Medial left-node raising in Japanese

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Abstract

In this paper, it is demonstrated that there is a phenomenon that can be viewed as a mirror image of medial right-node raising and thus might be designated as *medial left-node raising*, and it is argued that the properties of this phenomenon are consistent with the predictions of the HPSG-based theory of non-constituent coordination first proposed in Yatabe (2001) and modified in later works such as Yatabe (2015).

1 Introduction

In a canonical right-node raising (RNR) construction, a string is shared by multiple phrases, typically conjuncts, and that string is pronounced at the right edge of the rightmost of those phrases, as in (1). Here and elsewhere, expressions shared by multiple phrases in this type of construction are shown in boldface.

(1) This tall and that short **student** are a couple.
(from Shen (2016))

It has been noted in the literature that a string that is shared by multiple phrases in an RNR construction is sometimes pronounced at a location other than the right edge of the rightmost of the phrases that share it. The sentence in (2) illustrates this phenomenon, which will be referred to as *medial right-node raising* in what follows. In this example, the string *boyfriend*, which is shared by two NPs (viz. *a new boyfriend* and *that ex-boyfriend you used to date*), is pronounced within the second of those NPs, but is not at its right edge.

(2) Are you talking about a new or that ex-**boyfriend** you used to date?
(from Chaves (2014))

In this paper, it will be demonstrated that there is a phenomenon which can be viewed as a mirror image of medial RNR and thus might be designated as *medial left-node raising (LNR)*, and it will be argued that the properties of this phenomenon are consistent with the predictions of the HPSG-based theory of non-constituent coordination first proposed in Yatabe (2001) and modified in later works such as Yatabe (2015).

What is going to be dealt with in this paper is not merely a descriptive issue within Japanese linguistics but is of theoretical import. As we will see in section 5 below, facts regarding medial RNR have been shown to have the potential of ruling out some theories of non-constituent coordination, but it has been unclear whether medial RNR is truly a grammatical phenomenon or a result of some kind of performance error. On the assumption that LNR and RNR are mirror images of each other, the view that medial RNR is allowed by grammar and not merely a type

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Table 1: The 4-point scale used in the questionnaires

rating	meaning of the rating
1	'The sentence is perfectly natural (under the intended reading).'
2	'The sentence is slightly unnatural (under the intended reading).'
3	'The sentence is considerably unnatural (under the intended reading).'
4	'The sentence is completely impossible (under the intended reading).'

of performance error predicts that medial LNR will be found in a language like Japanese, which, as we will see in section 2, allows canonical, non-medial LNR. It is less clear what is predicted by the view that medial RNR is a type of performance error, but this latter view is compatible with there being no medial LNR, since there is no reason to expect patterns of performance errors to have left-right symmetry. Thus, if medial LNR does not exist, it will be possible to argue on that basis for the latter view of medial RNR. One of the implications of what follows is that it is not possible to make such an argument.

2 Left-node raising in Japanese

It is shown in Yatabe (2001) that Japanese has what might be called left-node raising constructions, i.e. structures in which a string that is shared by multiple phrases, typically conjuncts, is pronounced only once at the left edge of the leftmost of those phrases. (3) is an example of this construction, and can be viewed as the result of applying LNR to (4). The compound verb *omoidas-* 'to recall' consists of a noun *omoi* 'thought' and a verb *das-* 'to exude', and what has been left-node-raised in (3) is its first half, which appears at the left edge of both disjuncts in (4).

(3) [[**Omoi**dasu ka] [dasanai ka]] ga mondai da. <12, 3, 1, 0>
[[recall-PRES or] ['exude'-NEG-PRES or]] NOM problem COP
'Whether you recall it or you don't is the problem.'

(4) [[Omoidasu ka] [omoidasanai ka]] ga mondai da.
[[recall-PRES or] [recall-NEG-PRES or]] NOM problem COP

The figures shown in angle brackets after (3) and other examples below are the result of questionnaire studies in which the respondents were asked to judge the acceptability of given sentences on the scale of 1 to 4 described in Table 1. Each sentence was accompanied by a description of what the intended reading of that sentence was, when the 4-point scale presented to the respondents contained the parenthesized expression in Table 1, i.e. the phrase "under the intended reading". The order of sentences was randomized for each respondent. The four figures shown after a sentence indicate the number of respondents who chose 1, 2, 3, and 4 respectively for that sentence. A sentence for which the mean acceptability rating was R is shown throughout this paper with no symbol if $1 \leq R < 2$, with '?' if

$2 \leq R < 2.5$, with '??' if $2.5 \leq R < 3$, with '?*' if $3 \leq R < 3.5$, and with '*' if $3.5 \leq R \leq 4$.

Choice of the 4-point scale is justified by the finding reported in Weskott & Fanselow (2011) that *n*-point scale data are no less informative than data gathered by the magnitude estimation method. On the other hand, the way the questionnaire results are classified into the five categories of "no symbol", "?", "??", "?*", and "*" is unavoidably arbitrary to a certain extent, and is meant to be merely a useful expedient.

The two questionnaires whose results are reported in this section were conducted in order to test the factual claims made in Yatabe (2001). In the first of the two questionnaires, there were three experimental sentences and 29 fillers (for the purpose of this paper), and 16 respondents. In the second questinnaire, there were six experimental sentences and 37 fillers (for the purpose of this paper), and 19 respondents.

Although Japanese is a so-called pro-drop language in which more types of expressions are omissible than in a language like English, part of a compound verb is generally not omissible, even when it is recoverable from the context. This is shown by the contrast between (5b) and (5c), which are both to be interpreted as responses to the question in (5a).

(5) a. Omoidashita?
recall-PAST
'Have you recalled it?'

b. Iya, omoidasanai. <12, 2, 1, 1>
no recall-NEG-PRES
'No, I don't recall it.'

c. ?? Iya, dasanai. <3, 3, 4, 6>
no 'exude'-NEG-PRES
'(Same as (5b))'

This observation lends support to the view that (3) above cannot be explained away simply as a case of context-dependent omission of part of a word.

The examples in (6) and (7) below, whose syntactic structure parallels that of (3) above, show that what licenses (3) is a mechanism of some generality, not some idiosyncratic properties of the particular lexical items involved.

(6) [[[**Sô yû toki ni**] **atari**chirasu ka] [chirasanai ka]]
[[[such occasion DAT] throw tantrums-PRES or] ['sprinkle'-NEG-PRES or]]
de, zuibun inshô ga chigaimasu yo. <17, 0, 1, 1>
INST considerably impression NOM differ-POL.PRES I tell you
'The impression you leave will be considerably different, depending on whether you throw tantrums on such occasions or you don't, I tell you.'

(7) [[[**Dasareta tabemono o**] **tabe**kireru ka] [kirenai
[[[serve-PASS-PAST food ACC] eat up-can-PRES or] ['cut'-can-NEG-PRES
ka]] ga wakaremichi desu. <11, 6, 1, 1>
or]] NOM crossroads COP.POL
'Whether you can eat up the food that you're served or you cannot is the deciding issue.'

The compound verb *atarichiras-* 'to throw tantrums' in (6) consists of two verb stems, *atar-* 'to bump' and *chiras-* 'to sprinkle', and what is left-node-raised in this sentence is the first part of that compound verb and a temporal adjunct that modifies the compound verb as a whole. Example (7) involves a compound verb *tabekir-* 'to eat up', which consists of two verb stems, *tabe-* 'to eat' and *kir-* 'to cut'; what is left-node-raised in this sentence is the first part of that compound verb and the complement of the compound verb.

As shown by the following examples, ellipsis of the first part of the compound verbs, *atarichiras-* and *tabekir-*, which appears to be involved in (6) and (7) above, is not licensed by mere pragmatic recoverability. (8b) can be, while (8c) cannot be used as an answer to the question in (8a); likewise, (9b) can be, but (9c) cannot be used as an answer to the question in (9a).

(8) a. Atarichirashita no?
throw tantrums-PAST NML
'Did you throw tantrums?'

b. Iya, atarichirasanakatta. <18, 1, 0, 0>
no throw tantrums-NEG-PAST
'No, I didn't throw tantrums.'

c. ?? Iya, chirasanakatta. <2, 3, 12, 2>
no 'sprinkle'-NEG-PAST
'(Same as (8b))'

(9) a. Tabekireta no?
eat up-can-PAST NML
'Were you able to eat it up?'

b. Iya, tabekirenakatta. <19, 0, 0, 0>
no eat up-can-NEG-PAST
'No, I couldn't eat it up'

c. ?* Iya, kirenakatta. <0, 4, 11, 4>
no 'cut'-can-NEG-PAST
'(Same as (9b))'

The data presented in this section point to the conclusion that Japanese allows LNR of part of a compound.

3 Medial left-node raising

In (3), (6), and (7) above, the left-node-raised string, which is shown in boldface, is at the left edge of the first of the two conjuncts that share it, and is missing from the left edge of the second conjunct. They are all instances of canonical, i.e. non-medial, LNR. If LNR is a mirror image of RNR, medial LNR, that is to say a phenomenon corresponding to (2), must be possible too; more specifically, it is expected that a left-node-raised string can be pronounced at a non-initial position within the initial conjunct as well. At the same time, it is expected to be impossible for a left-node-raised string to be missing from a non-initial position within a non-initial conjunct, since a right-node-raised string cannot be missing from a non-final position within a non-final conjunct, as shown by the following example, which is a result of right-node-raising the head noun *boyfriend* out of the two conjuncts in *that tall boyfriend you used to date or a new boyfriend*:

(10) *that tall you used to date or a new **boyfriend**

In other words, in the case of RNR, the pronunciation site, i.e. the location at which the shared string is pronounced, can be medial while the ellipsis site, i.e. the location from which the shared string is missing, cannot be medial, and it is expected that the same is true in the case of LNR, if the latter is truly a mirror image of the former.[1]

It turns out that cases of medial LNR can be found on the internet. The following, found at http://q.hatena.ne.jp/1427552124, is one such example.

(11) Ima to natte wa [[mare ni **omoi**dasu ka] [dasanai ka]] no
now [[rarely recall-PRES or] ['exude'-NEG-PRES or]] COP
kusare-kioku desu ga...
rotten memory COP.PRES although
'Although it is now a rotten memory that I either rarely recall or do not recall at all...'

This is a case of medial LNR, because the expression *mare ni* 'rarely' at the beginning of the initial conjunct is semantically incompatible with the second conjunct but precedes the left-node-raised string *omoi*. This observation lends support to the first of our hypotheses, namely the hypothesis that the pronunciation site of an LNR construction can be medial.

However, corpus evidence is hard if not impossible to obtain regarding our second hypothesis, namely the hypothesis that the ellipsis site of an LNR construction cannot be medial. Thus, two questionnaire studies were conducted in order to test the two hypotheses simultaneously.

(12) and (13) are the experimental sentences in the first of these questionnaires, in which there were two experimental sentences and 14 fillers (for the purpose of

[1] It has been claimed by some authors that the ellipsis site of RNR *can* be medial. We will come back to this point in section 5.

this paper), and 28 respondents. Both sentences involve LNR of the first part of the compound verb *omoidas-* 'to recall'.

(12) ? [[Sukoshi wa **omoi**dasu no ka], [dasanai no ka]], ga
[[at least a little recall-PRES NML or] ['exude'-NEG-PRES NML or]] NOM
mondai da. <10, 10, 4, 4>
problem COP
'Whether you recall it at least a little or you don't is the problem.'

(13) ?? [[Sukoshi mo **omoi**dasanai no ka], [sukoshi wa dasu no
[[at all recall-NEG-PRES NML or] [at least a little 'exude'-PRES NML
ka]], ga mondai da. <8, 6, 6, 8>
or]] NOM problem COP
'Whether you don't recall it at all or you do at least a little is the problem.'

Since the phrase *sukoshi wa* 'at least a little' at the beginning of (12) is a positive polarity item and is not semantically compatible with the second conjunct, which means 'you don't recall', we know that the phrase unambiguously belongs to the first conjunct. The left-node-raised expression in this example, i.e. the string *omoi-*, which is missing from the left edge of the second conjunct, follows this phrase within the first conjunct. Therefore the fact that (12) was rated as only slightly unnatural indicates that Japanese allows medial LNR.

In (13), which is also an instance of medial LNR due to the presence of the phrase *sukoshi mo* 'at all' at its beginning, the left-node-raised string *omoi-* is missing from a non-initial position within the second conjunct. Thus, the fact that (13) was rated as considerably unnatural if not completely impossible tends to confirm the hypothesis that an expression cannot be left-node-raised from a non-initial position within a non-initial conjunct.

The contrast between (12) and (13) is subtle, but the one-sided Wilcoxon signed-rank test showed that the difference in acceptability between (12) and (13) was statistically significant ($Z = 2.27$, $p \leq 0.05$). Furthermore, as will be explained below, the subtlety of the contrast was in fact part of the prediction of the theory being tested, i.e. the theory that the phenomenon that we are examining can be regarded as the mirror image of right-node raising.

On the one hand, medial right-node raising is often slightly awkward, as shown in Yatabe (2015) using questionnaire results involving medial RNR in Japanese. Thus, medial left-node raising, exemplified by (12), was expected to be slightly awkward as well. The less than perfectly acceptable status of sentences involving medial LNR or RNR can be interpreted as the result of the necessarily degraded structural parallelism between the conjuncts in such sentences.

And on the other hand, the example showing that the first part of the compound *omoidas-* is normally not elidable, i.e. example (5c), was in the "??" range, so the example of impossible left-node raising, i.e. (13), was predicted to be in the "??"

range, too. Sentences like (5c), (8c), (9c), and (13) are unnatural but not completely impossible probably because it is marginally possible for the verbs *das-* 'to exude', *chiras-* 'to sprinkle', and *kir-* 'to cut' to metaphorically signify something analogous to what is expressed by the verbs *omoidas-* 'to recall', *atarichiras-* 'to throw tantrums', and *tabekir-* 'to eat up' respectively. Given such an interpretation, the bimodality of the responses to (13) becomes understandable in the following way; this sentence is acceptable to those speakers who feel that the verb *das-* can metaphorically signify something analogous to what is expressed by the verb *omoidas-*, and it is not acceptable to those speakers who feel that the verb *das-* cannot be interpreted in that way.

A second questionnaire was conducted to test the same hypotheses that the first questionnaire tested using different compound verbs and relying on a different set of respondents. This questionnaire had four experimental sentences and 12 fillers (for the purpose of this paper), and 27 respondents. (14) and (15) are one of the two experimental sentence pairs in this second questionnaire. They can both be interpreted as involving LNR of a temporal modifier and the first part of the compound verb *atarichiras-*.[2]

(14) [[[**Sô yû toki ni**] sukoshi wa **atari**chirasu no ka],
[[[such occasion DAT] at least a little throw tantrums-PRES NML or]
[chirasanai no ka]] de, zuibun inshô ga
['sprinkle'-NEG-PRES NML or]] INST considerably impression NOM
chigaimasu yo. <14, 7, 4, 2>
differ-POL.PRES I tell you
'The impression you leave would differ considerably, depending on whether you throw tantrums at least a little on such occasions or you don't.'

(15) ?? [[[**Sô yû toki ni**] **atari**chirasu no ka], [sukoshi mo
[[[such occasion DAT] throw tantrums-PRES NML or] [at all
chirasanai no ka]] de, zuibun inshô ga
'sprinkle'-NEG-PRES NML or]] INST considerably impression NOM
chigaimasu yo. <4, 8, 12, 3>
differ-POL.PRES I tell you
'The impression you leave would differ considerably, depending on whether you throw tantrums on such occasions or you don't at all.'

The high rating of (14) shows that medial LNR is possible, and the low rating of (15) indicates that LNR is not possible from a non-initial position within a non-initial conjunct. The difference in acceptability between (14) and (15) was statistically significant ($Z = 3.43$, $p \leq 0.05$).

[2]These sentences can also be interpreted as involving LNR of *atari-* alone. In other words, the temporal modifier *sô yû toki ni* in these sentences can be interpreted as belonging only to the first conjunct.

Sentences (16) and (17) are the other experimental sentence pair in the second questionnaire. They can both be interpreted as involving LNR of an accusative NP and the first part of the compound verb *tabekir-*.[3]

(16) ? [[[**Dasareta tabemono o**] dônika kônika **tabe**kireru
[[[serve-PASS-PAST food ACC] somehow or other eat up-can-PRES
ka] [kirenai ka]] ga wakaremichi desu. <4, 16, 5, 2>
or] [‘cut’-can-NEG-PRES or]] NOM crossroads COP.POL
‘Whether you can somehow or other eat up the food that you’re served or you cannot is the deciding issue.’

(17) ?* [[[**Dasareta tabemono o**] **tabe**kireru ka]
[[[serve-PASS-PAST food ACC] eat up-can-PRES or]
[dô shite mo kirenai ka]] ga wakaremichi desu.
[for the life of you ‘cut’-can-NEG-PRES or]] NOM crossroads COP.POL
<0, 4, 13, 10>
‘Whether you can eat up the food that you’re served or you cannot for the life of you is the deciding issue.’

The difference in acceptability between (16) and (17) was statistically significant ($Z = 4.23$, $p \leq 0.05$). Sentence (16), which was rated as slightly unnatural but acceptable, is an instance of medial LNR, due to the presence of the positive polarity item *dônika kônika* ‘somehow or other’, which unambiguously belongs to the first conjunct but precedes part of the left-node-raised string. (17), which was rated as considerably unnatural, shows, together with (13) and (15), that LNR is not possible from a non-initial position within a non-initial conjunct.

The result of this second questionnaire was exactly as predicted by the theory, as was the result of the first questionnaire. The examples of medial LNR, i.e. (14) and (16), were expected to be slightly awkward, and they were found to be slightly awkward. Of the two examples of impossible LNR, the first one, i.e. (15), which was expected to be in the same range as (8c), i.e. the “??” range, was found to be in the “??” range, and the second one, i.e. (17), which was expected to be in the same range as (9c), i.e. the “?*” range, was found to be in the “?*” range.

Thus, the two hypotheses stated at the outset of this section were both confirmed. In an LNR construction in Japanese, the pronunciation site can be medial, but the ellipsis site cannot be medial, just as in an RNR construction. In other words, Japanese allows not only canonical, non-medial LNR but also medial LNR, which is a mirror image of medial RNR. Given these findings, we now have one fewer potential reasons to believe that instances of medial RNR are results of some kind of performance error and are in fact ungrammatical.

[3]These sentences can also be interpreted as involving LNR of *tabe-* alone.

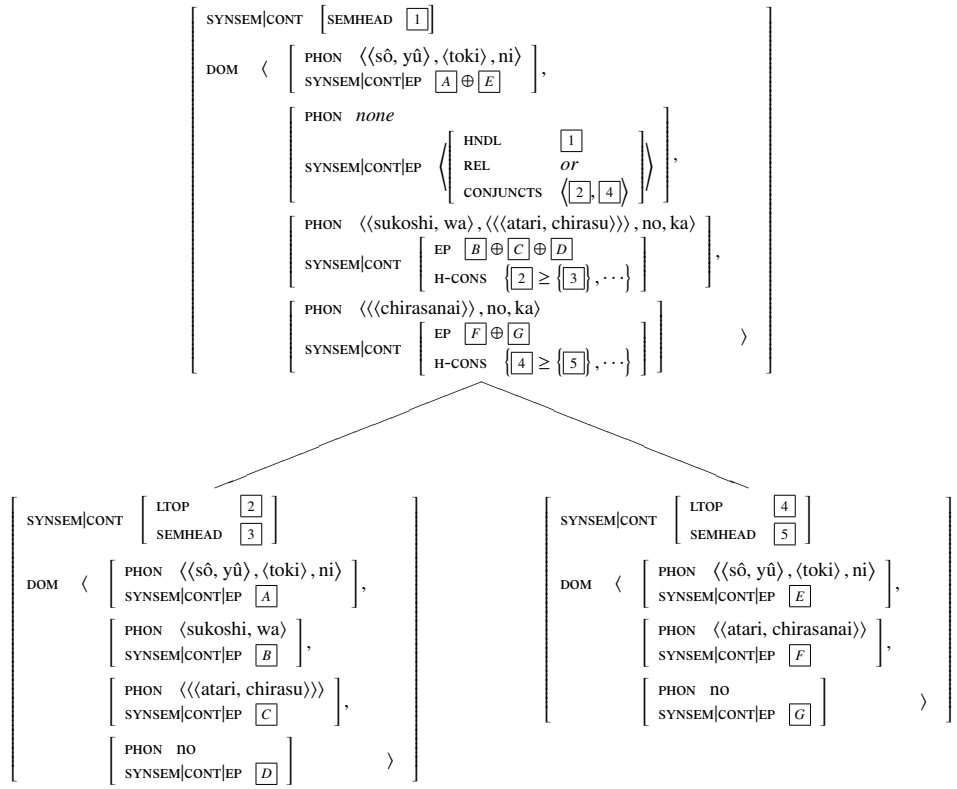

Figure 1: Part of the structure assigned to example (14) when the first half of the compound verb (namely *atari-*) and the temporal modifier (namely *sô yû toki ni*) are taken to have undergone phonological and syntactic LNR respectively

4 A linearization-based explanation

The HPSG-based theory of medial RNR and LNR proposed in Yatabe (2012) and slightly modified in Yatabe (2015) is fully compatible with the findings of this paper. According to this theory, there are two types of RNR and two types of LNR: a phonological kind of RNR and LNR that is merely prosodic ellipsis and a syntactic kind of RNR and LNR that involves merging of multiple domain objects that has the potential of affecting semantic interpretation. LNR of part of a compound must be phonological LNR, whereas LNR of things like a temporal modifier and an accusative NP may be either of the two types of LNR. Note that, pace Kubota & Levine (2015), there is nothing in this theory that is inconsistent with the long-known fact that RNR and LNR can affect semantic interpretation; Kubota and Levine's criticism of HPSG-based theories of non-constituent coordination is sound if read as a critique of the theory proposed in Beavers & Sag (2004), but not if read as an assessment of the theory under discussion, in which order domains are not mere phenogrammatical representations but principal carriers of semantic information (see Yatabe & Tam (2016)).

Figure 1 shows part of the structure assigned to example (14) in this theory when the temporal modifier *sô yû toki ni* is assumed to have undergone the syntactic type of LNR. The figure depicts the local subtree where two conjuncts, namely *sô yû toki ni sukoshi wa atarichirasu no* and *sô yû toki ni atarichirasanai no*, are conjoined by two instances of the coordinator *ka* to become a larger phrase *sô yû toki ni sukoshi wa atarichirasu no ka, chirasanai no ka*. Each node is associated with the the SYNSEM feature and the DOM feature. The value of the DOM feature is an order domain, which is a list of domain objects, each of which has the PHON feature and the SYNSEM feature. A coordinator like *ka* is assumed to be introduced into a syntactic structure by a linearization-related mechanism, and does not appear as a node in the syntactic tree (see Yatabe (2012)).

The first domain object in the order domain of the mother (pronounced "sô yû toki ni"), which represents the expression that has undergone the syntactic type of LNR, is the result of extracting the leftmost domain object from the order domain of each conjunct and merging those two domain objects, whose PHON values are identical with each other but whose SYNSEM values are not identical with each other because the two occurrences of this temporal adjunct modify different expressions. The second domain object is there to represent the meaning of disjunction, and has no phonological content. The third domain object (pronounced "sukoshi wa atarichirasu no ka") is the result of (i) compacting (i.e. turning into a single domain object) the first daughter with its leftmost domain object (which has undergone syntactic LNR) removed, and then (ii) adding *ka* as the last element of the PHON value of the newly created domain object. And the fourth domain object (pronounced "chirasanai no ka") is the result of (i) applying phonological LNR to (i.e. eliding) the string *atari* at the left edge of the domain object "atari chirasanai" in the order domain of the second daughter (which became the leftmost domain object in that order domain when the domain object "sô yû toki ni" was syntactically left-node-raised out of it), (ii) compacting the second conjunct thus altered, and then (iii) adding *ka* as the last element of the PHON value of the newly created domain object.

Sentence (14) satisfies the constraints on medial LNR that are stated in Yatabe (2012), irrespective of whether the temporal modifier *sô yû toki ni* is taken to have been (i) syntactically left-node-raised as in Figure 1, (ii) phonologically left-node-raised as in Figure 2, or (iii) part of the first conjunct alone all along rather than part of the left-node-raised string. According to Yatabe (2012), medial LNR is allowed only if all the left-node-raised expressions can be made to line up at the left edge of the order domain of the initial conjunct by removing one or more domain objects. The left-node-raised expressions in the example do line up at the left edge of the order domain of the initial conjunct if one domain object (namely the one to be pronounced "sukoshi wa") is removed, in the first two of the three scenarios above, and if two domain objects (namely "sô yû toki ni" and "sukoshi wa") are removed, in the third scenario.

Impossible cases of LNR and RNR in which the ellipsis site is medial are correctly ruled out by a generalized version of the Persistence Constraint. The Persis-

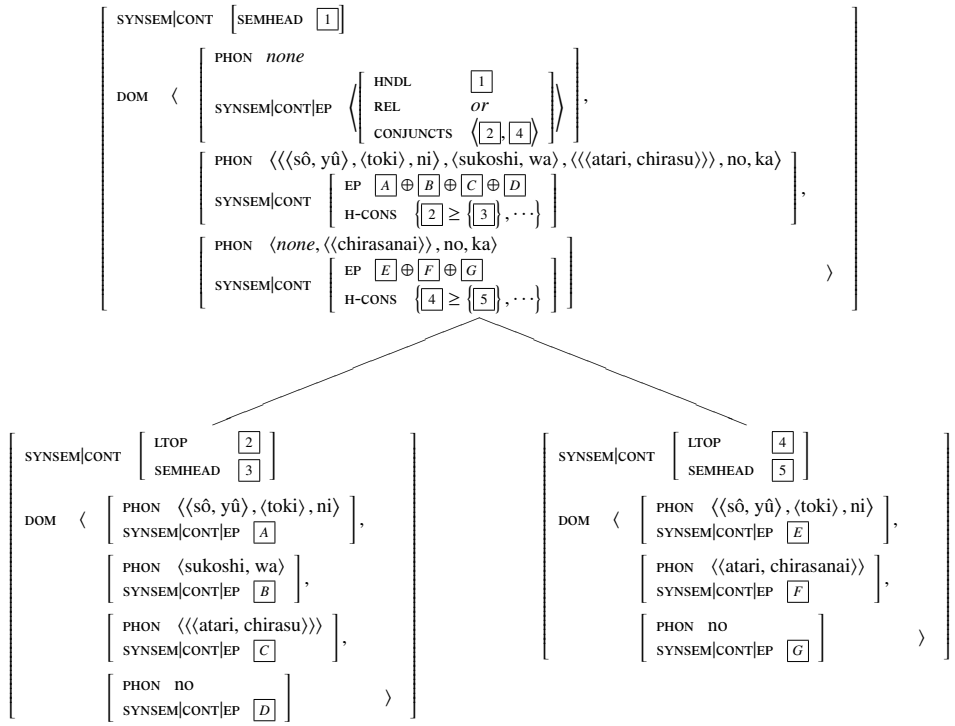

Figure 2: Part of the structure assigned to example (14) when the first half of the compound verb (namely *atari-*) and the temporal modifier (namely *sô yû toki ni*) are both taken to have undergone phonological LNR

tence Constraint as it is formulated in Kathol (1995) is shown in (18).

(18) Any ordering relation that holds between domain objects α and β in one order domain must also hold between α and β in all other order domains that α and β are members of.

This constraint can be generalized in the following way, using the term *string* to refer to any contiguous part of the PHON value of a domain object.

(19) Any ordering relation that holds between strings α and β in one order domain must also hold between α and β in all other order domains that α and β are both contained in.

What this constraint says is that the order of strings can never be reversed once it is fixed inside some order domain. Here is how this generalized version of the Persistence Constraint rules out example (10) (**that tall you used to date or a new boyfriend*), which is a result of combining (20) and (21) and right-node-raising the noun *boyfriend*.

(20) that tall boyfriend you used to date

(21) a new boyfriend

In the order domain corresponding to (20), the string *boyfriend* precedes the string *you used to date*. However, after the two phrases (20) and (21) are combined into one order domain corresponding to (10), the string *boyfriend* comes to *follow* the string *you used to date*, thus violating the generalized version of the Persistence Constraint. It is easy to see that this constraint is violated whenever the ellipsis site is medial in an RNR or an LNR construction.

In contrast, canonical RNR and LNR and medial RNR and LNR such that the pronunciation site is medial but the ellipsis site is not are consistent with the generalized version of the Persistence Constraint. Take, for example, the coordinate structure inside (2), namely *a new or that ex-boyfriend you used to date*, which is a result of combining (22) and (23) and right-node-raising *boyfriend*.

(22) a new boyfriend

(23) that ex-boyfriend you used to date

The string *a new* precedes the string *boyfriend* throughout, that is, both in the order domain of the first conjunct and in the order domain of the coordinate structure as a whole. Similarly, *that ex-* precedes *boyfriend*, and *boyfriend* precedes *you used to date* throughout, that is, both in the order domain of the second conjunct and in the order domain of the coordinate structure as a whole. Thus, there are no two strings whose order is reversed in violation of the generalized version of the Persistence Constraint. The constraint is likewise satisfied in all the other acceptable examples that have been discussed in this paper.

5 Comparison with other theories

In contrast to the theory advocated here, theories of medial RNR proposed within the framework of Categorial Grammar (CG), such as those described in Whitman (2009), Kubota (2014), and Warstadt (2015), arguably cannot be applied to the data presented in section 3. In these theories, a right-node-raised or left-node-raised string is assumed to be located outside the relevant coordinate structure. Thus, if they are to be applied to (14), for example, it will be necessary to assume that the coordinate structure here is of the form (*sô yû toki ni*) *sukoshi wa chirasu no ka chirasanai no ka*, and that the string *atari* is infixed into it when the left-node-raised string and the coordinate structure are combined. This is an unnatural assumption, and when such an assumption is made, the low acceptability of example (15) becomes a mystery, because in this analysis a degree modifier like *sukoshi mo* and *sukoshi wa* must be allowed to combine with an incomplete verb like *chirasanai* and *chirasu* to form a grammatical and hence conjoinable unit. Thus, these theories, which are shown in Yatabe (2015) to be unable to account for the full range

of facts involving medial RNR,[4] have trouble dealing with medial LNR as well.

The theory proposed in Maxwell & Manning (1996) is another theory of non-constituent coordination that is unable to deal with medial RNR and LNR in an appropriate fashion. This theory is based on LFG and utilizes what the authors refer to as finite-state rules, which license phrases such as NPs and VPs that are missing their left edge and/or the right edge. Phrases that are missing the same type of string at their left and/or right edge are allowed to be coordinated with each other, and the resulting structure involving non-constituent coordination is then combined with the kinds of strings that each of the non-constituent conjuncts is missing at its left and/or the right edge. As the authors note, this way of licensing non-constituent coordination naturally does not allow medial RNR or LNR. The theory employs the HPSG-style SLASH mechanism as well because the finite-state rules alone cannot generate all cases of canonical, non-medial RNR, but this additional mechanism still does not allow the theory to generate any instance of medial RNR or LNR. It is not clear in what way the SLASH mechanism is intended to be incorporated into the LFG setup, but if the standard type of SLASH mechanism is employed, then an additional problem arises, since such a theory allows the ellipsis site to be medial, while not allowing the pronunciation site to be medial.

The properties of medial RNR and medial LNR that we have been discussing are problematic for the theory proposed in Chaves (2014) as well. Chaves argues that there are three distinct categories of grammatical phenomena that have all been referred to as right-node raising: (i) phenomena involving VP ellipsis or N′ ellipsis, (ii) phenomena involving across-the-board extraposition, which could affect semantic interpretation, and (iii) phenomena involving prosodic ellipsis, which does not affect semantic interpretation. The first of these three categories clearly should be distinguished from the rest, and will be ignored in the remainder of the discussion. At first blush, there seems to be little difference between this theory and the theory proposed in Yatabe (2001) and modified in Yatabe (2012); the latter theory also distinguishes two types of RNR, as noted in the previous section, and treats one type of RNR (the syntactic type of RNR) using the same mechanism that it uses to deal with extraposition. However, there turn out to be important differences between the two theories.

First, prosodic ellipsis that is postulated in Chaves's theory is allowed to delete a string that is not at the edge of any phrase. In other words, his theory makes the wrong prediction that not only the pronunciation site but also the ellipsis site can be medial. More specifically, the schema presented in Chaves (2014, (128)) states, in effect, that a sequence of morphophonological units X can be omitted if (i) it precedes another sequence of morphophonological units Y that has the same morph form as X and (ii) there are one or more morphophonological units before X and also between X and Y. Let us see what prediction this theory makes concerning the sentence shown in (24).

[4] In Yatabe (2015), it is shown that the theories of medial RNR proposed in Whitman (2009), Kubota (2014), and Warstadt (2015) are all incapable of dealing with an example like (2).

(24) In this country, the second Tuesday of every month, which is a weekday, is an election day, and as a result of that, the second Tuesday of every month is important.

A parenthetical like *which is a weekday* and a long subject like *the second Tuesday of every month* are likely to be phrased as separate intonational phrases (see Gussenhoven (2004, p. 287)), so (24) is likely to be pronounced as in (25), where each bracketed string is an intonational phrase.

(25) [In this country], [the second Tuesday of every month], [which is a weekday], [is an election day], [and as a result of that], [the second Tuesday of every month] [is important].

Consequently, Chaves's theory predicts incorrectly that the first occurrence of the phrase *the second Tuesday of every month* in (24) can be omitted, as in (26).

(26) *In this country, which is a weekday, is an election day, and as a result of that, **the second Tuesday of every month** is important.

Second, Chaves's theory treats the potentially meaning-changing type of RNR, which he claims is across-the-board extraposition, using the SLASH mechanism, whereas in my theory extraposition and syntactic RNR (as well as syntactic LNR) are viewed as involving dislocation of domain objects. As a result, in Chaves's theory, this second type of RNR is also predicted to allow the ellipsis site to be medial. This prediction itself is not necessarily problematic; it may not lead to overgeneration if it is assumed, for example, that only complements and right-adjoined adjuncts are extraposable in English.[5] However, the theory makes analogous predictions when applied to left-node raising, and those predictions are clearly incorrect. Consider the following example, taken from Kubota & Levine (2015).

(27) I **said different things to** Robin on Thursday and Leslie on Friday.

This sentence has a reading in which it means "What I said to Robin on Thursday was different from what I said to Leslie on Friday." If we are to generate that reading by applying the mirror-image version of Chaves's theory to LNR, we need to assume that (27) involves SLASH-mediated dislocation of a verb (*said*) and of its object (*different things*) and prosodic ellipsis (or, less plausibly, SLASH-mediated dislocation) of the preposition *to*. Given the way Chaves's theory deals with the semantics of phrases like *different things*, it is not possible to view this sentence as involving SLASH-mediated dislocation of a partial VP of the form *said different things* or *said different things to*; the phrase *different things* must be treated as having been dislocated as an independent unit. Thus, unless some additional constraint

[5]Postal (1998, p. 194–195) argues that the prediction in question is in fact correct. His argument, however, is inconclusive, because it is based on the assumption that Heavy NP Shift cannot apply to a prepositional object, an assumption that is disputed in Rochemont & Culicover (1990, p. 191).

is added to it, the theory predicts that the sentence in (28), which involves SLASH-mediated dislocation of *different things* (but not SLASH-mediated dislocation of *said* or prosodic ellipsis of *to*), is also allowed by the grammar.

(28) *I **different things** said to Robin on Thursday and said to Leslie on Friday.

Shown below is the structure that can be assigned to this example according to the theory under discussion.

(29) *I [different things]$_i$ [[said t_i to Robin on Thursday] and [said t_i to Leslie on Friday]].

In the structure in (29), the two gaps corresponding to the dislocated grammatical object are in medial positions within the VPs, but that should not be a problem according to the theory. Thus, it turns out that Chaves's theory of RNR cannot be applied to LNR in a simple fashion.

There is a further problem with the theory that this second, potentially meaning-changing type of RNR involves filler-gap dependency mediated by the SLASH mechanism. Since what has been dislocated out of a phrase using the SLASH mechanism is necessarily pronounced outside that phrase, this theory predicts that the pronunciation site of meaning-changing RNR cannot be medial whereas the pronunciation site of meaning-preserving RNR can be medial. This prediction turns out to be also incorrect. It has been shown by Kubota (2014) and Warstadt (2015) that the pronunciation site of meaning-changing RNR can be medial, just like the pronunciation site of meaning-preserving RNR. (30) is the example that Warstadt uses to establish this point.[6]

(30) Carl Philip Emmanuel Bach secretly hid or donated **every manuscript in his father's collection** to the library. (Many of the former type remain lost, while the latter are well preserved.)

In this example, the right-node-raised expression, i.e. *every manuscript in his father's collection*, is in a medial position within the second disjunct, and the interpertation of the sentence, in which the universal quantifier takes wide scope over disjunction, is different from the only possible interpretation of the corresponding sentence in which the quantifier has not been right-node-raised, viz. *Carl Philip Emmanuel Bach secretly hid every manuscript in his father's collection or donated every manuscript in his father's collection to the library*.

6 A revision of the linearization-based theory

As it turns out, the theory proposed in Yatabe (2012) also incorrectly predicts that the pronunciation site of meaning-changing RNR cannot be medial, and hence

[6]Not all native speakers of English find this example perfectly acceptable under the intended reading, although here I will assume that it is grammatical under that reading.

does not fare any better than Chaves's theory in this regard. This is because the theory contains a stipulation to the effect that medial RNR and LNR can only be the phonological type of RNR and LNR respectively. It was noted in Yatabe (2015) that this stipulation needs to be excised from the theory, but it was not stated exactly how that could be done.

The problematic stipulation is contained in the following statement, which was given in (29) of Yatabe (2012).

(31) $\text{pnr\_dom}\left(\left\langle \boxed{1}, \cdots, \boxed{n} \right\rangle, \boxed{D_0}, \boxed{f}\right) \equiv$
$\left(\boxed{A_L} \neq \langle\rangle \quad \vee \quad \boxed{A_R} \neq \langle\rangle \quad \vee \quad \boxed{B_L} \neq \langle\rangle \quad \vee \quad \boxed{B_R} \neq \langle\rangle\right)$
$\wedge \quad \text{syn\_pnr}\left(\left\langle \boxed{1} \right\rangle \bigcirc \cdots \bigcirc \left\langle \boxed{n} \right\rangle, \boxed{H}, \left\langle \boxed{l_1}, \cdots, \boxed{l_n} \right\rangle, \left\langle \boxed{r_1}, \cdots, \boxed{r_n} \right\rangle\right)$
$\wedge \quad \text{phon\_pnr}\left(\boxed{H}, \boxed{G}, \boxed{B_L}, \boxed{B_R}\right)$
$\wedge \quad \text{totally\_compact\_each}\left(\boxed{G}, \boxed{F}\right)$
$\wedge \quad \text{add\_conjunction}\left(\boxed{F}, \boxed{E}, \boxed{f}\right)$
$\wedge \quad \text{fuse\_each}\left(\left\langle \boxed{l_1}, \cdots, \boxed{l_n} \right\rangle, \boxed{A_L}, \boxed{f}\right)$
$\wedge \quad \text{fuse\_each}\left(\left\langle \boxed{r_1}, \cdots, \boxed{r_n} \right\rangle, \boxed{A_R}, \boxed{f}\right)$
$\wedge \quad \boxed{D_0} : \boxed{A_L} \oplus \boxed{E} \oplus \boxed{A_R}$

This statement defines a relation that may or may not hold among the list of daughter signs ($\left\langle \boxed{1}, \cdots, \boxed{n} \right\rangle$), the order domain of the mother ($\boxed{D_0}$), and a phonologically empty domain object which is produced by the phrase-structure schema for coordinate structures and which carries the meaning of conjunction or disjunction ($\boxed{f}$). A local subtree in a syntactic phrase-structure tree has the option of being licensed by virtue of satisfying this constraint as opposed to other, more usual types of constraint, which license structures that do not involve any RNR or LNR.

Let us use the word *peripheral-node raising (PNR)* as a cover term for RNR and LNR. When a given local subtree is licensed by virtue of satisfying the constraint in (31), the licensed structure is going to involve some type of PNR. In (31), $\boxed{A_L}$, $\boxed{A_R}$, $\boxed{B_L}$, and $\boxed{B_R}$ denote syntactically left-node-raised material, syntactically right-node-raised material, phonologically left-node-raised material, and phonologically right-node-raised material, respectively. Notice that line 2 of (31) requires that at least one of the four tags should denote something other than an empty list.

What (31) as a whole dictates can be stated in ordinary English in the following way. Syntactic PNR deletes a list of domain objects at the right (or left, respectively) edge of each daughter (line 3 of (31)), fuses those lists of domain objects item by item to create a possibly modified list of domain objects (lines 7 and 8 of (31)), and places the resulting list of domain objects at the right (or left, respectively) edge of the order domain of the mother (line 9 of (31)). Phonological PNR simply deletes some phonological material at the right (or left, respectively) edge of non-final (or non-initial, respectively) daughters, on condition that the same phonological material is contained in the final (or initial, respectively) daughter (line 4 of (31)). Those parts of each daughter node that do not undergo syntactic or

phonological PNR are totally compacted and become a single domain object (line 5 of (31)), and the newly created domain objects, each corresponding to one of the daughter nodes, are placed in the order domain of the mother (line 9 of (31)), after possibly having a coordinator added to their PHON values (line 6 of (31)).

The reader is referred to Yatabe (2012) for the definitions of the relations *syn_pnr*, *phon_pnr*, *totally_compact_each*, *add_conjunction*, and *fuse_each*, which are used in (31) above.

The last line of (31) states that the syntactically left-node-raised expressions, i.e. $\boxed{A_L}$, have to be placed at the left edge of the order domain of the mother, and that the syntactically right-node-raised expressions, i.e. $\boxed{A_R}$, have to be placed at the right edge of the order domain of the mother. This is what produces the incorrect prediction that medial RNR and LNR can only be of the phonological type. Thus, (31) needs to be replaced by (32), which is identical to (31) except in lines 3, 7, 8, and 9.

(32)
$$\begin{aligned}
&\text{pnr_dom}\left(\left\langle \boxed{1}, \cdots, \boxed{n} \right\rangle, \boxed{D_0}, \boxed{f}\right) \equiv \\
&\left(\boxed{A_L} \neq \langle\rangle \quad \vee \quad \boxed{A_R} \neq \langle\rangle \quad \vee \quad \boxed{B_L} \neq \langle\rangle \quad \vee \quad \boxed{B_R} \neq \langle\rangle\right) \\
&\wedge \quad \text{syn_pnr}\left(\left\langle \boxed{1} \right\rangle \bigcirc \cdots \bigcirc \left\langle \boxed{n} \right\rangle, \boxed{H}, \left\langle \boxed{U_1} \oplus \boxed{T_1} \right\rangle \oplus \boxed{S_L}, \boxed{S_R} \oplus \left\langle \boxed{T_n} \oplus \boxed{U_n} \right\rangle\right) \\
&\wedge \quad \text{phon_pnr}\left(\boxed{H}, \boxed{G}, \boxed{B_L}, \boxed{B_R}\right) \\
&\wedge \quad \text{totally_compact_each}\left(\boxed{G}, \boxed{F}\right) \\
&\wedge \quad \text{add_conjunction}\left(\boxed{F}, \boxed{E}, \boxed{f}\right) \\
&\wedge \quad \text{fuse_each}\left(\left\langle \boxed{T_1} \right\rangle \oplus \boxed{S_L}, \boxed{A_L}, \boxed{f}\right) \\
&\wedge \quad \text{fuse_each}\left(\boxed{S_R} \oplus \left\langle \boxed{T_n} \right\rangle, \boxed{A_R}, \boxed{f}\right) \\
&\wedge \quad \boxed{D_0} : \boxed{U_1} \oplus \boxed{A_L} \oplus \boxed{E} \oplus \boxed{A_R} \oplus \boxed{U_n}
\end{aligned}$$

The last line of the new definition states that the sequence of syntactically left-node-raised expressions, i.e. $\boxed{A_L}$, may be preceded by some domain objects coming from the left edge of the order domain of the first daughter, i.e. $\boxed{U_1}$, and that the sequence of syntactically right-node-raised expressions, i.e. $\boxed{A_R}$, may be followed by some domain objects coming from the right edge of the order domain of the last daughter, i.e. $\boxed{U_n}$. This allows a sentence like (30), as desired.

The proposed analysis predicts correctly that medial RNR in Japanese cannot be meaning-changing, unlike medial RNR in English. The following three sentences, taken from Yatabe (2015), illustrate this property of medial RNR in Japanese.

(33) [Kyôko wa] [Pari de] [muji no] [masshiro na], soshite [Jirô wa] [aoi moyô no] **o-sara o** [Honkon de], **sorezore kônyû shita no desu**. <11, 6, 1, 1>
[Kyoko TOP] [Paris in] [plain COP] [pure white COP] and [Jiro TOP] [blue pattern COP] plate ACC [Hong Kong in] individually bought NML COP

'Kyoko bought pure white plates without patterns in Paris, and Jiro bought plates with blue patterns in Hong Kong, the two of them acting individually.'

(34) ?[Kyôko wa] [Pari de] [muji no] [masshiro na], soshite [Jirô wa]
[Kyoko TOP] [Paris in] [plain COP] [pure white COP] and [Jiro TOP]
[Honkon de] [aoi moyô no], [**gôkei jû-mai ijô no**] **o-sara o**
[Hong Kong in] [blue pattern COP] [in total ten or more] plate ACC
sorezore kônyû shita no desu. <4, 6, 5, 4>
individually bought NML COP
'Kyoko bought pure white plates without patterns in Paris, and Jiro bought plates with blue patterns in Hong Kong, buying ten or more plates in total between them and the two of them acting individually.'

(35) *[Kyôko wa] [Pari de] [muji no] [masshiro na], soshite [Jirô wa]
[Kyoko TOP] [Paris in] [plain COP] [pure white COP] and [Jiro TOP]
[aoi moyô no], [**gôkei jû-mai ijô no**] **o-sara o** [Honkon de],
[blue pattern COP] [in total ten or more] plate ACC [Hong Kong in]
sorezore kônyû shita no desu. <0, 2, 4, 13>
individually bought NML COP
'(Same as (34))'

Sentence (33) is an instance of meaning-preserving medial RNR,[7] and sentence (34) is an instance of meaning-changing non-medial RNR. Both sentences are more or less acceptable. In contrast, sentence (35) is an instance of meaning-changing medial RNR, and it is not acceptable. The constraint in (32) correctly captures this pattern. In sentence (35) and other cases of meaning-changing medial RNR in Japanese, the string that belongs only to the last conjunct (the phrase *Honkon de* in the case of (35)) but follows a syntactically right-node-raised expression (the phrase *gôkei jû-mai ijô no o-sara o* in the case of (35)) is in turn followed by another syntactically right-node-raised expression (the phrase *sorezore kônyû shita no desu* in the case of (35)). This is not permitted by the constraint in (32); according to the constraint, when a syntactically right-node-raised expression is followed by a sequence of expressions that belong only to the last conjunct, that sequence of expressions cannot in turn be followed by another syntactically right-node-raised expression.[8] Unlike (35), sentence (33) is possible because the medial RNR of the phrase *o-sara o* in this example is meaning-preserving and hence can be of the phonological type.

The effects of the constraint stated in (32) overlap extensively with those of

[7]More specifically, sentence (33) involves meaning-preserving medial RNR of the phrase *o-sara o* and meaning-changing non-medial RNR of the phrase *sorezore kônyû shita no desu*.

[8]Unlike the theory that is sketched in Yatabe (2015, section 3), the theory proposed here does not simultaneously account for the fact (noted in Yatabe (2007)) that conjuncts are scope islands in Japanese but not in English.

(19). There is probably a better, more succinct way to state this constraint that reduces that overlap. Investigation of that possibility will be left for future occasion.

7 Summary

In this paper, it has been shown that there is a phenomenon that is essentially a mirror image of medial right-node raising and thus might be designated as medial left-node raising. It has also been shown that, in both RNR and LNR, the ellipsis site cannot be medial while the pronunciation site (i.e. the surface position of the left-node-raised or right-node-raised string) can be medial. It was observed that these findings are consistent with the linearization-based theory proposed in Yatabe (2012) and modified in later works and are inconsistent with theories that are based on Categorial Grammar mechanisms and with theories that employ the SLASH mechanism to deal with RNR and LNR. In the penultimate section, a modification of the linearization-based theory was proposed that eliminates the incorrect prediction that medial RNR can only be of the phonological type.

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