Dependent string deletion in Japanese gapping

Abstract

In this paper, we develop a new analysis of gapping in Japanese within Williams' (1997) theory of Coordinate Ellipsis and Dependent Ellipsis, as further articulated in Ackema and Szendröi (2002), in order to investigate the form and function of PF-deletion processes involved in the derivation of this construction. Specifically, we propose that gapping in Japanese is best characterized by *Dependent String Deletion*, an operation on the strings in the PF component whose applicability is sensitive to the prior application of the Coordinate Ellipsis of the topmost coordinating head (e.g., Cs, Ts, or Ns) in the gapped conjunct. We show that this analysis allows for by far the most empirically adequate account for the major grammatical properties of Japanese gapping, including the island-insensitivity of gapping remnants, the linear order-sensitive distribution of postposition-/case particle-drop in final positions in the gapped clause, the restriction of gapping to true coordination structures headed by *sosite* 'and', and the insensitivity of gapping to syntactic constituency as well as morphological word boundaries in a restricted range of semantically conditioned environments. We also compare our analysis with Mukai's (2003) theory of gapping in Japanese which similarly adopts String Deletion as its critical elliptic process. We identify two empirical areas of comparison – undergeneration and overgeneration – which support our own definition of String Deletion over Mukai's formulation.

Keywords: gapping, coordinate ellipsis, dependent string deletion, island, non-constituent deletion

1. Introduction

In this paper, we develop a new analysis of gapping in Japanese within Williams' (1997) theory of Coordinate Ellipsis and Dependent Ellipsis, as further articulated in Ackema and Szendröi (2002), in order to investigate the form and function of PF-deletion processes

involved in the derivation of this construction. Specifically, we propose that gapping in Japanese is best characterized by *Dependent String Deletion*, an operation whose applicability is sensitive to the prior application of the Coordinate Ellipsis of the topmost coordinating head (e.g., Cs, Ts, or Ns) in the gapped conjunct. We show that this analysis allows for by far the most empirically adequate account for the major grammatical properties of Japanese gapping, some pointed out in the literature and others reported for the first time in this paper, including, but not limited to, the island-insensitivity of gapping remnants, the linear order-sensitive distribution of postposition-/case particle-drop in final positions in the gapped clause, the restriction of gapping to true coordination structures headed by *sosite* 'and', and the insensitivity of gapping to syntactic constituency as well as morphological word boundaries in a restricted range of semantically conditioned environments.

We also compare our analysis with Mukai's (2003) theory of gapping in Japanese which similarly adopts String Deletion as its critical elliptic process. We identify two empirical areas of comparison – undergeneration and overgeneration – which support our own definition of String Deletion over Mukai's formulation.

We conclude this paper by exploring some theoretical implications of our analysis for the nature of PF-deletion and the syntax-phonology interface. We compare the results of our investigation into gapping with those arrived at in Sato and Maeda's (to appear) String Deletion-analysis of the so-called particle stranding ellipsis. We conclude that String Deletion is a fully general deletion process that, in principle, may apply either rightward from the left edge of a prosodic constituent such as Intonational Phrase (as in particle stranding ellipsis) or leftward from the right edge of the same prosodic constituent (as in Japanese gapping).

The present paper is organized as follows. In section 2, we provide a brief overview of the theory of Coordinate Ellipsis and Dependent Ellipsis proposed in Williams (1997) and extended by Ackema and Szendröi (2002). In section 3, we present our definition of Dependent String Deletion as a PF operation that is parasitic on the prior application of the Coordinate Ellipsis in Williams' sense to the highest coordinating head in the gapping

construction (such as Cs, Ts and Ns) to delete a string of words under identity with the previous occurrence of the same string. We show that this theory provides a principled explanation for the core properties of gapping in Japanese, some noted previously in the literature and others pointed out for the first time in this paper, including, but not limited to, a) the island-insensitivity of gapped remnants, b) massive violations under gapping of standard syntactic constituency requirements imposed on other ellipsis processes, c) invasion of gapping into complex morphological words, and d) the availability of case-/particle-omission in the final position of non-gapped conjuncts.

In section 4, we compare our theory with the existing theory of gapping developed by Mukai (2003), who similarly adopts String Deletion in her analysis of the same construction, albeit with a different set of conditions imposed on its application. We show that, due to several lenient conditions that she suggests to govern the application of String Deletion, Mukai's version faces problems of overgeneration as well as undergeneration. We demonstrate how these problems can be successfully resolved under our own analysis, which has the architectural property to condition the application of String Deletion in consultation with both phonological and semantic identity. Section 5 is the conclusion.

2. Coordination and dependency in the derivation of gapping in English

In this section, we will present a concise summary of Williams' (1997) theory of Coordinate Ellipsis and Dependent Ellipsis to lay the groundwork for our analysis of Japanese gapping proposed in section 3.

Williams (1994, 1997) hypothesizes that a coordinate structure arises from the projection of a bivalent lexical item of the general form depicted in (1). Note that the template in (1) is underspecified for the nature of X. Thus, English grammar, for example, allows a variety of bivalent heads, including [C, C], [T, T], and [V, V], as shown in (2a–c), respectively.

(1)   [X, X] P $\rightarrow$ XP and XP (Williams 1997:620)

(2) a. [C, C] P= CP and CP

   [$_{CP}$ That the Earth revolves around the Sun] and [$_{CP}$ that the Moon revolves around

   the Earth] are well-established facts.

   b. [T, T] P = TP and TP

   I think that [$_{TP}$ John will eat meat] and [$_{TP}$ Mary will drink wine].

   c. [V, V] P = VP and VP

   It is okay to [$_{VP}$ like fish] and [$_{VP}$ hate meat].   (Ackema and Szendröi 2002:6)

Adopting this bivalent hypothesis, Williams (1997) proposes that gapping is nothing but

another instance of the projection of this double-headed coordinate verb. Specifically,

gapping arises just when the second of the two heads is null, as shown in (3a–c), yielding C-

gapping, T-gapping and V-gapping, respectively.

(3) a. [C, 0] P = CP and 0P

   That the Earth revolves around the Sun and 0_C the Moon revolves around the Earth

      are well-established facts.

   b. [I, 0] P = IP and 0P

   I think that John will eat meat and Mary 0_T drink wine.

   c. [V, 0] P = VP and 0P

   It is okay to eat fish on Fridays and 0_V meat on Wednesdays.

                                     (Ackema and Szendröi 2002:6)

   Williams further argues that the null head obtained through Coordinate Ellipsis itself

can license further ellipsis. In (4a), the verb in the second conjunct undergoes Coordinate

Ellipsis as the by-product of the [V, 0] P → VP and 0P rule. The 0_V, in turn, licenses the

ellipsis of the goal complement of the null head, as shown in (4b). The ill-formedness of (4c)

shows that this additional DP ellipsis is possible only if the verb is null. Ackema and

Szendröi (2002:7) thus refer to this type of ellipsis as Dependent Ellipsis to highlight the observation that its application is dependent on the prior application of Coordinate Ellipsis.

(4) a.   John gave Mary a book today and 0_V Sue a record yesterday.

b.   John gave Mary a book today and 0_V 0_{DP} a record yesterday.

c. * John gave Mary a book today and bought 0_{DP} a record yesterday.

d. * John gave Mary$_i$ a book today and 0_V her$_i$ a record yesterday.

e.   John gave Mary a book today and bought her$_i$ a record yesterday.

((4a-e) adopted from Ackema and Szendröi 2002:7, based on Williams 1997:621, 622)

Williams (1997) postulates the Disanaphora Law as a general principle governing deletion. This principle requires that an elided element in an elliptical conjunct be referentially dependent on the structurally parallel element in a full-fledged antecedent conjunct whereas its overt counterpart must not in the same context. Thus, in (4b), the elided DP complement, 0_{DP}, has to be interpreted as anaphoric to its counterpart in the antecedent clause, *Mary*. If the complement of the null head is not elided, on the other hand, the principle requires that it must not be referentially dependent on its overt antecedent, as shown by the ungrammaticality of (4d), where *her* cannot refer back to *Mary*. Note that the Disanaphora Law manifests itself only in the presence of Coordinate Ellipsis. Thus, in (4e), *her* in the second conjunct can refer back to *Mary* without any loss of grammaticality because this sentence has not undergone Coordinate Ellipsis.

Williams points out that Coordinate Ellipsis licenses the application of Dependent Ellipsis not only of the whole complement of the null head but also of just the head of that complement, yielding what appears to be a non-constituent gapping configuration. Example (5) is a case in point, where the 0_V, the result of Coordinate Ellipsis, licenses the Dependent Ellipsis of just the head of its nominal complement. As stated above, the Disanaphora Law kicks in in this elliptical example to ensure that the null nominal head refers back to pictures, and not, for example, photos.

(5) John saw pictures of Mary on Tuesday and 0_V [$_{NP}$ 0_N of Sue] on Wednesday.

<div align="right">(Williams 1997:623)</div>

3. Dependent string deletion in Japanese gapping

Having built the groundwork for our new theory of gapping, let us start this section with an outline of our theory of Dependent String Deletion. We assume that Japanese gapping involves coordination, in which the head of the first conjunct undergoes obligatory Coordinate Ellipsis, as schematically illustrated in (6).[1]

(6) [Subject-ga … 0_V] (sosite) [Subject-ga … V]

This assumption readily explains the observation that Japanese gapping is available only in coordinate structures headed by *sosite* 'and', whether it is phonologically manifested or not (Kato 2006). Example (7a) is grammatical because it involves coordination by *sosite* 'and'. Examples (7b–d), on the other hand, are ruled out because the coordinate structures there involve some other conjunction markers such as *atode* 'after', *toki* 'when', *demo/keredomo* 'but', and *matawa* 'or'.

(7)   a.   John-ga   hon-o   **sosite**   Mary-ga   hana-o   katta.

        John-NOM   book-ACC   and   Mary-NOM   flower-ACC bought

        'John bought books and Mary bought flowers.'

    b. * John-ga   hon-o   **atode/toki**, Mary-ga   hana-o   katta.

        John-NOM   book-ACC   after/when Mary-NOM   flower-ACC bought

        'After/when John bought books, Mary bought flowers.'

    c. * John-ga   hon-o   **demo/keredomo/sikasi** Mary-ga   hana-o   katta.

        John-NOM   book-ACC   but/but/however   Mary-NOM flower-ACC bought

        'John bought books, but Mary bought flowers.'

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[1] We will come back to gapping cases which involve coordination of other categories such as CPs and NPs in section 4 when we compare our analysis with Mukai's (2003) alternative.

d. * John-ga   hon-o   **matawa/aruiwa/mosikuwa** Mary-ga   hana-o   katta.

   John-NOM book-ACC or/or/or   Mary-NOM flower-ACC bought

   'John bought books, or Mary bought flowers.'   (Kato 2006: 6, 8, 10)

Kato's (2006) observation is an immediate consequence of our proposed extension of Williams' (1997) Coordinate Ellipsis to Japanese gapping if the construction in question must involve at minimum the projection of the bivalent head of the form [0, V]P (or heads above the VP projection), the first head of which is null. The construction, then, simply cannot be derived with any other conjunction marker.

   We propose now that archetypal cases of gapping in Japanese, as illustrated in (8), are derived through an additional process of Dependent Ellipsis whose application is parasitic on the prior application of Coordinate Ellipsis (cf. Williams 1997, Ackema and Szendröi 2002).

(8)   [John-ga   Bob-ni   ~~zassi-o~~ 0_V] (**sosite**)   [Mary-ga   Kate-ni

        John-NOM Bob-DAT   magazine-ACC   and   Mary-NOM Kate-DAT

       zassi-o   katta].

       magazine-ACC   bought

       'John bought a magazine for Bob and Mary bought a magazine for Kate.'

However, departing from Williams (1997) and Ackema and Szendröi (2002), we argue that the Dependent Ellipsis is not operated in syntax, but in the PF component based on linear adjacency. Given that syntactic Dependent Ellipsis applies to the complement of the null head, syntactic Dependent Ellipsis cannot easily accommodate gapping cases like (9) (see also section 3.3 for relevant discussions on examples akin to (9)).

(9)   Syoosetu-*(o)$_i$ Maki-(ga) t_i,   zassi-o$_j$ Yuki-ga t_j katta.

       novel-ACC   Maki-(NOM)   magazine-ACC   Yuki-NOM   bought

       '(Intended.) Maki bought a novel, and Yuki bought a magazine.'

In (9), the direct object is scrambled out of VP. If Dependent Ellipsis were operated on the complement of the null head V, it would be expected that the object, which originates in the complement position of the verb, might as well undergo Dependent Ellipsis and omit its particle. However, as (9) shows, omitting the accusative case particle of the scrambled object is not allowed. Instead, what undergoes optional Dependent Ellipsis in this example is the subject, which is, syntactically speaking, not in the complement position of the verb. These observations suggest that dropping a particle from a non-final remnant within the gapped conjunct results in ungrammaticality (see also Abe & Hoshi 1997, Kim 1998).

Abandoning the syntactic Dependent Ellipsis and respecting the linear-sensitivity of Dependent Ellipsis, we now propose that archetypal cases of verb gapping in Japanese, as shown in (8) and (9), are derived through an additional process of String Deletion whose application is parasitic on the prior application of Coordinate Ellipsis. Under our present analysis, the derivation of the V-gapping examples in (8) and (9) actually involves two steps. The V head in the first conjunct is realized as 0_V by virtue of the application of Coordinate Ellipsis. The V head, in turn, licenses further ellipsis of the particle of the object/subject in the same conjunct to yield the surface string – a process which we will henceforth call *Dependent String Deletion*. Our definition of this process is given in (10). See Kageyama (1993), Fukui and Sakai (2003), Mukai (2003), An (2007, 2016), and Sato and Maeda (to appear) for some earlier statements of a string-based deletion process; see also sections 4 and 5 for pertinent discussions on this operation and the kind of conditions imposed on this rule.

(10)　Dependent String Deletion in the Phonological Component

String Deletion is a PF deletion operation that applies to a contiguous phonetic string in a phonological representation under identity with another occurrence of the same string. String Deletion is dependent when its application is constrained under the condition of string adjacency by the output of other elliptic processes such as Coordinate Ellipsis.

In the rest of this section, we demonstrate that our new theory of Dependent String Deletion provides a unified explanation for core properties of gapping in Japanese, including the island-insensitivity of gapping remnants (section 3.1), the immunity of gapping to syntactic constituency requirements imposed on other ellipsis constructions (section 3.2), and the string-sensitive distribution of particle omission within the gapped conjunct (section 3.3).

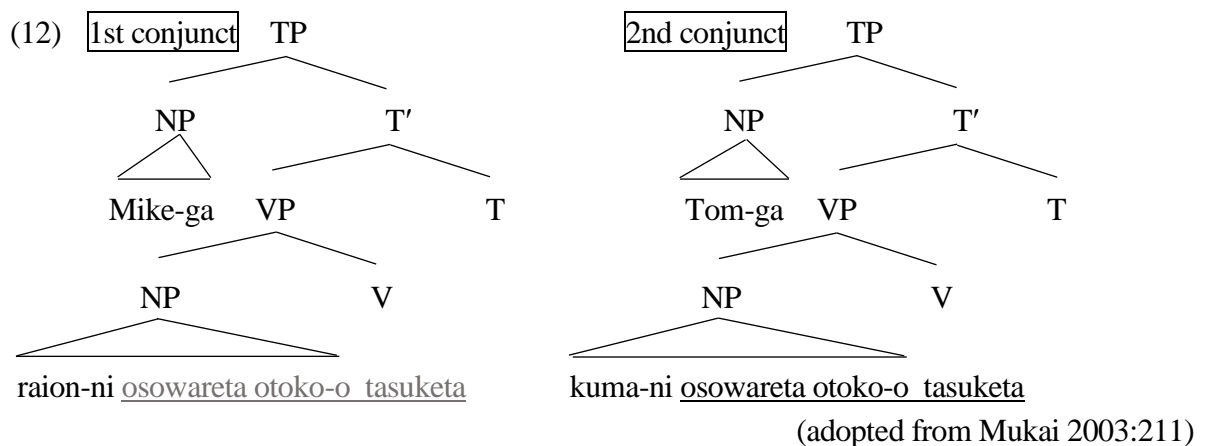### 3.1.　*Japanese gapping is island-insensitive*

Mukai (2003) observes that gapping in Japanese is insensitive to island effects, an observation that argues against any movement-based analysis of the construction (Saito 1987; Abe & Hoshi 1997). Consider examples (11a, b).

(11)　a. * Raion-ni$_i$　Mike-ga　　t_i osowareta　　otoko-o　　 tasuketa.

　　　　　lion-DAT　Mike-NOM　　was.attacked　man-ACC　　saved

　　　　　'Mike saved the man who was being attacked by a lion.'

　　　b.　Mike-ga　　raion-ni, Tom-ga　kuma-ni　osowareta　　otoko-o　　tasuketa.

　　　　　Mike-NOM　lion-DAT Tom-NOM bear-DAT　　was.attacked　man-ACC　　saved

　　　　　'Mike saved the man who was being attacked by a lion, and Tom saved the man who was being attacked by a bear.'　　　　　　　((11b) from Mukai 2003:210)

Example (11a) shows that the extraction of the dative argument *raion-ni* 'lion-DAT' to the sentence-initial position from within its containing DP results in the violation of the so-

called complex DP island constraint. Suppose now that the derivation of the example in (11b) involves the same extraction of the dative argument from the complex DP structure headed by the noun *otoko-o* 'man-ACC' to some position above the VP, so that it escapes the subsequent PF-deletion of the VP. Any movement-based theory of gapping, then, would wrongly predict that (11b) should be ungrammatical on a par with (11a).

Mukai (2003) proposes that an in-situ deletion analysis in terms of String Deletion provides a principled answer to the island-insensitivity of gapping to the relevant constraint: the dative arguments within the two conjuncts do not undergo any syntactic movement but instead stay literally in-situ throughout the derivation, as shown in (12).

(12)   1st conjunct   TP

NP   T′

Mike-ga   VP   T

NP   V

raion-ni <u>osowareta otoko-o tasuketa</u>

2nd conjunct   TP

NP   T′

Tom-ga   VP   T

NP   V

kuma-ni <u>osowareta otoko-o tasuketa</u>

(adopted from Mukai 2003:211)

Mukai (2003:211) assumes that "String Deletion applies to a phonetic string, regardless of its syntactic constituency" under string adjacency. She further assumes that "the only structural condition on String Deletion is that the target string is continuous and contains a verb." (See section 4 for our critical review of this condition.) In (12), the underlined portion of the first conjunct – *osowareta otoko-o tasuketa* 'saved the man who was attacked' – is identical to the underlined portion of the second conjunct, and hence String Deletion may apply to the former,

even though the target of this operation is not a syntactic constituent. We follow Mukai's String Deletion analysis of the island-insensitivity of gapping here.[2].

3.2. *Japanese gapping can target non-syntactic constituents*

The second property of Japanese gapping n is that the derivation of this construction shows signs of massively violating standardly postulated constituency requirements imposed on ellipsis, a point which we take to provide further empirical support in favor of the String Deletion analysis. Here, we note that this violation comes in two forms: the violation of syntactic constituency and the violation of morphological wordhood.

Let us start with examples showing that gapping in Japanese may ignore syntactic constituent boundaries. Example (13a) is a baseline example in which the direct object contains the genitive-marked nominal *Tomo-no* 'Tomo-GEN' in the specifier of the NP headed by

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[2] Abe & Hoshi (1997) and Abe & Nakao (2012) argue that Japanese gapping is island-sensitive, contrary to Mukai's observation.

(i) a.?? Harry-ga   imiron,   sosite   Alfonse-ga toogoron-o   kenkyuusiteiru
        Harry-NOM   semantics and   Alfonse-NOM syntax-ACC is.studying
        gengogakusya-ni   atta.
        linguist-DAT   met
        'Harry met a linguist who studies semantics and Alfonse met a linguist who studies syntax.'
   b.?? John-ga   suugaku, sosite Mary-ga   eego-o   benkyoosuru maeni syokuzisita.
        John-NOM   math   and   Mary-NOM   English-ACC study   before ate
        'John ate a meal before he studied math and Mary ate a meal before she studied English.'
                                                   (Abe and Hoshi 1997:115, with judgments as reported)

(ii) a. * John-wa   kuma-ni, sosite Mary-wa raion-ni Bill-ga   osowareta   koto-o
         John-TOP bear-DAT and   Mary-TOP lion-DAT Bill-NOM was.attacked fact-ACC
         minna-ni   itta.
         everyone-DAT told
         'John told everyone that Bill was attacked by a bear and Mary told everyone that Bill was attacked by a lion.'
    b. * John-wa   munoosa-no   tameni,   sosite Mary-wa mudankekkin-no   tameni
         John-TOP incompetence-GEN because   and   Mary-TOP absence.without.notice-GEN because
         kubininatta   hito-o   nagusameta.
         was.fired   person-ACC   comforted
         'John comforted a person who was fired because of his incompetency and Mary comforted a person who was fired because of his absence without notice.'

However, the present authors, as well as 15 other native speakers of Japanese they consulted, find (i) and (ii) acceptable. See also Mukai (2003) and Kato (2006) for the observation that Japanese gapping is island-insensitive.

kuruma 'car'. (13b) results from the movement of the genitive nominal from within the NP. The ungrammaticality of this example shows that Japanese is subject to the left branch condition.

(13) a. Lydia-wa   [NP Tomo-no   kuruma-o]   untensita.

          Lydia-TOP   Tomo-GEN   car-ACC   drove

          'Lydia drove Tomo's car.'

     b. * Tomo-no$_i$ Lydia-wa   [NP t_i kuruma-o]   untensita.

          Tomo-GEN Lydia-TOP   car-ACC   drove

          'Lydia drove Tomo's car.'

     c. Nina-wa   Ana-no   (sosite) Lydia-wa   Tomo-no   kuruma-o   untensita.

          Nina-TOP   Ana-GEN   and   Lydia-TOP   Tomo-GEN   car-ACC   drove

          'Nina drove Ana's car and Lydia drove Tomo's car.'

                                                                    ((13b, c) from An 2007: 145,146)

Keeping this point in mind, consider how (13c) can be derived. To maintain the standard constituency requirement on ellipsis, the currently standard movement + deletion approach to ellipsis (e.g., Merchant 2001) would assign the derivation in (14) for the first conjunct of (13c).

(14) [TP   Nina-wa   [XP   **Ana-no$_i$**   ~~[VP t_i kuruma-o   untensuru]~~]]

Here, the possessor argument *Ana-no* 'Ana-GEN' undergoes sub-extraction from its containing NP to some position above VP, which we designate here as XP for convenience, followed by the ellipsis of the VP. However, we have just seen above that the left-branch condition is active in Japanese, showing that this derivation is independently blocked.

Our PF-deletion analysis in terms of String Deletion, on the other hand, correctly predicts the grammaticality of the example in (13c) precisely because this operation is free

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from the constituency requirement which has been commonly held to characterize ellipsis. Under our analysis, example (13c) is analyzed as schematically shown in (15).

(15) Gapped Conjunct: [TP   Nina-wa   Ana-no_i   kuruma-o   untensuru]

Full-Fledged Conjunct: [TP   Lydia-wa   Tomo-no_i   kuruma-o   untensuru]

In (15), the underlined part in the gapped conjunct, has the same string in the full-fledged conjunct and hence makes the possible target of String Deletion without any need to move the possessor out of the VP. We take the well-formedness of (13c) as the first indication that the derivation of gapping in Japanese involves a string-based deletion in the PF component.

Example (16) makes a similar case for our analysis. Its derivation is shown in (17).

(16) Taroo-wa Ziroo-ga,   Ziroo-wa   Taroo-ga   Hanako-o   korosita to   omotta.

Taro-TOP Jiro-NOM   Jiro-TOP   Taro-NOM   Hanako-ACC   killed   COMP thought

'Taro thought that Jiro killed Hanako and Jiro thought that Taro killed Hanako.'

(Tagawa 2008)

(17)

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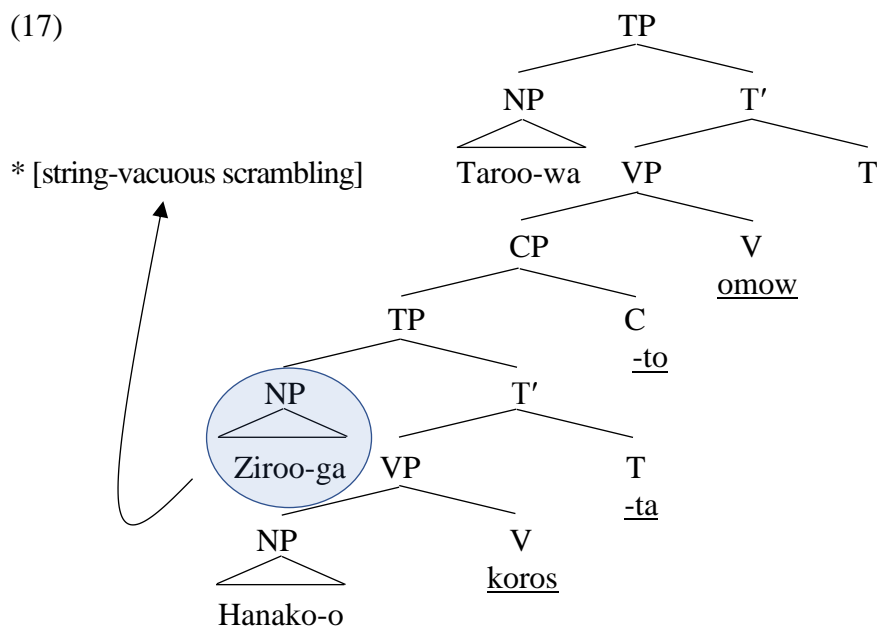
The set of elements to undergo deletion to yield the surface string in the first conjunct of (16) is underlined in (17). It is clear that no constituent exists in this derivation that exclusively consists of the underlined expressions.

Note that one cannot save the constituency requirement on ellipsis here by saying that the embedded subject *Ziroo-ga* 'Jiro-NOM' undergoes scrambling to some position above the matrix VP so that the rest of the underlined expressions may end up forming the unitary constituent to the exclusion of the subject, since it is well-known that string-vacuous scrambling is prohibited in Japanese (Hoji 1985) (cf. George 1980). Hoji's (1985) definition of this ban is given in (18).

(18) A syntactic adjunction operation cannot apply if it does not change the order of the overt lexical string.   (Hoji 1985:352)

One well-known supporting piece of evidence for the ban comes from binding (see also Takano 2010 and Takita 2017). Hoji (1985, p.350) assumes, as the condition on referential dependency, that α cannot antecede β if β c-commands α at the S-structure representation in the sense of Government and Binding Approach. Thus, the coreference between *kare* 'he' and *John* is not permitted in (19a) because the pronoun c-commands the R-expression. By contrast, the relevant interpretation is permitted in (19b), which is derived by scrambling the direct object to the front of the sentence, so that *kare* 'he' no longer c-commands the R-expression after the movement.

(19) a. *[$_{TP}$ Kare$_i$-ga [$_{VP}$ John$_i$-no   haha-o   semeta]].

         he-NOM   John-GEN   mother-ACC   criticized

      b. [$_{TP}$ [$_{DP}$ John$_i$-no   haha-o]$_j$ [$_{TP}$ kare$_i$-ga   [$_{VP}$ t_j semeta]]].

            John-GEN   mother-ACC   he-NOM   criticized

                                                      (Hoji 1985:350, with minor modifications)

Keeping this condition on pronominal binding in mind, consider now (20). This example is ungrammatical under the reading that the null subject is intended to refer back to John.

(20)   *pro_i John-no   haha-o   semeta.

           John-GEN   mother-ACC   criticized

       'lit. pro_i criticized John$_i$'s mother.'   (Hoji 1985:349)

Hoji reasons that (20) could, in principle, be associated with either the representation shown in (21a), with no scrambling, or the representation shown in (21b), where the direct object *John-no hana-o* 'John's mother-ACC' undergoes scrambling across the *pro* subject.

(21)   a. [$_{TP}$ pro_i [$_{VP}$ John$_i$-no   haha-o   semeta]].

                   John-GEN   mother-ACC   criticized

       b. [$_{TP}$ [$_{DP}$ John$_i$-no   haha-o]$_j$ [$_{TP}$ pro_i [$_{VP}$ t_j semeta]]].

               John-GEN   mother-ACC   criticized

                                  (adopted from Hoji 1985:349, with minor modifications)

The derivation in (21a) correctly predicts that the coreferential reading between *John* and *pro* is blocked in (20) because *pro* c-commands *John* whereas the derivation in (21b) erroneously predicts otherwise because *John* is not in the c-command domain of *pro* after scrambling. The condition in (18) blocks the latter derivation. Thus, to the extent that string-vacuous scrambling is prohibited in Japanese, examples of gapping disobeying syntactic constituency requirements, as manifested in examples such as (16), argue in favor of our string-based deletion analysis.

       Closer inspection of other data on Japanese gapping leads us to an even more radical observation, namely that gapping flouts not only syntactic constituency but also

morphological word boundaries in certain cases, contrary to some generally accepted wisdom. Example (22) from Tagawa (2008) is a case in point.

(22) Taroo-wa   zen,   Hanako-wa   gen-daitooryoo-ha-da.
      Taro-TOP   former Hanako-TOP   current-president-support-COP
      'Taro is a supporter of the former president and Hanako is a supporter of the current
       president.'   (Tagawa 2008)

As the English translation makes clear, the example is understood such that Taro is a supporter of the former president. Thus, the pre-ellipsis representation for the relevant parts of the first and second conjuncts of (22) should be as shown in (23).

(23) Gapped Conjunct: Taroo-wa   zen-<u>daitooryoo-ha-da</u>
      Full-Fledged Conjunct: Hanako-wa   gen-<u>daitooryoo-da-da</u>

Here, ellipsis invades into only some subpart of the complex compound *zen-daitooryoo-ha* 'supporter of the former president', a pattern that would be mysterious under any approach to gapping, with or without resort to movement, which maintains the standard constituency assumption on ellipsis. Our String Deletion analysis, on the other hand, is consistent with the existence of gapping of this type because String Deletion targets the set of strings such as *daitooryoo-ha-da* as long as these strings are contiguous to one another (see section 4 for discussions on possible semantic conditions imposed on the application of String Deletion).

    Example (24) makes the same point. This example involves two compounds, *kinobori-zyoozu* 'good at tree climbing' and *monomane-zyoozu* 'good at impersonation' in the first and second conjunct, respectively, as reflected in the English translation.

(24) Taroo-wa   kinobori,   Ziroo-wa   monomane-zyoozu-na-tame   kurasu-no

Taro-TOP   tree climbing   Jiro-TOP   impersonation-good-COP-because   class-GEN

ninkimono-da.

popular-COP

'Taro is popular in his class because he is good at tree climbing. Jiro is popular in

his class because he is good at impersonation.'

(25) Gapped Conjunct: Taroo-wa   kinobori-zyoozu-na-tame   kurasu-no

ninkimonoda

Full-Fledged Conjunct: Ziroo-wa   monomane-zyoozu-na-tame kurasu-no

ninkimonoda.

The fact that gapping applies to the set of strings underlined in (25) shows that this construction may aggressively trespass otherwise stringent syntactic as well as morphological boundaries noted to characterize ellipsis phenomena, a surprising property in view of the reported wisdom that is nonetheless naturally expected "as a matter of course" under our String Deletion approach.

As stated earlier, our observation that gapping may permeate into morphological words in Japanese runs counter to the conventional wisdom. For example, Kageyama (1993:77) designs the examples in (26a, b) to illustrate that even though gapping may apply on the basis of a linear string, it must nonetheless respect the morphological word boundary.

(26) a.*Ani-wa kokuritu-daigaku-no hoogakubu-ni hairi,

big.brother-TOP national-university-GEN law.faculty-into enter

otooto-wa siritsu-daigaku-no hoogakubu-ni haitta.

little.brother-TOP private-university-GEN law.faculty-into entered

'My big brother entered the law faculty of a national university. My little brother

entered the law faculty of a private university.'

b.*Ani-wa kokuritu-daigaku-siboo de, otooto-wa

big.brother-TOP national-university-intending-COP little.brother-TOP

siritu-daigaku-siboo-da.

private-university-intending-COP

'My big brother intends to enter a national university. My little brother intends to

enter a private university.'

(Kageyama 1993:77, with his own judgements as reported)

Interestingly, the present authors, as well as 15 native speakers of Japanese (see footnote 2), find these examples completely acceptable, *pace* Kagayama. Although we need to leave a more in-depth investigation of this intra-speaker variation on the acceptability of sub-word gapping for another occasion, we nonetheless wish to outline here a hitherto unnoticed semantic condition for those speakers who accept this type of gapping. More specifically, we note that even those speakers who found Kageyama's examples in (26a, b) grammatical still found the example in (27b) completely ungrammatical. The example in (27b) is derived from the baseline grammatical example in (27a) by gapping the second member of the V-V compound in the first conjunct, *nomi-aruku* 'drink-walk, bar hop', under string-identity with the second member of another V-V compound in the second conjunct, *tabe-aruku* 'eat-walk, do an eating tour'.

(27) a. Sono yoru,   ani-wa   Kobe-de   nomi-aruki, (sosite) otooto-wa

    that night   big.brother-TOP Kobe-in   drink-walk   and   little.brother-TOP

    Osaka-de   tabe-arui-ta.

    Osaka-in   eat-walk-PAST

    'That night, my big brother did bar-hopping and my little brother did an eating

    tour.'

b.*Sono yoru,   ani-wa   Kobe-de   nomi,   (sosite) otooto-wa

    that night   big.brother-TOP Kobe-in   drink   and   little.brother-TOP

    Osaka-de   tabe-arui-ta.

    Osaka-in   eat-walk-PAST

    'That night, my big brother did bar-hopping and my little brother did an eating tour.'

                    (Kageyama 1993:77, with his own judgements as reported)

We suggest that the critical contrast responsible for the difference in acceptability between (26a, b) and (27b) lies in compositional semantics of individual morphemes involved in the formation of relevant complex morphological words. More concretely, the meaning of the compound *kokuritu-daigaku* 'national university' in (26a, b) is computable in a compositional fashion in the sense that its two component parts, *kokiritsu* 'national' and *daigaku* 'university', transparently contribute their respective meanings to the resulting compound. The situation is radically different in (27b), where the idiosyncratic meaning of the V-V compound *nomi-aruku* 'bar hop' is hardly unpredictable in a compositional manner simply from the meaning of its two constituents parts, *nomu* 'to drink' and *aruku* 'to walk'.

Capitalizing on this semantic difference, we submit that String Deletion must target at minimum a morpheme as a minimal unit of sound-meaning correspondence. Within this new condition in place, the example in (26a) is fine with gapping targeting below the complex morphological word *kokuritu-daigaku* 'national university' because the three components targeted by gapping, i.e., *daigaku-no* 'of a university', *hoogakubu-ni* 'into

faculty of law', and *hairu* 'to enter', each form an independently meaningful unit. The example in (27b) is out with the relevant pattern of gapping, however. The reason is that *nomi-aruku* 'bar hop' *as a whole* makes one semantic unit due to its idiosyncratic lexical meaning because the meaning of the entire V-V compound cannot be compositionally calculated from the two parts when they are used in isolation (i.e., *nomu* 'to drink' and *aruku* 'to walk', respectively).

We will revisit our claim made here that that Dependent String Deletion applies to a minimal sense in section 4.3, where we will also address the question why the application of this purely phonological ellipsis operation in the PF component is ever effected by semantic conditions of this sort. Suffice it to say here that the examples of gapping violating syntactic constituencies and/or morphological boundaries strongly suggest that the derivation of this construction is governed by a string-sensitive operation in the phonological wing of grammar.

3.3. *Japanese gapping permits string-final p-omission*

In this section, we would like to note a third property of Japanese gapping – string-based availability of particle-omission –, which we take to be strongly indicative of the string-based nature of the application of this ellipsis process, together with the island-insensitivity (section 3.1) and the absence of syntactic/morphological constituency requirements (section 3.2). Examples in (28) illustrate this property (also recall our earlier example in (9)).

(28) a. Mary-ga   nokogiri-*(**de**) gareezi-(**o**), John-ga   hammaa-de ie-o   tukutta.
          Mary-NOM saw-with   garage-ACC John-NOM hammer-with house-ACC made
          'Mary built a garage with a saw and John built a house with a hammer.'

      b. Mary-ga   gareezi-*(**o**) nokogiri-(**de**), John-ga ie-o   hammaa-de tukutta.
          Mary-NOM garage-ACC saw-with   John-NOM house-ACC hammer-with made
          'Mary built a garage with a saw and John built a house with a hammer.'

As one of the empirical problems for their movement + copy analysis of gapping, Abe and Hoshi (1997:133) observe that dropping a particle (either a postposition or a case marker) from a non-final remnant within the gapped conjunct results in ungrammaticality. Thus, in (28a), the postposition –*de* 'with' cannot be omitted from the DP it is attached to, *nokogiri* 'saw', when the DP in question is not in the linearly last position immediately adjacent to the coordination marker (whether it is realized as *sosite* 'and' or not). On the other hand, the DP in the linearly final position, *gareezi* 'garage', can have its accusative case marker –*o* omitted without any loss of grammaticality. The situation is reversed in (28b), however, which is derived by short scrambling of the PP over the direct object DP. As a result of this reordering operation, *nokogiri* 'saw' now stands in the linearly final position before the coordination marker and hence can now have its postposition omitted. On the other hand, *gareezi* 'garage' is now located in a non-final position of the gapped conjunct, and hence retains its accusative case marking.

Abe and Hoshi's analysis assumes that P-stranding is universally allowed at LF for leftward movement, an option which they claim is used in the derivation of Japanese gapping. Abe and Hoshi note that their analysis, then, would incorrectly rule in the examples in (28a) and (28b), with P-omission on the part of *nokogiri* 'saw' and *gareezi* 'garage', respectively, because nothing in their analysis should prevent the particles –*de* and –*o* from being stranded by leftward LF movement of the relevant DPs.

This position-sensitive distribution of P-omission has remained an unresolved issue in subsequent research on gapping in Japanese as well as in Korean. Kato (2006: 124–125), for example, speculates that P-stranding in Japanese might be related to a different intonational contour on the element that immediately precedes the gap (such as lengthening of the syllable preceding the gap), but leaves the problem essentially as is for future research. Noting that the same P-stranding distribution characterizes Korean gapping, Kim (1998:183) observes that "the post-position or Case marker in Korean gapping may be dropped only if the host remnant is immediately followed by the conjunction *kuliko* 'and'." Sohn (1999:383) reaches a similar

conclusion, stating that "P/case particle omission is a PF-phenomenon" and that "conjunction takes the whole contrasted part as one unit, optionally deleting the postposition on the last NP".

Our current String Deletion analysis provides the most straightforward solution to the position-sensitive distribution of P-omission if we assume that Dependent String Deletion applies under the condition of linear string adjacency – which we will heretofore dub the String Contiguity Condition, as embodied in our proposed definition of this operation in (10); see also An's (2016) theory of Extra Deletion, which is hypothesized to satisfy the same design condition. To illustrate how our analysis works, consider the derivations in (29) and (30). (29) represents the derivation of the example in (28a) with the omission of the accusative case marker *–o* whereas (30) represents the derivation of the same example with the omission of the postposition *–de*.

(29) Gapped Conjunct: Mary-ga   nokogiri-de   gareezi-o   tukutta
      Full-Fledged Conjunct: John-ga   hammaa-de   ie-o   tukutta
      → String Deletion meets the String Contiguity Condition.

(30) Gapped Conjunct: Mary-ga   nokogiri-de   gareezi-o   tukutta
      Full-Fledged Conjunct: John-ga   hammaa-de   ie-o   tukutta
      → String Deletion does not meet the String Contiguity Condition.

In (29), String Deletion meets the string adjacency requirement since the set of strings targeted by the String Deletion (more precisely, Dependent String Deletion parasitic on the application of the Coordinate Ellipsis of the T head) is contiguous, consisting of the accusative case marker and the verb. In (30), on the other hand, Dependent String Deletion violates the String Contiguity Condition because the set of strings targeted by this operation, the postposition *–de* and the verb, do not form a contiguous string due to the intervention of

the accusative-marked direct object *gareezi-o* 'garage-ACC'. See also the example (9), which can be used to make the same point.

Note that our analysis predicts that the derivation in (30) should end up converging in the PF component if the intervening direct object DP also undergoes String Deletion so that the PP, the DP and the final verb jointly form one giant contiguous string, as shown in (31). Here, we replaced the direct object in the gapped clause with *ie-o* 'house-ACC': recall that we assume, following Williams (1997), that the XP elided by Coordinate Ellipsis or Dependent Ellipsis is subject to the Disanaphora Law to the effect that it be referentially dependent on its structural correspondence in the full-fledged antecedent clause.

(31) Gapped Conjunct: Mary-ga   nokogiri-de   ie-o   tukutta

      Full-Fledged Conjunct: John-ga   hammaa-de   ie-o   tukutta

That the relevant prediction is indeed borne out is evidenced by the well-formedness of the example in (32) by omitting the intervening direct object DP which is coreferential with the overt direct object in the second clause (i.e., 'house-ACC'), together with the postposition attached to the instrumental DP.

(32) Mary-ga   nokogiri-de ie-o   John-ga   hammaa-de   ie-o   tukutta.

      Mary-NOM saw-with   house-ACC John-NOM hammer-with house-ACC made

      'Mary built a house with a saw and John built a house with a hammer.'

4. Problems with Mukai's (2003) string-deletion theory of gapping in Japanese

As stated in the previous section, Mukai (2003) is the first to propose that gapping (or what she calls verbless conjunction) in Japanese is best accounted by the process of String Deletion. Indeed, her theory captures three central properties of gapping examined in the previous section – the island-insensitivity of gapping remnants, the immunity of gapping to

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syntactic constituency requirements imposed on other ellipsis constructions, and the string-sensitive distribution of particle omission within the gapped conjunct – no less satisfactorily than our own theory, a hardly surprising result given that both theories use the string-based deletion process in the PF component.

A question that arises then, is whether our own version of the String Deletion-based analysis yields any empirical prediction which distinguishes it from Mukai's version. The purpose of this section is to present a wide variety of examples showing that Mukai's theory of String Deletion both over- and under-generates, because of the rather lenient nature of the conditions she proposed to condition the application of String Deletion. We demonstrate how this problem is successfully overcome within our rendition of this operation, couched, as we have assumed so far, within Williams' (1997) theory of deletion.

4.1. *Examples of "overgeneration" under Mukai's (2003) theory*

Let us start by discussing examples which Mukai's (2003) theory of gapping would overgenerate. As already stated in section 3.1, Mukai (p. 211) assumes that "the only structural condition on String Deletion is that the target is continuous and contains a verb". This condition is too weak in at least two respects.[3]

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[3] There is another problem with Mukai's theory. As Mukai herself (p.213) points out, if phonological identity were the only thing at stake in the derivation of gapping, then this theory would make a wrong prediction concerning gapping examples involving homonyms (Mukai notes that this problem was pointed out by Hajime Hoji (p.c.)). Specifically, examples such as (i) involving the homonymic noun *kumo* 'spider, cloud' would allow four logically possible semantic interpretations provided here, instead of the two factually available interpretations where *kumo* is interpreted in the same way across two conjuncts. The same point can be made with another homonymic noun *koi* 'carp, love' in (ii). This example is ungrammatical if the two different senses of *koi* are distributed in the two conjuncts; the example is grammatical, of course, if it is interpreted in such a way that Goto and Sato caught fish in a fish pond in Shizuoka and in America, respectively.

(i) John-ga Mary-ni, Bill-ga Susan-ni   *kumo*-no   syasin-o   miseta.
     John-NOM Mary-DAT Bill-NOM Susan-DAT   cloud/spider-GEN picture-ACC   showed
     'John showed Mary a picture of a cloud/a spider and Bill showed Susan a picture of a cloud/spider.'
     → John showed Mary a picture of a cloud and Bill showed Susan a picture of a cloud.
     → John showed Mary a picture of a spider and Bill showed Susan a picture of a spider.
     → *John showed Mary a picture of a cloud and Bill showed Susan a picture of a spider.
     → *John showed Mary a picture of a spider and Bill showed Susan a picture of a cloud.
                              (adopted from Mukai 2003:213, with a minor modification)

Firstly, Mukai's proposed constraint on String Deletion to the effect that its target be continuous and contain a verb is too weak to correctly rule out examples such as (34) below. To set the stage for this argument, consider examples in (33a–c).

(33) a. Taroo-ga   Hanako-o,   sosite,   Ziroo-ga   Yuki-o   suki   na   koto-ga

Taro-NOM   Hanako-ACC   and   Jiro-NOM   Yuki-ACC   like   COP   fact-NOM

tugitugito   akirakaninatta.

one.after.another   came.to.light

'It was revealed that Taro likes Hanako. It was then revealed that Jiro likes Yuki.'

(ii) * Goto-kun-wa   Sizuoka-no   ohori-de,   Sato-kun-wa   America-no   daigaku-de
     Goto-TITLE-TOP Shizuoka-GEN fish.pond-LOC Sato-TITLE-TOP America-GEN university-at
       koi-o   teni-ireta.
     carp/love-ACC   caught
     'Intended: Goto caught a carp in a fish pond in Shizuoka and Sato found a new love at a university in America.'

The same-sense condition imposed on gapping manifests itself also in the verb. Example (iiia) involves the single verb *tateru*, which is intended to be interpreted in two radically different senses (i.e., to put up a notice board and to set up a goal, respectively). The result is hopeless, as shown by the ungrammaticality of (iiia). Example (iiib), on the other hand, uses the same verb in the identical sense (i.e., to set up a goal and a plan), and is grammatical.

(iii) a.* Kotosi John-ga   kono kanban-o, Bill-ga ano mokuhyoo-o *tateta*.
     this year John-NOM   this notice-ACC Bill-NOM that goal-ACC   put.up/set up
     'Intended: This year, John put up this notice and Bill set up that goal.'
  b. Kotosi John-ga   kono kikaku-o, Bill-ga ano mokuhyoo-o *tateta*.
     this year John-NOM   this plan-ACC Bill-NOM that goal-ACC   set up
     'This year, John set up this plan and Bill set up this goal.'

The same-sense constraint imposed on gapping, identified above, would be totally mysterious under a purely phonological analysis such as the one offered by Mukai. Mukai (p. 213) does conclude, in face of homophonic examples akin to (i), that "LF identity, as well as PF identity, is relevant in the case of verbless conjunction".

    One might mechanically graft the relevant semantic identity condition on top of PF identity condition to sufficiently constrain the elliptic potential of String Deletion. We agree that this would be certainly feasible, but our point here is that Mukai's system does not provide a principled explanation for why such a requirement is imposed on gapping, whose application would be only sensitive to the surface string identity condition according to Mukai. On the other hand, our proposed analysis, framed within Williams' (1997) theory of deletion, provides the simplest possible answer to this *why* question if we take the notion of "anaphoricity" in the Disanaphora Law seriously. Suppose that any elided element in the first conjunct must be strictly identical *in its sense* to the overt structural correspondence in the second conjunct. Then, it simply follows from the definition of the Disanaphora Law imposed on gapping that if *kumo* in (44) is interpreted as "cloud' in the full-fledged conjunct, its first occurrence in the gapped conjunct must also be interpreted as "cloud", a clearly correct result. The same analysis applies *mutatis mutandis* for the two other examples of homonymic gapping in (ii) and (iii). Note that this condition is not language-specific, for it equally applies to English gapping, as witnessed by the contrast in grammaticality between *John went to Chicago, and Mary crazy.* (Kim 1998:160) vs. *John went to Chicago, and May to Tucson*.

b.　[NP [CPTaroo-ga　　Hanako-o　　　suki　na]　　koto], sosite,　[NP　[CP Ziroo-ga

　　　　　Taro-NOM　Hanako-ACC　like　COP　fact　and　　　　　　　　Jiro-NOM

　　Yuki-o　　　suki　na]　koto]-ga　　tugitugito　　　　　　　akirakaninatta.

　　Yuki-ACC　like　COP　fact-NOM　one.after.another　　came.to.light

　　'It was revealed that Taro likes Hanako. It was then revealed that Jiro likes Yuki.'

c. *[TP [CP Taroo-ga　　Hanako-o　　　suki　na]　　　koto-ga　　　tugitugito

　　　　　Taro-NOM　Hanako-ACC　like　COP　　　fact-NOM　　one.after.another

　　akirakaninari],　sosite,　　[TP [CP Ziroo-ga　Yuki-o　　　suki　na]　　koto-ga

　　come.to.light　　and　　　　　　Jiro-NOM　Yuki-ACC　like　COP　fact-NOM

　　tugitugito　　　　　　akirakaninatta].

　　one.after.another　　came.to.light

　　'It was revealed that Taro likes Hanako. It was then revealed that Jiro likes Yuki.'

It is reasonable to assume that the pre-ellipsis derivational source for the gapping example in (33a) involves the coordination of the NPs headed by the formal noun *koto* 'fact', which respectively contain the CP structure within them, as represented in (33b). The coordinated NPs, in turn, function as the complex subjects of the single predicate *akirakaninatta* 'came to light'. Note that the derivational source for the first conjunct does not contain the relevant predicate: such a reconstructed source is ungrammatical, as shown in (33c), given the meaning of *tugitugito* 'one after another', which requires plural eventualities.

　　The problem with Mukai's approach to gapping here is that nothing in her approach would prevent the example in (34) from being generated through the ellipsis of the verb-copula sequence *suki-na* 'like-COP', which is linearly contiguous and contains the verb, in compliance with her proposed condition on String Deletion.

(34) * [_{NP} [_{CP} Taroo-ga   Hanako-o   ~~suki na~~   koto]], sosite, [_{NP} [_{CP} Ziroo-ga

          Taro-NOM   Hanako-ACC   like   COP   fact   and   Jiro-NOM

   Yuki-o   suki   na   koto]]-ga   tugitugito   akirakaninatta.

   Yuki-ACC   like   COP   fact-NOM   one.after.another   came.to.light

   'It was revealed that Taro likes Hanako. It was then revealed that Jiro likes Yuki.'

Our analysis, on the other hand, correctly blocks the derivation in (34). It is important to note that the first conjunct is contained within the CP. Recall that we assume that gapping in Japanese always involves Coordinate Ellipsis of the head of conjuncts, which may trigger Dependent String Deletion of its left-adjacent string. The impossibility of the verb gapping in (34), then, immediately follows from the fact that Dependent Ellipsis of the verbal complex cannot be triggered due to the absence of the Coordinate Ellipsis of the highest coordinating D/N head lexicalized by the formal noun *koto* 'fact', which otherwise would have caused the Dependent Ellipsis of the successively lower heads such as Cs and Ts in the first CP conjunct. Indeed, if gapping applies not only to the verb-copula complex but also to the formal noun, the result is well-formed, as shown in (33a), which provides further indication that Dependent Ellipsis in gapping is indeed subject to the String Contiguity Condition.

We can make the same argument against Mukai's approach to gapping with ill-formed cases of gapping as in (35a) through the ellipsis of the verbal complex *rainiti-suru* 'visit Japan'. Since the example involves the deletion of this contiguous verbal complex, her approach would wrongly predict the output of this deletion to be well-formed.

(35) a.* Chomsky-ga sangatu-ni ~~rainiti-suru~~ mitai, sosite Rizzi-ga

Chomsky-NOM March-in visit.Japan-do seem, and Rizzi-NOM

gogatu-ni rainiti-suru-mitai-desu-ne.

May-in visit.Japan-do-seem-COP.POL-PRT

'It seems that Chomsky is visiting Japan in March and that Rizzi is visiting Japan in

May.'

b. Chomsky-ga sangatu-ni ~~rainiti suru mitai~~, sosite Rizzi-ga

Chomsky-NOM March-in visit.Japan-do seem, and Rizzi-NOM

gogatu-ni rainiti-suru-mitai-desu-ne.

May-in visit.Japan-do-seem-COP.POL-PRT

'It seems that Chomsky is visiting Japan in March and that Rizzi is visiting Japan in   May.'

Our alternative analysis in terms of Dependent String correctly predicts this outcome if we assume that the Dependent Ellipsis of this complex cannot occur due to the lack of the application of the functional head *mitai* 'seem'. The relevance of the Dependent String Deletion here is further confirmed by the fact that the example in (35a) becomes grammatical if gapping also targets this functional head, as shown in (36).

(36)   Chomsky-ga sangatu-ni ~~rainiti suru mitai~~, sosite Rizzi-ga

Chomsky-NOM March-in visit.Japan-do seem, and Rizzi-NOM

gogatu-ni rainiti-suru-mitai-desu-ne.

May-in visit.Japan-do-seem-COP.POL-PRT

'It seems that Chomsky is visiting Japan in March and that Rizzi is visiting Japan in

May.'

The second area where Mukai's (2003) theory overgenerates concerns the descriptive observation, already introduced in section 3. Recall that gapping in Japanese is only possible

in coordinate structures created by *sosite* 'and' (whether it is realized or not), not by any other heads such as *atode* 'after' or *demo* 'but'. The examples in (7) illustrate this observation. Unless otherwise supplemented with other conditions, however, Mukai's theory would not be able to capture this observation. By contrast, our present theory correctly resolves this overgeneration problem with regard to coordination structures because gapping results only when one of the bivalent heads of the coordination marker *sosite* 'and' is realized as null.

4.2. *Examples of "undergeneration" under Mukai's (2003) theory*

In this section, we report two cases of gapping in Japanese which would be incorrectly undergenerated within Mukai's theory of gapping but are correctly accounted for under our alternative theory. Our first case is concerned with C-level gapping, as illustrated in (37a).

(37) a. *After 20 years*-o   yonda toki,   Jimmy-ga   Bob-ni   kizuki,   Bob-ga
   After 20 years-ACC   read   when   Jimmy-NOM   Bob-DAT   notice   Bob-NOM
   Jimmy-ni   kizuita   kadooka   toiu   hutatu-no gimon-ga   ukanda.
   Jimmy-DAT noticed   whether   COMP   two-GEN   question-NOM popped
   'When I read *After 20 years*, the two questions whether Jimmy noticed Bob and whether Bob noticed Jimmy popped up in my mind.'

   b. *After 20 years*-o   yonda toki, [CP Jimmy-ga   Bob-ni   kizuita kadooka],
   After 20 years-ACC   read   when   Jimmy-NOM Bob-DAT noticed whether
   [CP Bob-ga   Jimmy-ni   kizuita kadooka] toiu   hutatu-no gimon-ga   ukanda.
   Bob-NOM Jimmy-DAT noticed whether COMP two-GEN   question-NOM popped
   'When I read *After 20 years*, the two questions whether Jimmy noticed Bob and whether Bob noticed Jimmy popped up in my mind.'

c. * *After 20 years*-o   yonda toki, [TP [CP Jimmy-ga   Bob-ni   kizuita kadooka]

   After 20 years-ACC read   when   Jimmy-NOM Bob-DAT noticed whether

toiu   hutatu-no gimon-ga   ukabi], [TP [CP Bob-ga   Jimmy-ni   kizuita

C   two-GEN   question-NOM arise   Bob-NOM   Jimmy-DAT noticed

kadooka   toiu   hutatu-no gimon-ga   ukanda.

whether   COMP   two-GEN   question-NOM   popped

'When I read *After 20 years*, the two questions whether Jimmy noticed Bob and whether Bob noticed Jimmy popped up in my mind.'

(37a) is derived from the CP-coordinate structure in (37b) headed by the complementizer *kadooka* 'whether' through ellipsis of its occurrence in the first conjunct. Note that the example has a single predicate in the sentence-final position, instead of at the end of each of the two conjuncts, since such a reconstruction yields ill-formedness, as shown in (37c). Given this consideration, the relevant part of the gapped conjunct in (36a) should be derived as in (38).

(38)   Jimmy-ga   Bob-ni   kizuki   ~~kadooka~~
       Jimmy-NOM   Bob-DAT   noticed whether

Since one of the requirements on String Deletion is that the target of this operation must contain a verb, Mukai's theory predicts that C-gapping as illustrated in (38) to yield the example in (37a) would be ungrammatical, contrary to fact. Our theory, on the other hand, derives this C-gapping as a straightforward consequence of the Coordinate Ellipsis of the complementizer *kadooka* 'whether'.

More generally, our analysis predicts that Japanese gapping does not need to involve verb gapping, unlike in Mukai's analysis, a prediction which is further confirmed below with the gapping of the Sino-Chinese adverbial noun *tyuu* 'during' and the Dependent String Deletion it triggers on a verbal noun to its immediate left. Consider examples (39a, b).

(39) a. Tuma-ga   Amerika-hoomon-~~tyuu~~,   musume-ga   igirisu-hoomon-tyuuni

        wife-NOM   America-visiting-during   daughter-NOM England-visiting-during

        watasi-mo   sorera-no   kuni-o   zyunni   otozureru-yotee-desu.

        I-also   they-GEN   country-ACC in.sequence   visit-plan-COP.POL

        'While my wife visits America and then while my daughter visits England, I plan

        to visit these countries in that order.'

   b. Tuma-ga   Amerika-~~hoomon tyuu~~ ,   musume-ga   igirisu-hoomon-tyuuni

        wife-NOM   America-visiting-during   daughter-NOM England-visiting-during

        watasi-mo sorera-no   kuni-o   zyunni   otozureru-yotee-desu.

        I-also   they-GEN   country-ACC in.sequence   visit-plan-COP.POL

        'While my wife visits America and then while my daughter visits England, I plan

        to visit these countries in that order.'

As the English translation shows, the example in (39a) involves a coordination structure headed by *tyuu* 'during', the first occurrence of which undergoes gapping in the first conjunct. The grammaticality of the example in (39b) further shows that gapping may apply further leftward to delete the verbal noun *hoomon* 'visiting'. Since the gapping in these cases does not involve the verb, Mukai's theory should not be able to generate these well-formed examples. On the other hand, nothing in our alternative theory blocks the formation of these gapping examples: (39a) involves the Coordinate Ellipsis of the Sino-Chinese temporal noun *tyuu* 'during' whereas (39b) involves the same ellipsis process followed by the Dependent Ellipsis of the verbal noun.

4.3.   *Potential problems with our analysis and the generalized sense unit condition*

So far in this section, we have pointed out novel data of Japanese gapping to show that Mukai's (2003) proposed constraint on String Deletion both over- and under-generates. We

have shown how these examples are straightforwardly captured instead by our own rendition of String Deletion, which incorporates Williams' (1997) hybrid theory of Coordinate/Dependent Ellipsis.

Recall that we have proposed in section 3.2 that String Deletion must target at minimum a morpheme, a minimal unit of sound-meaning correspondence. Here, we propose a generalized version of this constraint to the effect that the target of String Deletion must consist of an independent sense unit, i.e., a (sequence of) morpheme(s). As stated in section 2, the Disanaphora Law proposed by Williams (1997) requires that an elided element in a gapped conjunct must be referentially dependent upon its structurally parallel element in a full-fledge conjunct whereas its overt counterpart must not be in the same structure. For this law to play its role in ellipsis structures, then, the necessary condition has to be that an elliptical XP in a gapped conjunct must constitute a meaningful unit as a whole, for otherwise the reference of the XP would not be fixed properly and hence won't be properly calculated against the overt antecedent in a full-fledged clause in compliance with the requirement from the Disanaphora Law. Thus, we submit that the generalized version of the sense unit condition, in fact, is not a stipulation but derivable from the way the Disanaphora Law works in ellipsis (see also note 3).

The hitherto unnoticed contrast in semantic interpretation between (40) and (42), presented below, provides independent supporting evidence in favor of our generalized version of the sense unit condition. The first conjunct of the example in (40) means that Taro ordered a cup of coffee, but crucially cannot mean that Taro ordered a cup of coffee as well as a cake.

(40) Taroo-wa   koohii,   Hanako-wa   kootya-to   keeki-o   tyuumonsita.

   Taro-TOP   coffee   Hanako-TOP   black tea-and cake-ACC   ordered

   (i) 'Taro ordered a cup of coffee and Hanako ordered a cup of black tea and a cake.'

   (ii) '*Taro ordered a cup of coffee and a cake and Hanako ordered a cup of black tea and a cake.'   (Tagawa 2008)

The lack of the latter interpretation appears to pose a potential problem for our current analysis of gapping since the example with such an interpretation may well be generated in the manner shown in (41), where Dependent String Deletion applies to the contiguous string of symbols *–to keeki-o tyuumonsi*. Note that in this connection, Mukai's (2003) theory would also be faced with the same overgeneration problem in yielding the unavailable interpretation in (40).

(41)* Taroo-wa   koohii ~~to   keeki-o   tyuumonsi~~,   Hanako-wa   kootya-to

      Taro-TOP   coffee   cake-ACC   order   Hanako-TOP   black tea-and

      keeki-o   tyuumonsita.

      cake-ACC   ordered

We suggest that the derivation shown here is blocked precisely by the sense unit condition because the target of Dependent String Deletion here contains the sequence *to keeki-o tyuumonsuru*, which does not form an independently meaningful unit, i.e., a set of morphemes against which the referential anaphoricity of their structural correspondent in the full-fledged antecedent can be licitly checked.

Notice now that our analysis leads us to the following interesting prediction. If Dependent String Deletion targets the verb in the first conjunct up to the direct object *keeki-o* 'cake-ACC' in (41) while leaving the conjunction marker intact, then the result should allow the reading that was absent in (40), namely that Taro ordered a cup of coffee and a cake. This should be so because the target of the deletion – *keeki-o tyuumonsuru* 'order cake' – now makes up an independently meaningful sequence of morphemes. Example (42) shows that the relevant reading is indeed available precisely under this ellipsis option which targets the relevant sequence of morphemes.

(42) Taroo-wa koohii-to ~~keeki-o~~ ~~tyuumonsi~~, Hanako-wa kootya-to

Taro-TOP coffee cake-acc order Hanako-TOP black tea-and

keeki-o tyuumonsita.

cake-ACC ordered

'Taro ordered a cup of coffee and a cake and Hanako ordered a cup of black tea and a cake.'

In sum, our proposed sense unit condition is not only natural in the sense that it follows from the very working of the Disanaphora Law. We have also shown that the condition itself receives convincing empirical support from the hitherto unnoticed interpretive contrast in pairs of examples such as (40) vs. (42).

5. Conclusion

In this paper, we have proposed that gapping in Japanese is best explained by what we have called *Dependent String Deletion*, formulated within Williams' (1997) hybrid theory of ellipsis, whereby gapping consists of two steps: the Coordinate Ellipsis of the highest coordinating head such as Cs, Ns and Ts in the coordinate structure headed by *sosite* 'and' the Dependent Ellipsis of any remnant string linearly left-adjacent to the null head. We have demonstrated that this new analysis provides a simple, principled explanation for major structural properties noted for Japanese gapping, including a) the island-insensitivity of remnants under gapping (Mukai 2003), b) the limitation of gapping to true coordinate structures headed by the conjunction marker *sosite* 'and' (Kato 2006), c) the aggressive violation of standardly assumed constituency requirements on ellipsis and even morphological boundaries (Tagawa 2008), and d) the linear order-sensitive distribution of case/particle drop in the gapped conjunct (Abe & Hoshi 1997; Kim 1998; Sohn 1999). Properties (a, c, d) are elegantly explained as natural consequences of our position that Dependent String Deletion applies to a phonetic string in the PF component under the condition of linear string adjacency with the same occurrence of the string elsewhere without any resort to syntactic movement in

the derivation of gapping configurations in Japanese. Property (b) falls into place as our conception of the trigger of the Coordinate Ellipsis as the null projection of the bivalent lexical item *sosite* 'and' a là Williams (1994, 1997).

To her credit, Mukai (2003) is the first comprehensive study to argue for the string-based deletion analysis of gapping in Japanese. We have indeed followed the footstep of Mukai's theory in our analysis, but have pointed out that her particular version of the String Deletion approach both over- and under-generates in face of those gapping cases involving verbal nouns and CP-coordination, a series of problems which we have shown to be successfully resolved in our own formulation of this operation with crucial reference to the fully dependent nature of String Deletion triggered by Coordinate Ellipsis. In the course of this demonstration, we have further proposed that gapping in Japanese is subject to the sense unit condition to the effect that String Deletion must target an independently meaningful unit consisting of a sequence of morphemes, an axiom which we have shown is, in turn, derived from the requirement imposed by Williams' (1997) Disanaphora Law. We have noted that this condition yields an important prediction, not available in Mukai's system, that the depth of penetration of the Dependent String Deletion within the remnant of the Coordinate Ellipsis should correlate with the semantic interpretation of arguments silenced by this operation, a prediction which was indeed borne out.

Needless to say, we have not completely established what the ultimate theory of String Deletion looks like, despite its clearly motivated empirical bites. However,   the results of our study indicate at least that some PF-deletion process has its own set of guidelines independent of syntactic computation, as clearly evidenced, for example, by the insensitivity of gapping to syntactic as well as morphological constituencies, the linear sensitive distribution of particle omission, and the lack of island effects under the derivation of gapping. Our current study, together with other contemporary works arguing for String Deletion (Fukui and Sakai 2003; Mukai 2003; An 2016; Sato and Maeda, to appear), has helped uncover several core architectural criteria that the ultimate theory of String Deletion

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(and, PF-deletion, more generally) must be able to satisfy. For example, Sato and Maeda (to appear) have presented a wide variety of examples from the so-called particle stranding ellipsis construction in Japanese to prove that a) string deletion must apply to a contiguous sequence of phonetic string and that b) this operation may target non-syntactic constituents. These two properties are highly reminiscent of the two central properties of gapping as well that we reported in this paper.

Sato and Maeda propose that the particle stranding ellipsis construction is derived through the application of String Deletion to a set of string so that the left edge of the utterance phrase coincides with the left edge of the intermediate phrase. Given the phonetic evidence reported by Kawahara and Shinya (2008) that each syntactic clause in the gapping example in Japanese involves Intonational Phrase whereas one sentence contains one Utterance Phrase, it may be a possible conjecture that String Deletion applies freely either from the left edge or the right edge of some major prosodic constituency, most plausibly, the level of Intonational Phrase, as schematically illustrated in (43a, b).

(43) a. [$_{UtteranceP}$ [$_{IntonationP}$ ~~W X Y~~ Z]]

       (particle stranding ellipsis: String Deletion applies to the right)

     b. [$_{UtteranceP}$ [$_{IntonationP}$ W ~~X Y Z~~]]

       (gapping: String Deletion applies to the left)

We believe that the major properties reported here for Japanese gapping clearly motivate the postulation of some version of a string-sensitive PF-deletion in the phonological component as one additional architectural component of a comprehensive theory of PF-deletion.

Abbreviations

ACC = accusative case, COMP = complementizer, COP = copula, DAT = dative case, GEN = genitive case, LOC = locative, NOM = nominative case, PAST = past tense, POL = politeness marker, PRT = particle, TITLE = title, TOP = topic marker

Competing Interests

The authors have no competing interests to declare.

References

Abe, Jun & Hiroto Hoshi. 1997. Gapping and P-stranding. *Journal of East Asian Linguistics* 6. 101–136.

Abe, Jun & Chizuru Nakao. 2012. String-vacuity under Japanese right node raising. In: Matthew A. Tucker, Anie Thompson, Oliver Northrup & Ryan Bennett (eds.), *MIT Working Papers in Linguistics 64: Formal Approaches to Japanese Linguistics 5 (FAJL5),* 1–14. Cambridge, MA: MITWPL.

Ackema, Peter & Krista Szendröi. 2002. Determiner sharing as an instance of dependent ellipsis. *Journal of Comparative Germanic Linguistics* 5. 3–34.

An, Duk-Ho. 2007. Syntax at the PF interface: Prosodic mapping, linear order, and deletion. Storrs: University of Connecticut dissertation.

An, Duk-Ho. 2016. Extra deletion in fragment answers and its implications. *Journal of East Asian Linguistics* 25. 313–350.

Fukui, Naoki & Hiromu Sakai. 2003. The visibility guideline for functional categories: Verb raising in Japanese and related issues. *Lingua* 113. 321–375.

George, Leland. 1980. Analogical generalization in natural language syntax. Cambridge, MA: Massachusetts Institute of Technology.

Hoji, Hajime. 1985. Logical form constraints and configurational structures in Japanese. Seattle, WA: University of Washington dissertation.

Kageyama, Taro. 1993. *Bunpoo to gokeisei* (Grammar and word formation). Tokyo: Hituzi Syobo.

Kato, Kumiko. 2006. Japanese gapping in minimalist syntax. Seattle: University of Washington dissertation.

Kawahara, Shigeto & Takahito Shinya. 2008. The intonation of gapping and coordination in Japanese: Evidence for intonaitonal phrase and utterance. *Phonetica* 65:62–105.

Kim, Jeong-Seok. 1998. A minimalist account of gapping in Korean/Japanese. *Studies in Generative Grammar* 8. 105–137.

Merchant, Jason. 2001. *The syntax of silence: Sluicing, islands, and the theory of ellipsis*. Oxford: Oxford University Press.

Mukai, Emi. 2003. On verbless conjunction in Japanese. In: Makoto Kadowaki and Shigeto Kawahara (eds.), *Proceedings of NELS 33*, 205–224. Amherst, MA: GLSA Publications.

Saito, Mamoru. 1987. Three notes on syntactic movement in Japanese. In: Takashi Imai & Mamoru Saito (eds.), *Issues in Japanese linguistics*, 301–350. Dordrecht: Foris.

Sato, Yosuke & Masako Maeda. To appear. Particle stranding ellipsis involves PF-deletion. *Natural Language and Linguistic Theory*.

Sohn, Keun-Won. 1999. Deletion or copying? Right node raising in Korean and Japanese. *Proceedings of the Nanzan GLOW*. 367–384. Nagoya: Nanzan University.

Tagawa, Takumi. 2008. Keitai toogo riron niokeru sakuzyo gensyoo-no toriatukai-nituite – Nihongo-no uhoo setten kuriage koobun-o tyuusinni [On the treatment of deletion phenomena in a morphosyntactic theory – with special reference to right-node-raising constructions in Japanese]. Paper presented at the 5th Meeting of the Tsukuba Applied Linguistic Meeting.

Takano, Yuji. 2010. Scrambling and control. *Linguistic Inquiry* 41:83–110.

Takita, Kensuke. 2017. Antecedent-contained clausal argument ellipsis. To appear in *Journal of East Asian Linguistics*.

Williams, Edwin. 1994. *Thematic structure in syntax*. Cambridge, MA: MIT Press.

Williams, Edwin. 1997. Blocking and anaphora. *Linguistic Inquiry* 28. 577–628.