) is to ensure that the elided elements have identical morphological forms and head with their licensing counterparts. In this way, the following problematic sentences with Wilder's (1997) analysis are correctly predicted to be ungrammatical. In (24a), the elided element and its counterpart do not share HEAD and FORM values, and in (24b) and (24c), the elided elements and their counterparts have non-identical FORM values[11]:

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10) Here, the left daughter and the right daughter are required to be [CRD -] and [CRD +], respectively. This specifies whether the conjunct is marked for coordination ([CRD +]), or not ([CRD -]), ruling out strings like *[*and John*] [*and Mary*]. The CRD value of the mother is unmarked, allowing it to be either a right daughter embedded in a coordinate structure or a free-standing sign.

11) Sag et al. (2003: 247) assume that there is just one FORM value for past and present verbs, *fin*(*ite*). Under this assumption, then, (24b) and (24c) cannot be ruled out since

(24) a. *John will ~~drive~~ and Mary built the *drive*.
b. *At present the project managers ~~set the research priorities~~, but in the past the executive directors *set the research priorities*.
c. *Last year the major airlines ~~cut their prices quite dramatically~~, and every day numerous computer companies, *cut their prices quite dramatically*.

As it is noted by Chung (2006), however, the constraint in (23) causes an overgeneration problem, which also occurs under Phillips's (2003) and Wilder's (1997) analyses.

(25) *John ~~is my favorite friend~~ and Mary *is my favorite friend*.

In addition, as Chung (2006) points out, the constraint in (23) is too strong in that it requires conjuncts and their mother have identical SYN values, contrary to the fact that some SYN features such as PER(son), NUM(ber), AUX(iliary) can differ in the mother and in each daughter as in the following examples:

(26) a. Kim [likes bananas] and [is happy]. [AUX -] & [AUX +]
b. [You] and [I] may perjure ourselves. [PER 2] & [PER 1]
c. [The students] and [the professor Swansong] are meeting in the park. [NUM *pl*] & [NUM *sg*]

Moreover, the constraint illustrated in (23) does not capture the discussed examples of Wilder (1997) in (16), repeated below:

(27) a. the in~~put~~ and the out*put* of this machine
b. Your theory under~~generates~~, and my theory over*generates*.

In the next section, I will present how these problems can be resolved.

4.2 Revised Constraints

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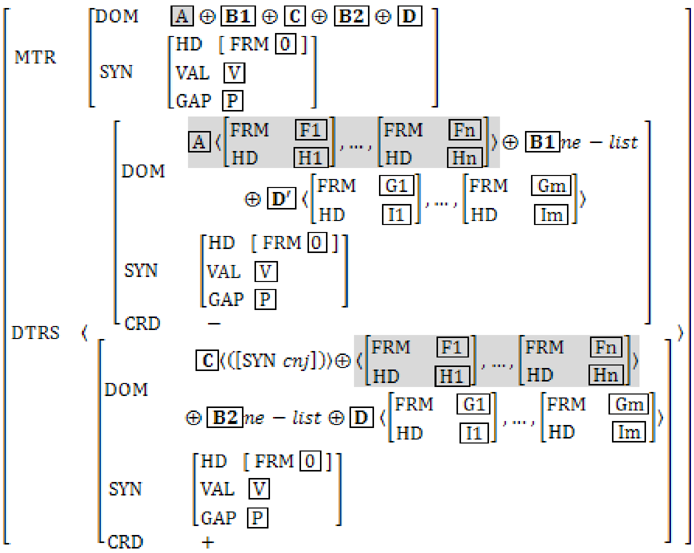
the elided element and its counterpart would have the same FORM values. Rather, paper follows Chung (2006): I assume that past and present morphemes have non-identical FORM values, *past*, and *pres(ent)*, which are subtypes of the type, *fin*.

Let us first consider the problem with respect to the SYN features. In Sag et al. (2003), it is noted that at least the SYN features FORM, VAL(ence), and GAP must be identified between the daughters and the mother in order to block the ill-formed sentences such as (28):

(28) a. *Dana walking and Kim ran. [FORM *prp*] & [FORM *pst*]
b. *Kim walks and run. [VAL<$NP_{[3sg]}$>] & [VAL<$NP_{[non\text{-}3sg]}$>]
c. *What did Kim buy and ate a banana?
[GAP<[1]>] & [GAP< >]

Based on this analysis, I present a new constraint, the *coordinate-construction* (*co-cxt*), which is a modified version of *cnj-cxt* in (23):

(29) *co-cxt* ⇒



This constraint requires only the values for FRM, VAL and GAP to be shared between conjuncts and mother. Thus, it correctly rules out examples in (28), while licensing examples in (26).

Another concern is how to correctly impose constraints so as to block the undesirable ellipsis in (25), repeated here as in (30):

(30) *John ~~is my favorite friend~~ and Mary *is my favorite friend*.

One less optimal solution would be to prevent the right-peripheral ellipsis of domain elements corresponding VP, so that a singular verb would not be linearized after a conjoined NP subject. However, VP ellipsis should be a viable option for sentences like (31):

(31) I think John ~~likes that movie~~, and Jan thinks Mary *likes that movie*.

Thus, It seems that the problematic cases are where the ellipsis removes a VP when the SYN elements corresponding to [B1] and [B2] of the *co-cxt* are singular NPs. In order to block this, I propose the following constraint:

(32) Constraint in number:
In *co-cxt*, [B1] must not be [HEAD *noun* [NUM *sg*]] if [A] is empty.

This constraint applies when the targeting structure is RNRC (i.e. when [A] is empty). It correctly rules out (30), since it contains an empty list [A] and an NP corresponding to [B1], whose number is singular.

For the third problem, I will employ a modified version of Yatabe's (2001) constraints, the *chop_right* and *add_synsem* operations[12)] in (33).

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12) Yatabe's original operations, the *chop_left* and the *add_synsem* are devised to explain Japanese left-node raising (LNR), such as in (i).

(i) [*Omoi*dasu ka] [~~omoi~~danasai ka] ga mondai da. (Yatabe 2001: 326)
recall-PRES-Q recall-NEG-PRES-Q NOM problem COP-PRES
'Whether (you) can recall (it) or (you) cannot recall (it) is the problem.'

Since LNR is a mirror image of RNRC, Yatabe's operations and the modified version in (33) are minimally different in the place of the removed element. However, my analysis and Yatabe's are fundamentally different. In Yatabe's analysis, examples such as (i) are directly licensed by the two operations, and a different operation is assumed for RNRC examples involving domain ellipsis. On the other hand, in my analysis, examples involving prosodic ellipsis and those involving domain ellipsis are both licensed by *co-cxt*, and the operations in (33) are intended to optionally apply to prosodic ellipsis.

(33) chop_right ([SYNSEM [1]
[a] ⊕ DOM [SYNSEM [2]
PHON [b]]] , [c])

= [SYNSEM [1]
DOM [a] ⊕ [SYNSEM [2]
PHON subtract_right[13]([b],[c])]]

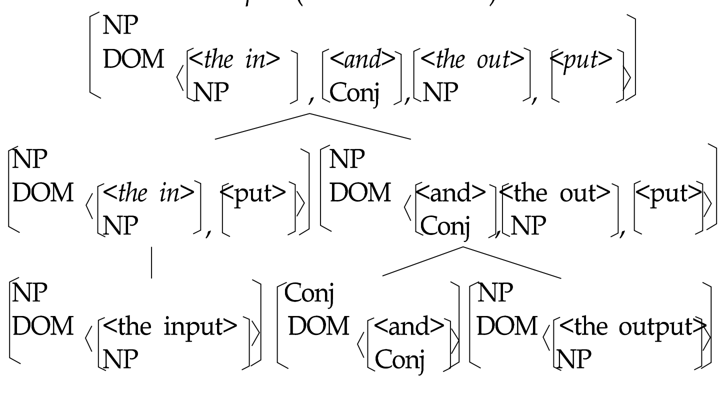
(34) add_synsem([k]) = [*dom-obj*
SYNSEM [CONT [LTOP none
INDEX none
EP < >
H-CONS{ }
H-STORE { }]
CAT [HEAD none
FORM none
COMPS < >]]
PHON [k]]

Here, [k], [b] and [c] represent lists of prosodic constituents. Chop_right ensures that a domain object whose PHON value is a list of prosodic constituent [b] is allowed to lose some prosodic constituent [c], part of the prosodic constituent [b]. Add_synsem takes this element, and converts it into a domain object

To illustrate how these operations account for the ellipsis of prosodic constituent, I provide the following domain structure:

(35) a. the in- and the out*put* (of this machine)

b.



13) In Yatabe (2001), subtract_left is defined only when [b] contains more elements than [c]. However, I assume that [b] and [c] in (33) can potentially be the same lists. The reason I assume this will be clear in Section 4.3.

The nodes in the middle show the situation where the chop_right and add_synsem operations have applied to each conjunct. The topmost node of this structure is then licensed by the *co-cxt* in (29), since the elements corresponding to [D′] and [D] are identified.

4.3 Compaction-driven semantic composition

As I noted in Section 2.3.2, RNRC containing a rightmost quantifier can admit an additional wide scope reading which is not allowed for its corresponding non-elided coordinate structure. Below, I repeat the example of Sabbagh (2006), appeared in (18):

(36) a. Some nurse gave a flu shot to, and administered a blood test for, *every patient.*
b. Some nurse gave a flu shot to every patient, and administered a blood test for every patient. (Sabbagh 2007: 365)

The wide scope reading of *every patient* in (36a) cannot be captured under the present ellipsis analysis, because the *co-cxt* in (29) only constrains domain objects.

In order to solve this problem, I note that adopting Yatabe's (2001) surface-oriented semantic composition theory is one possibility. This theory is basically to move the operation of semantic composition onto the level of Word Order Domains, so that the relationship between word order facts and semantic relations can be directly captured. This is achieved by the *total_compaction* operation in (37):

(37) total compaction :

$$
\begin{bmatrix}
\textit{sign} & \\
\text{SYNSEM} & \begin{bmatrix}
\text{CONT} & \begin{bmatrix}
\text{LTOP} & \boxed{0} \\
\text{INDEX} & \boxed{1} \\
\text{SEMHEAD} & \boxed{2} \\
\text{EP1} & \boxed{a_0} \\
\text{H-CONS} & \boxed{b_0} \\
\text{H-STORE} & \boxed{c_0}
\end{bmatrix} \\
\text{CAT} & \boxed{3}\,[\text{TO-BE-STORED}\ \boxed{4}]
\end{bmatrix} \\
\text{DOM} & \left\langle
\begin{bmatrix}
\text{SYNSEM} \mid \text{CONT} & \begin{bmatrix}
\text{EP} & \boxed{a_1} \\
\text{H-CONS} & \boxed{b_1} \\
\text{H-STORE} & \boxed{c_1}
\end{bmatrix} \\
\text{PHON} & \boxed{d_1}
\end{bmatrix}, \ldots,
\begin{bmatrix}
\text{SYNSEM} \mid \text{CONT} & \begin{bmatrix}
\text{EP} & \boxed{a_n} \\
\text{H-CONS} & \boxed{b_n} \\
\text{H-STORE} & \boxed{c_n}
\end{bmatrix} \\
\text{PHON} & \boxed{d_n}
\end{bmatrix}
\right\rangle
\end{bmatrix}
$$

$$
\Rightarrow
\begin{bmatrix}
\textit{dom-obj} & \\
\text{SYNSEM} & \begin{bmatrix}
\text{CONT} & \begin{bmatrix}
\text{LTOP} & \boxed{0} \\
\text{INDEX} & \boxed{1} \\
\text{EP} & \boxed{a_0} \oplus \ldots \oplus \boxed{a_n} \\
\text{H-CONS} & \boxed{b_0} \cup \ldots \cup \boxed{b_n} \cup \{\boxed{0} \geq \{\boxed{2}\} \uplus \ldots \uplus \boxed{c_n}\} \\
\text{H-STORE} & \boxed{4}
\end{bmatrix} \\
\text{CAT} & \boxed{3}
\end{bmatrix} \\
\text{PHON} & f(\boxed{d1}, \ldots, \boxed{dn})
\end{bmatrix}
$$

(Yatabe 2001: 334)

The total-compaction defines the relation between a sign and a domain object (*dom-obj*) that can be put into its mother. Roughly, it has the effect of gathering all the information contained within the CONT value of a sign and its domain objects, and of merging this information within the CONT value of their mother. What are of special importance about the constraint in (37) are the two features H-STORE (handle-store) and TO-BE-STORED. The former is used to achieve what the feature QSTORE performs in Pollard and Sag (1994). The value of the feature TO-BE-STORED is an empty or a single set of quantifier handles, introduced by individual quantifier lexeme. As the value of TO-BE-STORED and H-STORE are the same, the scope information of a quantifier introduced by TO-BE-STORED can be put in storage.

Given the total_compaction operation, the wide scope of quantifiers in examples such as (36a) can be captured by totally compacting the non-elided quantifier and the rest of the sentence, so that the quantifier can take scope over the entire coordination phrase. When the quantifier

(36a) admits individual quantification, it is phonological ellipsis[14]. On the other hand, the quantifiers in non-elliptical coordinate structures such as in (36b) must be compacted within each conjunct. In this case, then, the scope of the quantifier will be properly resolved conjunct-internally.

5. Conclusion

In this paper, I attempted to explicate the syntactic and semantic properties of RNRC. I revised three possible approaches in Section 2, and found that none of these can correctly capture the unique properties of RNRC. In Section 4, I examined the proposals and problems of the previous ellipsis analysis of Beavers and Sag (2004) and proposed some modifications to their analysis. I also presented that the wide scope reading of the rightmost quantifier can be captured by adopting Yatabe's (2001) compaction-driven semantic composition theory.

The proposed analysis has several advantages. First, it does not have the problems of the movement approach we observed in 2.1.2. Second, it can explain the sloppy identity interpretation of examples containing a rightmost pronoun. Third, as it was shown in 4.1, specific constraints can be imposed on the way domain objects are composed. As a result, undesirable ellipsis such as in (19) does not arise under the domain ellipsis approach.

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14) In this case, chop_right removes the phonological content of *every patient*, and add_synsem converts this element into a new domain object.

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