b. Gakusei-ga tyoodo zyuu-nin hikooki-ni notta
student-NOM exactly ten-person plane-on boarded

'Exactly ten students boarded the plane'

(62a) does not entail (62b).

Then, does this difference pose a problem for the unified individual event analysis of the complements of perception verbs and factive verbs? I would like to suggest that the answer is negative. I illustrate the point by discussing the difference in the ways the tense of the embedded clause is interpreted in the two types of sentences. A perception verb individualizes events more finely along the time dimension. As is briefly discussed below, it seems to individualize events in other dimensions as well.

First, in a sentence with the perception verb *see*, for example, the matrix event of seeing and the event the embedded clause expresses must take place simultaneously. This is encoded in the syntax in English. The embedded clause, being a small clause, lacks tense. Thus, (63a) is interpreted as (63b) with a specific time t in the past.

(63) a. John saw Mary leave
b. [∃e: leave (Mary, e)] John sees e (at some time t in the past)

This is true for Japanese as well although perception verb complements accompany tense. Let us consider again (48), repeated below in (64).

(64) Taroo-wa [$_{CP}$ kirin-ga heya-ni hair-u /hait-ta no]-o mita
-TOP kirin-NOM room-to enter-Pres/enter-Past *no*-ACC saw

'Taroo saw a kirin enter the room'

With the non-past *-(r)u*, a kirin entering the room and Taroo seeing the event must take place simultaneously. And this is true with the past *-ta* as well. As noted above, *-ta*, in this context, is interpreted as a perfective aspect, and the sentence roughly means that Taroo saw a kirin complete its entrance into the room. The event of a kirin completing its action and Taroo seeing the event are simultaneous.

Then, what (65a) and its Japanese counterpart entail must be (65b).

(65) a. John saw exactly ten students board the plane
b. Exactly ten students boarded the plane at the time John saw exactly ten students board the plane
c. Exactly ten students boarded the plane

(65b) is not equivalent to the tense-wise more general sentence in (65c). In the case of Japanese, it is possible to specify the time of the perceived event as in (66).

(66) Hanako-wa [$_{CP}$ gakusei-ga sono toki tyoodo zyuu-nin hikooki-ni noru
-TOP student-NOM that time exactly ten-person plane-on board
no]-o mita
no-ACC saw

'Lit. Hanako saw [exactly ten students board the plane at that time]'

(66) entails that exactly ten students boarded the plane at that time.[8]

On the other hand, the tense of the embedded clause need not coincide with the tense of the matrix clause in factive sentences. The point is obvious with the simple examples in (67).

(67) a. John regrets that he boarded the plane

b. Taroo-wa [$_{CP}$ *pro* hikooki-ni notta no]-o kookaisite iru
-TOP plane-on boarded *no*-ACC regret

'Taroo regrets that he boarded the plane'

These examples are interpreted as in (68).

(68) [∃e: board (John, the plane, e) (at some t in the past)] John regrets e (at the speech time)

Similarly, (69a) with the non-monotone increasing *only ten* and its Japanese counterpart are interpreted as in (69b).

(69) a. John regrets that only ten students boarded the plane
b. [∃e: [only10x: x a student] board (x, the plane, e) (at some t in the past)] John regrets e (at the speech time)

(69b) entails that only ten students boarded the plane. As expected, if *at that time* is added to the complement of (69) as in (70a), it only entails (70b) and not (70c).

(70) a. John regrets that only ten students boarded the plane at that time
b. Only ten students boarded the plane at that time
c. Only ten students boarded the plane

The analysis of the differences between the complements of perception verbs and factive verbs need to be made more precise. What the discussion above suggests is that the

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[8] Note that this complication does not affect monotone increasing quantifiers. (ia) entails (ib) when Q is monotone increasing.

(i) a. [Qx: A(x)] B(x) at a specific time t in the past.
b. [Qx: A(x)] B(x) at some time in the past.

event that a perception verb complement expresses is individualized in relation to the time of the matrix event, whereas the event (or state) that a factive verb complement expresses is more general in this respect.[9] Here, it is possible that the events of perception verb complements can be individualized in other dimensions as well. For example, one may raise doubts on the inference from (65a) to (65b) in the following situation. Suppose that John is at the economy class boarding gate, and saw exactly ten students board the plane. Suppose also that there were five students who boarded the same plane through the business class boarding gate at the same time, and John did not see them board the plane. In this situation, one may say that (65a) is true and (65b) is false. Then, the description of the event must be made more specific (for example, by adding *through the economy class gate*) so that the entailment is maintained. The complexity with the individualization of events is more evident in with causative sentences. (71a) does not entail (71b) or (71c).

(71) a. Mary made exactly ten students board the plane
b. Exactly ten students boarded the plane
c. Exactly ten students boarded the plane at the time Mary made exactly ten students board the plane

In the case of causatives, events seem to be individualized with respect to cause. Thus, what (71a) implies, roughly, is that exactly ten students boarded the plane because of Mary.

Also, the discussion above treated the perception verb complements in Japanese and English in the same way. There are a few differences. For example, the small clause complement in English completely lacks tense, and hence, the matrix tense extends to it. As the matrix event of seeing is instantaneous, (72) is odd unless Mary's height fluctuates, as Higginbotham points out.

(72) #John saw Mary tall

On the other hand, the Japanese counterpart of (72) is quite natural as shown in (73).

(73) Taroo-wa [$_{CP}$ Hanako-ga se-ga takai no]-o mite, odoriota
-TOP -NOM height-NOM tall *no*-ACC seeing surprised

'Lit. Taroo was surprised to see Hanako tall'

This must be because the embedded clause carries its own tense. All that is required is that the event (or state) that the embedded clause expresses occurs (or holds) when matrix event takes place.

[9] In this sense, it makes sense to say that factive verb complements are factive whereas perception verb complements are not. It is also understandable that Higginbotham presented the *individual* event analysis for perception verb complements.

Nevertheless, the general point of the discussion, I hope, was clear. It suggests that Higginbotham's (1983) individual event analysis can be extended to finite CPs, in particular, to factive verb complements. The differences between the complements of perception verbs and factive verbs are likely to be due to independent factors. The factive presupposition of the latter should be attributed to the information structure if Simons (2007) is correct. And the truth of a perception verb complement apparently fails to be entailed in some cases because a perception verb forces a finer individualization of the event its complement expresses with respect to time and other dimensions.

5. Conclusion

In this paper, I discussed the distributions of the Japanese complementizers, *no*, *ka* and *to*, and argued that the distinction between *no* and *to*, in particular, provides direct evidence for Davidson's (1967, 1968-69) theory of semantic representation. Then, I presented an analysis for perception verb complements in Japanese, which are uniformly finite CPs headed by *no*. I argued that they provide evidence for Higginbotham's (1983) individual event analysis and for the extension of the analysis from small clauses to finite CPs. Finally, I suggested that the analysis should be applied to factive verb complements as well, which are also finite CPs headed by *no* in Japanese.

The discussion in this paper, if it is on the right track, has a number of additional implications for the analysis of English. I argued that the individual event analysis should be extended to the finite CP complements of factive verbs in part because the Japanese counterparts of those CPs are headed by *no* and express descriptions of events. The same point can be made for non-finite CP complements as in (74).

(74) John waited for Mary to come

The Japanese counterpart of *wait*, *mat*, takes a CP complement headed by *no*, as shown in (75).

(75) Taroo-wa [$_{CP}$ Hanako-ga kuru no]-o matta
-TOP -NOM come *no*-ACC waited

'Taroo waited for Hanako to come'

Then, the individual event analysis should be extended to non-finite CPs as well. The complement of *wait* is referentially opaque simply because *wait* is an intensional verb.

Also, according to the analysis suggested in this paper, the complements in (76a-b) are interpreted differently although they look identical syntactically.

(76) a. John says that he went to London
b. John regrets that he went to London

The complement in (76a) expresses a paraphrase of direct discourse whereas that in (76b) expresses an event. Then, *that* in (76a) must be a Report head just like *to* in Japanese. This raises the question why *that* differs from *que* in Spanish and *to* in Japanese, and cannot embed a question, for example.

(77) *John asked that what Mary bought

There are a number of possibilities for this. For example, *that* as a Report head may select Finite. Or it may consist of two features, [+Report] and [+Finite], and consequently, must originate at Fin and move to Report. In the latter case, (77) may be ruled out as *that* moves across a question C. I must leave the pursuit of these implications, as well as the refinement of the arguments presented in this paper, for future research.

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Cartography and Selection: Case Studies in Japanese*

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1 Introduction

The cartographic structure of the Japanese right periphery has been investigated extensively in recent years. For example, Ueda (2007) examines modals and presents the following structure:

(1) [$_{\text{U-modalP}}$ [$_{\text{E-modalP}}$ [$_{\text{TP}}$ … T] E(pistemic)-modal] U(tterance)-modal]

Saito (2009) discusses the hierarchical relations of complementizers and arrives at (2).

(2) [$_{\text{CP}}$ … [$_{\text{CP}}$ … [$_{\text{CP}}$ [$_{\text{TP}}$ … T] Finite (*no*)] Force (*ka*)] Report (*to*)]

Endo (2010), on the other hand, considers the distributions of sentence-final particles and proposes (3).

(3) [$_{\text{Mod-SpeechActP}}$ [$_{\text{Mod-EvaluativeP}}$ [$_{\text{Mod-EvidentialP}}$ [$_{\text{Mod-EpistemicP}}$ [$_{\text{TP}}$ … T] *wa*] *na*] *yo*] *ne*]

The purpose of this paper is two-fold. First, I would like to put these results together and present a more comprehensive picture of the cartography of the Japanese right periphery.

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* This is a slightly revised version of the paper presented at the conference, "Syntactic Cartography – Where Do We Go from Here?", held at the University of Geneva on June 7-9, 2012. The material was presented also at seminars at the University of Maryland, Nanzan University and the University of Connecticut. I would like to thank the audiences at these places for helpful comments, especially Jonathan Bobaljik, Norbert Hornstein, Richie Kayne, Hideki Kishimoto, Keiko Murasugi, Paul Portner, Ian Roberts, and Kensuke Takita. Special thanks are due to Tomoko Haraguchi for discussions that inspired me to pursue the research reported here. Section 2 is an extension of her work on Japanese modals, Haraguchi (2012), and Section 4 is a summary of our joint paper on Japanese sentence-final particles, Saito and Haraguchi (2012).

Secondly, I will reconsider the hierarchies themselves and explore their sources. It is assumed in the Minimalist research that phrase structure is constructed by the minimal operation Merge, which takes two syntactic objects and forms their union. (See Chomsky 1995, 2013.) This operation, taken by itself, does not yield the hierarchies in (1)-(3). Then, their sources must be sought elsewhere to the extent that they are correct. I will show that s-selection plays a role to determine the distributions of heads in the right periphery. I will argue in addition that compatibilities in morphology, semantics and speech acts limit the distrubutions of modals, complementizers and sentence-final particles respectively.

The following section concerns modals. Although Ueda (2007) proposes the hierarchy in (1), she also points out that a simple sentence cannot contain more than one modal. I will show that this generalization and more generally, the distributions of modals follow from morphology and s-selection. In Section 3, I will briefly review the discussion in Saito (2009) and argue that the hierarchy of complementizers in (2) can be expained by the s-selection and semantic properties of the complementizers. Finally, in Section 4, I will present Haraguchi's (2012) argument that sentence-final particles are genuine discourse elements whose distruibutions are confined to matrix contexts, and suggest that their distrubutions are dictated by s-selection as well as compatibility of speech acts. Section 5 concludes the paper.

2 The Uniqueness Condition on Modals in Japanese

In the Japanese syntax literature, 'modal' often refers to a category of clause-final elements that express modality or force and do not carry tense. Ueda (2007) classifies them into the two groups shown in (4).

(4) a. E(pitemic)-modals: *daroo* (surmise), *desyoo* (formal surmise), *mai* (negative surmise)
b. U(tterance)-modals: *ro/e* (imperative), *(i)nasai* (formal imperative), *na* (negative imperative), *yoo* (invitation), *(i)masyoo* (formal invitation), *yoo* (volition), *mai* (negative volition)

She assumes the hierarchy in (1), and at the same time, observes that two modals cannot co-occur in the same clause. The observation is confirmed by the examples in (5).

(5) a. Kimi-wa soko-e ik-u daroo (*na)
you-TOP there-to go-Pres. will don't
'Don't go there (Don't be going there)'

b. Taroo-wa soko-e ik-u mai (*daroo)
Taroo-TOP there-to go-Pres. won't will
'Taroo won't go there (I guess Taroo won't go there)'

I will argue in this section that this uniqueness condition on modals follows from their lexical properties.[1]

It should be noted here that English modals exhibit a similar uniqueness condition. Thus, (6a) is totally out although it is synonymous with the grammatical (6b).

(6) a. *John may can solve the problem
b. John may be able to solve the problem

It has long been observed that English modals can occur only in finite contexts and hence, cannot follow another modal. This suggests that they have a morphological requirement to merge with an affixal tense. I will assume that a similar approach should be pursued for the parallel case in Japanese. Yet, the situation is slightly different as Japanese modals, by definition, do not carry tense.

First, it seems plausible that all the modals in (4) take propositional complements. Propositions can take the syntactic forms of a *v*P (as in small clauses), a TP and a ModalP, for example. This by itself does not exclude the multiple occurrences of modals in (5). However, each modal has additional lexical requirements. Let's examine the imperative *ro/e* first. This element is a suffix that attaches to verb stems. As shown in (7), *ro* is employed for verb stems that end in vowels and *e* for those that end in consonants.

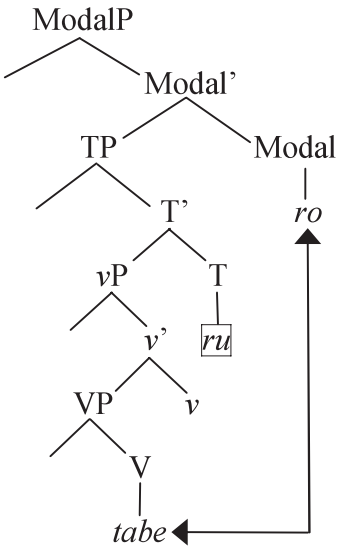
(7) a. Taroo-wa sore-o tabe-ro
Taroo-TOP it-ACC eat-Imp.
'Taroo, eat it'
b. Taroo-wa soko-ni ik-e
Taroo-TOP there-to go-Imp.
'Taroo, go there'

[1] The material in this section developed out of discussions with Tomoko Haraguchi over the last couple of years. See Haraguchi (2012) for an analysis that is different but shares the same general approach.

The suffixal nature of *ro/e* automatically limits its distribution. For example, if it takes a TP complement, then T intervenes and blocks its morphological merger with the verb, as illustrated in (8).

(8) a. *Taroo-wa sore-o tabe-ru-ro
Taroo-TOP it-ACC eat-Pres.-Imp.

b.



The only morphologically permissible option is for it to take a *v*P complement. In this case, the suffix can successfully merge with V (or V-*v* complex). Significantly, *ro/e* cannot take a ModalP as its complement because the intervening modal blocks the morphological merger just like T. There is an independent reason then that *ro/e* cannot follow another modal.

Most of the other utterance modals have the same suffixal property. Among them are *(i)nasai* (formal imperative), *yoo* (invitation, volition), and *(i)masyoo* (formal invitation). Examples of *(i)masyoo* are shown in (9).[2]

(9) a. Sore-o tabe-masyoo
it-ACC eat-let's
'Let's eat it'

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[2] The form *masyoo* appears when the verb stem ends in a vowel, and *imasyoo* when the verb stem ends in a consonant. I assume that the morpheme is *imasyoo*, and that the initial vowel of the suffix is deleted by the following morphophonological rule when the stem ends in a vowel:

(i) V → Ø / V + __ C

b. Soko-e ik-imasyoo
there-to go-let's
'Let's go there'

I conclude then that they all must take *v*P complements in order to morphologically merge with V.

The epistemic modals *daroo* (surmise) and *desyoo* (formal surmise) also exhibit a regular pattern. They always take a TP complement. The head T can be present or past, and can be a verbal tense (*ru/ta*) or an adjectival tense (*i/katta*). This is shown in (10).

(10) a. Taroo-wa sore-o tabe-ru /tabe-ta daroo
Taroo-TOP it-ACC eat-Pres./eat-Past will
'I guess Taroo will eat/ate it'
b. Soko-no huyu-wa samu-i /samu-katta daroo
there-GEN winter-TOP cold-Pres./cold-Past will
'I guess the winter there is/was cold'

(11) shows that they cannot be employed as verbal or adjectival suffixes.[3]

(11) a. *Taroo-wa sore-o tabe-daroo
Taroo-TOP it-ACC eat-will
'I guess Taroo eats it'
b. *Soko-no huyu-wa samu-daroo
there-GEN winter-TOP cold-will
'I guess the winter there is cold'

Thus, *daroo* (and *desyoo*) takes a tensed proposition as a complement and s-selects T. It follows that they cannot have a ModalP as a complement.

The situation with *na* (negative imperative) is slightly more complex but is similar. It takes a TP with verbal present tense as its complement. The following examples meet this

[3] There is another modal *karoo*, which is similar in meaning to *daroo* but is a suffix that attaches to adjectival stems. Thus, (11b) becomes grammatical when *karoo* is substituted for *daroo* as in (i).

(i) Soko-no huyu-wa samu-karoo
there-GEN winter-TOP cold-will
'I guess the winter there is cold'

condition:

(12) a. Taroo-wa sore-o tabe-ru na
Taroo-TOP it-ACC eat-Pres. don't
'Taroo, don't eat it'
b. Taroo-wa soko-ni ik-u na
Taroo-TOP there-to go-Pres. don't
'Taroo, don't go there'

(13) shows that *na* is not a verbal suffix and also cannot take TP complements headed by past or adjectival present.

(13) a. *Taroo-wa sore-o tabe-na
Taroo-TOP it-ACC eat-don't
'Taroo, don't eat it'
b. *Taroo-wa sore-o tabe-ta na
Taroo-TOP it-ACC eat-Past don't
'Taroo, you should not have eaten it'
c. *Taroo-wa kimuzukasi(-i) na
Taroo-TOP difficult(-Pres.) don't
'Taroo, don't be difficult'

It appears then that *na* selects for a specific subcategory, verbal present tense. But this requirement is plausibly s-selection rather than categorial selection (c-selection).

It is well known that verbal present tense *ru* is more precisely characterized as indicating non-past. Thus, it occurs also in future contexts as in (14).

(14) a. Hanako-wa asita wani-o tabe-ru
Hanako-NOM tomorrow alligator-ACC eat-Pres.
'Hanako is going to eat alligator meat tomorrow'
b. Taroo-wa rainen soko-ni ik-u
Taroo-TOP next.year there-to go-Pres.
'Taroo is going there next year'

This extension to future contexts, as far as I know, is not observed with the adjectival present *i*. (15) is ungrammatical.

(15) a. *Taroo-wa asita kimuzukasi-i
Taroo-TOP tomorrow difficult-Pres.
'Taroo will be difficult tomorrow'
b. *Watasi-wa asita kanasi-i
I-NOM tomorrow sad-Pres.
'I will feel sad tomorrow'

Then, it can be hypothesized that *na* s-selects future tense.

The distribution of *mai* (negative volition, negative surmise) is similar. The following examples indicate that it s-selects future tense just like *na*.

(16) a. Watasi-wa sore-o tabe-ru mai
I-TOP it-ACC eat-Pres. won't
'I will not eat it'
b. Watasi-wa soko-ni ik-u mai
I-TOP there-to go-Pres. won't
'I will not go there'
c. *Watasi-wa sore-o tabe-ta mai
I-TOP it-ACC eat-Past won't
'I will not have eaten it'
d. *Watasi-wa kanasi(-i) mai
I-TOP sad-Pres. won't
'I will not feel sad'

But there is another pattern observed with *mai*, as in (17).

(17) Watasi-wa sore-o tabe-mai
I-TOP it-ACC eat-won't
'I guess Taroo won't eat it'

In this example, *mai* is suffixed to the verbal stem *tabe*. Curiously, *mai* cannot be suffixed to a verb stem that ends in a consonant. Thus, an example parallel to (17) cannot be formed with (16b). Here, I tentatively propose that the verbal suffix is not *mai* but *(u)mai*. Then, the example with this suffix that corresponds to (16b) is homophonous with (16b) as in (18).[4]

[4] The suffix is *umai* uniformly. When it is merged with *tabe* as in (17), the initial *u* is deleted according to the morphophonological rule suggested in Footnote 2.

(18) Watasi-wa soko-ni ik-umai
I-TOP there-to go-won't
'I will not go there'

This concludes the discussion of all modals listed in (4). It was shown that most of them are verbal suffixes and hence, must take *v*P complements so that morphology can interpret them. *Daroo* (surmise) and *desyoo* (formal surmise) s-select T and must take TP complements. A similar pattern is observed with *na* (negative imperative) and *mai* (negative volition, negative surmise), which s-select T with future tense. It follows then that no modal can take a ModalP as a complement.[5] This accounts for the uniqueness condition on modals. Ueda (2007) groups the elements in (4) under the category Modal in part because they are in complementary disctribution. But given the analysis suggested here, it is no longer clear that they form a natural class. As shown in the subsequent sections, the complementizer *no* and the discourse particle *wa* s-select T, and hence, are in complementary distribution with the elements in (4). This, however, does not show that they belong to the category Modal. This state of affairs is expected under the bare phrase structure theory where there are no "fixed positions" for categories and Merge applies freely to two syntactic objects. It is simply that the formed structure must meet the requirements of morphology and s-selection, and this forces some elements to be in complementary distribution.

3 The Hierarchy of Japanese Complementizers

Japanese has three complementizers, *no*, *ka* and *to*, as illustrated in (19).

(19) a. Taroo-wa [$_{CP}$ Hanako-ga soko-ni i-ru no]-o sittei-ta
Taroo-TOP Hanako-NOM there-in be-Pres. *no*-ACC know-Past
'Taroo knew *that* Hanako was there'

b. Taroo-wa [$_{CP}$ Hanako-ga sono hon-o mottei-ru ka] siritagattei-ru
Taroo-TOP Hanako-NOM that book-ACC have-Pres. *ka* want.to.know-Pres.
'Taroo wants to know whether Hanako has that book'

c. Taroo-wa [$_{CP}$ Hanako-ga sono hon-o mottei-ru to] omottei-ru
Taroo-TOP Hanako-NOM that book-ACC have-Pres. *to* think-Pres.
'Taroo thinks that Hanako has that book'

These complementizers can co-occur as in (20), and when they do, they appear in the order

[5] Two modals can appear, although not adjacently, in a structure like V-*v*-(T)-Modal-(X)-V-*v*-(T)-Modal. But the two modals belong to different clauses in this structure.

indicated.

(20) Taroo-wa [$_{CP}$ kare-no imooto-ga soko-ni i-ta (no) ka (to)] minna-ni tazune-ta
Taroo-TOP he-GEN sister-NOM there-at be-Past *no ka to* all-DAT inquire-Past
'Taroo asked everyone *if* his sister was there'

Given this, I proposed the hierarchy in (2), repeated in (21), in Saito (2009).

(21) [$_{CP}$ … [$_{CP}$ … [$_{CP}$ … Finite (*no*)] Force (*ka*)] Report (*to*)]

(21) predicts that the complementizer sequences in (22a) are allowed while those in (22b) are not.

(22) a. *no-ka, ka-to, no-ka-to*
b. **to-ka, ka-no, to-no, to-ka-no, ka-to-no*
c. **no-to*

There is, however, one sequence, *no-to* in (22c), that is consistent with the hierarchy in (21) and yet is illicit. Thus, (23) is ungrammatical.

(23) *Taroo-wa [$_{CP}$ kare-no imooto-ga soko-ni i-ru no to] kitaisi-ta
Taroo-TOP he-GEN sister-NOM there-at be-Pres. *no to* expect-Past
'Taroo expected his sister to be there'

The purpose of this section is to provide an explanation for the hierarchy in (21), and at the same time, to account for the exception in (22c).

It is necessary to consider the properties of each complementizer first in order to examine the source of their hierarchical relations. *Ka* is straightforward as it is the complementizer for questions. *No* and *to*, on the other hand, require some discussion. Let's consider *to* first.

To is ambiguous between a marker of direct quotation as in (24a) and a complementizer that embeds indirect discourse as in (24b).

(24) a. Hanako-ga, "Watasi-wa tensai da," to it-ta /omot-ta (koto)
Hanako-NOM I-TOP genius be *to* say-Past/think-Past fact
'(the fact that) Hanako said/thought, "I'm an genius"'
b. Hanako-ga [zibun-ga tensai da to] it-ta /omot-ta (koto)
Hanako-NOM self-NOM genius be *to* say-Past/think-Past fact
'(the fact that) Hanako said/thought that she is an genius'

In the latter case, it has been widely assumed that *to* is employed for propositional complements as it appears when the matrix verb is a typical bridge verb like *iw* 'say' and *omow* 'think'. However, I argued in Saito (2009) that *to* embeds a paraphrase or report of direct discourse. Plann (1982) shows that the Spanish complementizer *que* has this function. What I proposed is that *to* is specialized for this function. One piece of evidence is that the matrix verbs that s-select *to* are all verbs of saying and thinking, that is, verbs that are compatible with direct quotation. A partial list of those verbs is shown in (25).

(25) *omo-u* 'think', *kangae-ru* 'consider', *sinzi-ru* 'believe', *i-u* 'say', sakeb-u 'scream', *syutyoosu-ru* 'claim, insist', *tazune-ru* 'inquire', *kitaisu-ru* 'expect, hope', *kakuninsu-ru* 'confirm', *kanzi-ru* 'feel' (all in present tense)

Secondly, *to* embeds various types of sentences just like *que*. *To* follows a question in (26a), imperative sentences in (26b-c), and an expression of invitation in (26d).[6]

(26) a. Taroo-wa Ziroo-ni [$_{CP}$ kanozyo-ga kare-no ie-ni ku-ru ka to] tazune-ta
Taroo-TOP Ziroo-DAT she-NOM he-GEN house-to come-Pres. *ka to* ask-Past
'Taroo asked Ziroo if she is coming to his house'

b. Hanako-wa Taroo-ni [$_{CP}$ kanozyo-no ie-ni i-ro to] meizi-ta
Hanako-TOP Taroo-DAT she-GEN house-at be-Imp. *to* order-Past
'Hanako ordered Taroo to be at her house'

c. Hanako-wa Taroo-ni [$_{CP}$ kanozyo-no ie-ni ik-u-na to] meizi-ta
Hanako-TOP Taroo-DAT she-GEN house-to go-Pres.-don't *to* order-Past
'Hanako ordered Taroo not to go to her house'

d. Hanako-wa Taroo-o [$_{CP}$ kanozyo-no ie-ni ik-oo to] sasot-ta
Hanako-TOP Taroo-ACC she-GEN house-to go-let's *to* invite-Past
'Hanako invited Taroo to go to her house'

This is unexpected if *to* is a complementizer for propositional complements. On the other hand, the examples in (26) should be grammatical if *to* embeds paraphrases of direct discourse. A direct discourse, and hence its paraphrase, can be a question, an order or an

[6] Plann (1982) demonstrates that *que* can take a question CP as a complement when the matrix verb is a verb of saying or thinking. She argues, based on this fact, that *que* can embed a paraphrase of a quotation. Rivero (1994) shows in support of Plann's analysis that *que* takes an imperative complement as well. The discussion of *to* in Saito (2009), thus, closely follows that of *que* in these two papers.

invitation, in addition to a simple statement.

Then, what is the complementizer for embedded propositions in Japanese? It is argued in Saito (2009) that *no* is employed for this purpose. (27) is a partial list of matrix verbs that take CP complements headed by *no*.

(27) *wasure-ru* 'forget', *kookaisu-ru* 'regret', *mi-ru* 'see', *mat-u* 'wait', *tamera-u* 'hesitate', *kyohisu-ru* 'refuse', *ukeire-ru* 'accept', *kitaisu-ru* 'expect, hope', *kakuninsu-ru* 'confirm', *kanzi-ru* 'feel' (all in present tense)

All of these verbs take complements that express events or actions. For example, what one forgets is an event or to perform an action. What one hesitates is to perform an action and what one waits for is for an event to happen. Then, they take propositional complements.

Matsumoto (2010) argues that *no* is a Finite head, a hypothesis originally proposed by Hiraiwa and Ishihara (2002). If *no* is the complementizer for propositions, it should in principle be able to embed a ModalP, as a ModalP can stand for a proposition. However, Matsumoto observes that *no* s-selects T and is incompatible with modals. This is shown in (28)-(29).

(28) a. Taroo-wa [$_{CP}$ [$_{TP}$ ame-ga hur-u] no]-o kitaisi-ta
Taroo-TOP rain -NOM fall-Pres. *no*-ACC expect-Past
'Taroo hoped that it would rain'

b. *Taroo-wa [$_{CP}$ [$_{ModalP}$ ame-ga hur-u daroo] no]-o kitaisi-ta
Taroo-TOP rain-NOM fall-Pres. will *no*-ACC expect-Past
'Taroo hoped that it would rain'

(29) a. Taroo-wa [$_{CP}$ [$_{TP}$ ame-ga hur-u] no]-o yosoosi-ta
Taroo-TOP rain-NOM fall-Pres. *no*-ACC predict-Past
'Taroo predicted that it would rain'

b. *Taroo-wa [$_{CP}$ [$_{ModalP}$ ame-ga hur-u mai] no]-o yosoosi-ta
Taroo-TOP rain-NOM fall-Pres. won't *no*-ACC predict-Past
'Taroo predicted that it would not rain'

Finite, by definition, is closely related to Tense. Then, the fact that *no* s-selects T, Matsumoto (2010) argues, provides evidence that it is a Finite head.

Let us now consider the hierarchy in (21), repeated in (30), with this background.

(30) [$_{CP}$ … [$_{CP}$ … [$_{CP}$ … Finite (*no*)] Force (*ka*)] Report (*to*)]

The fact that *no* occupies the lowest position in the hierarchy already follows from its s-selection requirement. As it s-selects T, it cannot take a CP complement. On the other hand, *ka* and *to* are not in selectional relation with any specific head. *Ka*, for example, merges with a syntactic object that stands for a proposition and creates a question. A proposition can be expressed as a *v*P, a TP, a ModalP or a CP. *Ka* can take a TP, a ModalP and a CP as its complement, as shown in (31).

(31) a. Taroo-wa [$_{CP}$ [$_{TP}$ Hanako-ga soko-ni it-ta] ka] minna-ni tazune-ta
Taroo-TOP Hanako-NOM there-to go-Past *ka* all-DAT ask-Past
'Taroo asked everyone if Hanako went there'

b. Taroo-wa [$_{CP}$ [$_{ModalP}$ Hanako-ga soko-ni ik-u daroo] ka] minna-ni tazune-ta
Taroo-TOP Hanako-NOM there-to go-Pres. will *ka* all-DAT ask-Past
'Taroo asked everyone if Hanako would go there'

c. Taroo-wa [$_{CP}$ [$_{CP}$ Hanako-ga soko-ni it-ta no] ka] minna-ni tazune-ta
Taroo-TOP Hanako-NOM there-to go-Past *no* *ka* all-DAT ask-Past
'Taroo asked everyone if Hanako went there'

(31c) is the most relevant for the hierarchy in (30), which allows the *no-ka* sequence. As argued above, *no* is the complementizer for embedded propositions and a CP headed by *no* stands for a proposition. Hence, *ka* can merge with a *no*-headed CP as in (31c).

The merger of *v*P and *ka* should be possible on semantic grounds but is excluded by morphology. A verb stem is a dependent morpheme and requires a suffix such as tense. As *ka* cannot serve as an appropriate suffix for a verb stem, it cannot take a *v*P complement. Also, *ka* cannot combine with ModalPs and CPs that do not stand for propositions. Thus, the following examples are totally ungrammatical:

(32) a. *Taroo-wa [$_{CP}$ [$_{ModalP}$ Hanako-ga soko-ni ik-e] ka] minna-ni tazune-ta
Taroo-TOP Hanako-NOM there-to go-Imp. *ka* all-DAT ask-Past

b. *Taroo-wa [$_{CP}$ [$_{CP}$ Hanako-ga soko-ni it-ta to] ka] minna-ni tazune-ta
Taroo-TOP Hanako-NOM there-to go-Past *to* *ka* all-DAT ask-Past

The embedded ModalP in (32a) expresses an order, and the embedded *to*-headed CP in (32b) a paraphrase of direct discourse. These are examples of semantic incompatibility as *ka* requires a complement that stands for a proposition. (32b), in particular, illustrates why the complementizer sequence *to-ka* is impossible.

It was shown so far why *no-ka* is possible wheras *ka-no* and *to-ka* are not. It is necessary to review the property of *to* in order to examine the other combinations. It was argued above that *to* embeds a paraphrase of direct discourse. This complementizer, like *ka*, does not s-

select any specific head, and can combine with various types of clauses as long as its semantic requirement is satisfied. It was already shown in (19c) and (26) that *ka* can take a TP, a CP and a ModalP as its complement. Most relevant in the present context is (26a), repeated below as (33).

(33) Taroo-wa Ziroo-ni [$_{CP}$ [$_{CP}$ kanozyo-ga kare-no ie-ni ku-ru ka] to] tazune-ta
Taroo-TOP Ziroo-DAT she-NOM he-GEN house-to come-Pres. *ka to* ask-Past
'Taroo asked Ziroo if she is coming to his house'

As the paraphrased direct discourse can be a question, *to* can take a question CP as its complement. A direct discourse, or an utterance, can express a statement, an assertion, a question, an order, and the like. It is then not surprising that *to* can embed various types of clauses. Outstanding in this context is the ungrammaticality of (23), repeated below as (34).

(34) *Taroo-wa [$_{CP}$ kare-no imooto-ga soko-ni i-ru no to] kitaisi-ta
Taroo-TOP he-GEN sister-NOM there-at be-Pres. *no to* expect-Past
'Taroo expected his sister to be there'

This example indicates that *to* cannot take a *no*-headed CP as its complement. Recall here that *no*-headed CPs stand for propositions, and express events, states, actions and the like. Then, they cannot be construed as paraphrases of direct discourse. The *no-to* sequence is illicit also because of semantic incompatibility.

In this section, I argued that the hierarchical relation among the complementizers, *no*, *ka* and *to*, follows from the s-selection requirement of *no* and the semantics of those complementizers. *No*, which is the complementizer for embedded propositions, s-selects T. Hence, it occupies the lowest position in the hierarchy. *Ka* merges with clauses that stand for propositions and creates questions. Hence, the *no-ka* sequence is possible. *To* embeds paraphrases of direct discourse. Since the paraphrased direct discourse can be a question, the *ka-to* sequence is also possible. This covers all the possible combinations, *no-ka*, *ka-to*, and *no-ka-to*. On the other hand, the *ka-no* and *to-no* sequences are both in conflict with the s-selection requirement of *no*. The *to-ka* sequence is ruled out because a *to*-headed CP does not stand for a proposition. Thus, the hierarchy in (30) is precisely what is expected. The only exception to the hierarchy is that the *no-to* sequence is illicit. This fact too receives an account because a *no*-headed CP cannot express a paraphrase of direct discourse. In the following section, I turn to the distributions of sentence-final discourse particles, another phenomenon for which a hierarchy is proposed.

4 Discourse Particles and Speech Act Compatibility

Japanese is rich in sentence-final particles. Endo (2010) discusses four of them in some detail; *wa*, *yo*, *ne* and *na*. Roughly speaking, the first two are employed for assertion, and the latter two for solicitation of response. As Endo observes, their distributions are quite interesting because some of them can co-occur but only in a fixed order. For example, (35) contains three particles, and they must appear in the order indicated.

(35) Hanako-wa soko-ni i-ta (wa) (yo) (ne)
Hanako-TOP there-at be-Past *wa* *yo* *ne*
'Hanako was there'

In this section, I will investigate the source of this hierarchy.[7] I will first discuss the properties of these particles, and then, suggest that the hierarchy, to a large extent, stems from the specific speech acts they convey.

First, as Haraguchi (2012) shows, these particles are genuine discourse elements whose distribitions are confined to matrix contexts. Thus, they cannot occur even within *to*-headed CPs, which embed various types of clauses as observed above.

(36) a. Hanako-wa [$_{CP}$ Taroo-wa kanozyo-no ie-ni i-ru (*wa) to] omot-ta
Hanako-TOP Taroo-TOP she-GEN house-at be-Pres. *wa* *to* think-Past
'Hanako thought that Taroo is at her house'
b. Hanako-wa [$_{CP}$ Taroo-ga kanozyo-o tasukete kure-ru (*yo) to] kitaisi-ta
Hanako-TOP Taroo-TOP she-ACC help (for her)-Pres. *yo* *to* expect-Past
'Hanako expected Taroo to help her'

Nevertheless, *wa*, in particular, has an s-selection requirement. It takes a TP complement as shown in (37).[8]

(37) a. Watasi-wa soko-ni ik-u wa / it-ta wa
I-TOP there-to go-Pres. *wa* go-Past *wa*
'I will go there / I went there'
b. Taroo-wa yasasi-i wa / yasasi-katta wa
Taroo-TOP kind-Pres. *wa* kind-Past *wa*
'Taroo is kind / Taroo was kind'

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[7] The content of this section is based on joint research with Tomoko Haraguchi, which is reported in more detail in Saito and Haraguchi (2012).

[8] *Wa* is typically employed in women's speech.

Wa follows verbal tenses (*ru*/*ta*) in (37a) and adjectival tenses (*i*/*katta*) in (37b).

On the other hand, *wa* cannot merge with a CP or a ModalP. (38a) shows that *wa* is incompatible with a CP complement, and (38b-c) that it cannot take a ModalP as its complement.

(38) a. Taroo-wa soko-ni ik-u no (*wa)
Taroo-TOP there-to go-Pres. *no* *wa*
'Taroo will go there'
b. Taroo-wa soko-ni ik-e (*wa)
Taroo-TOP there-to go-Imp. *wa*
'Taroo, go there'
c. Hanako-wa ku-ru desyoo (*wa)
Hanako-TOP come-Pres. will *wa*
'Hanako will come'

Then, *wa* s-selects T. This predicts that *wa* must occupy the lowest position in a sequence of discourse particles. It indeed cannot follow any discourse particle, as shown in (39).

(39) a. Hanako-wa soko-ni i-ta yo (*wa)
Hanako-TOP there-at be-Past *yo* *wa*
'Hanako was there'
b. Hanako-wa soko-ni i-ta ne (*wa)
Hanako-TOP there-at be-Past *ne* *wa*
'Hanako was there, wasn't she?'

Although *yo* is also employed for assertion, it exhibits a different distribution. It allows various clause types as its complement, and as Tenny (2006) notes, it can be translated roughly as 'I'm telling you …' It takes TP complements in (40) and ModalP complements in (41).

(40) a. Taroo-wa soko-ni i-ru yo / i-ta yo
Taroo-TOP there-at be-Pres. *yo* be-Past *yo*
'Taroo is there / was there'
b. Taroo-wa yasasi-i yo / yasasi-katta yo
Taroo-TOP kind-Pres. *yo* kind-Past *yo*
'Taroo is kind / was kind'

(41) a. Taroo-wa soko-ni ik-e / ik-inasai yo
Taroo-TOP there-to go-Imp. go-Imp. *yo*
'Taroo, go there'
b. Soko-ni ik-oo / ik-imasyoo yo
there-to go-Inv. go-Inv. *yo*
'Let's go there'

The examples in (42) show that *yo* can follow the complentizer *no* and the discourse particle *wa*.

(42) a. Hanako-wa soko-ni i-ru no yo
Hanako-TOP there-at be-Pres. *no yo*
'Hanako is there'
b. Hanako-wa soko-ni i-ru wa yo
Hanako-TOP there-at be-Pres. *wa yo*
'Hanako is there'

Yo clearly does not have any s-selection requirement, and given this, it is not surprising that it can follow another discourse particle.

Na and *ne*, which solicit response, are similar to *yo* in distribution. Here, I will provide some examples of *ne*.

(43) a. Taroo-wa yasasi-i ne
Taroo-TOP kind-Pres. *ne*
'Taroo is kind, isn't he?'
b. Taroo-wa soko-ni ik-inasai ne
Taroo-wa there-to go-Imp. *ne*
'Taroo, go there. Will you?'
c. Soko-ni ik-imasyoo ne
there-to go-let's *ne*
'Let's go there. Shall we?'
d. Taroo-wa yasasi-i no ne
Taroo-TOP kind-Pres. *no ne*
'Taroo is kind, isn't he?'
e. Taroo-wa yasasi-i wa ne
Taroo-TOP kind-Pres. *wa ne*
'Taroo is kind, isn't he?'

What appears in the complement position of *ne* is a TP in (43a), a ModalP in (43b-c), a CP in (43d), and a sentence headed by the speech act particle *wa* in (43e). Thus, *ne* does not s-select a specific head, either.

As Keiko Murasugi observes, there is clear evidence that *wa* and the other discourse particles differ in selectional properties. *Yo*, *ne* and *na* can appear not only sentence-finally but after any major constituent. (44) illustrates this with *ne*.

(44) Taroo-ga ne soko-ni ne i-te ne …
Taroo-NOM *ne* there-at *ne* be-and *ne*
'It's Taroo, alright? It's there, alright? He was there, alright? And, …'

This is consistent with the proposal that *ne* does not s-select any head. *Wa*, on the other hand, cannot be employed in this way as it s-selects T.

Nevertheless, there are restrictions on the complements of *yo*, *ne* and *na*. For example, *ne* and *na* can follow *yo*, but *yo* cannot follow them. Further, *ne* and *na* are mutually exclusive. Relevant examples are shown in (45)-(46).

(45) a. Hanako-wa soko-ni i-ta yo ne/na
Hanako-NOM there-at be-Past *yo ne/na*
Hanako was there, wasn't she?'
b. *Hanako-wa soko-ni i-ta ne/na yo
Hanako-NOM there-at be-Past *ne/na yo*

(46) a. *Hanako-wa soko-ni i-ta ne na
Hanako-NOM there-at be-Past *ne na*
Hanako was there, wasn't she?'
b. *Hanako-wa soko-ni i-ta na ne
Hanako-NOM there-at be-Past *na ne*
Hanako was there, wasn't she?'

Then, descriptively, the hierarchy in (47) obtains.

(47) [[[TP *wa*] *yo*] *ne/na*]

As argued above, *wa* must occupy the lowest position because it s-selects T. In the remainder of this section, I will suggest that the rest should be accounted for in terms of the speech acts these particles yield.

First, *yo* is employed for assertion, and hence, its complement must be capable of

expressing an assertion. The following examples demonstrate this:

(48) a. [$_{CP}$ Dare-ga soko-ni ik-u ka] yo
who-NOM there-to go-Pres. *ka yo*
'Who will go there? = No one will go there'
b. [$_{CP}$ Taroo-ni nani-ga deki-ru ka] yo
Taroo-DAT what-NOM can.do-Pres. *ka yo*
'What can Taroo do? = Taroo can't do anything'

A question can be interpreted at the discourse level as a literal question or as a rhetorical question. However, when a question is embedded under *yo* as in (48), only the rhetorical question interpretation survives. This is expected because a rhetorical question expresses an assertion while a literal question does not. The situation is different with *ne* and *na*, which solicit response. (49a-b), unlike (48a-b), retain the ambiguity.

(49) a. [$_{CP}$ Dare-ga soko-ni ik-u ka] ne
who-NOM there-to go-Pres. *ka ne*
'Who will go there? / (I think) no one will go there. What do you think?'
b. [$_{CP}$ Taroo-ni nani-ga deki-ru ka] ne
Taroo-DAT what-NOM can.do-Pres. *ka ne*
'What can Taroo do? / (I think) Taroo can't do anything. What do you think?'

This should be because a response can be solicited on a question or an assertion.

Given the observation above, it is not at all surprising that the *yo-ne*/*na* sequence is allowed whereas the *ne*/*na-yo* sequence is not. *Yo* combines with an expression of assertion and reinforces the speech act. It is then possible to solicit a response on the assertion by placing *ne*/*na* after *yo*. On the other hand, *ne*/*na* adds the speech act of soliciting a response. A sentence with these particles is in fact best translated as a tag question. But it was shown above that the complement of *yo* cannot express a literal question for the simple reason that a question cannot be asserted. Thus, the hierarchical relation between *yo* and *ne*/*na* is predicted from their discourse roles.

The final question to be addressed is why *ne* and *na* cannot co-occur, as was shown in (46). Although I do not have a clear-cut answer for this, I would like to make a suggestion, based on an observation in Endo (2010). Endo notes that *na* is appropriate when talking to onself whereas *ne* is not. Let's compare the following two examples:

(50) a. Dekake-ta na
go.out-Past *na*
'It looks like she/he went out'
b. Dekake-ta ne
go.out-Past *ne*
'You/she/he went out, didn't you/he/she?'

Suppose that you go home alone and find that your roommate is not there. Then, you could utter (50a), talking to yourself. (50b) is inappropriate in this context. On the other hand, suppose that you go home with your friend. Then, you could say (50b) to your friend, referring to your roommate. Or (50b) can be addressed to your roommate when she/he comes home. This suggests that *na* solicits a response from the discourse participants including the speaker, while *ne* seeks a response from those excluding the speaker. *Na* can be employed when talking to oneself, as there is a discourse participant to whom the utterance can be addressed, namely, the speaker. *Ne* has no function in this context. If this characterization of *ne* and *na* is correct, then they should be mutually exclusive because their discourse functions are not compatible.

5 Conclusion

As discussed in this paper, constraints and hierarchies have been proposed and entertained in the recent investigation of the Japanese right periphery. Ueda (2007) examines Japanese modals in detail and entertains the constraint that a clause can contain at most one modal. Saito (2009) observes the hierarchy of Japanese complementizers in (30), repeated below in (51).

(51) [$_{CP}$ … [$_{CP}$ … [$_{CP}$ … Finite (*no*)] Force (*ka*)] Report (*to*)]

Endo (2010), on the other hand, examines the hierarchy of discourse particles, which can be formulated as in (52).

(52) [[[TP *wa*] *yo*] *ne*/*na*]

These constitute facts to be explained.

In this paper, I explored the possibility that they are consequences of the properties of the relevant lexical items. In Section 2, I showed that Japanese modals are either suffixes or s-select T, and argued that the uniqueness condition follows from these lexical properties. In Section 3, I argued that the hierarchy of complementizers in (51) is a consequence of the s-

selection requirement of *no* and the semantics of the complemetizers. Finally, in Section 4, I suggested that the discourse particles are hierarchically organized as in (52) because *wa* s-selects T and any other ordering of *yo*, *ne* and *na* causes a contradiction in the composit speech act. These accounts need to be made more precise in future research. But they suggest that there is no need to postulate constraints or hierarchies for Japanese phrase structure as the relevant facts are derivable from lexical properties. This is in line with the Minimalist hypothesis that all that is required for phrase structure building is the minimal operation, Merge.

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Remnant Movement, Radical Reconstruction, and Binding Relations[1]

Mamoru Saito

1. Introduction

Two major properties of Japanese scrambling are listed in (1).

(1) a. A remnant created by scrambling can never move.
b. A phrase preposed by scrambling is subject to radical (total) reconstruction.

(1a) was motivated initially by the fact that remnant movement of the form in (2) is always illicit.

(2) *$[_{\beta} \ldots t_i \ldots]_j [\ldots \alpha_i [\ldots t_j \ldots] \ldots]$, where α and β are preposed by scrambling.

In Saito (1985), I proposed to account for this in terms of Fiengo's (1977) proper binding condition, which requires that traces be bound. On the other hand, I argued in Saito (1989) for (1b), which implies that scrambling need not be represented at LF. If this is correct, (3a) can have the LF in (3b) as if scrambling never applied.

(3) a. $\alpha_i [\ldots t_i \ldots]$, where α is preposed by scrambling.
b. $[\ldots \alpha \ldots]$

This raises questions on the proper binding analysis of (2) if the condition applies at LF. With total reconstruction, the LF of (2) can be as in (4), where there is no trace and hence, clearly no violation of the proper binding condition.

(4) $[\ldots [_{\beta} \ldots \alpha \ldots] \ldots]$

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Given this situation, a number of alternative analyses for (2) have been proposed in the literature. Among them is Takita's (2010) PF analysis. He adopts the theory of linearization proposed by Fox and Pesetsky (2005) and developed by Ko (2007), and demonstrates that it explains (1a). He then goes on to argue that the proper binding condition can be totally eliminated from the syntax.

The purpose of this paper is to examine the issues raised by (1a) and (1b) further. In the first part of the paper, I present supporting evidence for Takita's (2010) PF approach to (2) and for his claim that there are no syntactic constraints on the movement of remnants created by Japanese scrambling. I argue in addition that the same piece of evidence, interestingly, provides strong support for (1b). Then, in the latter part of the paper, I explore some issues related to (1b). First, I consider the fact that movement creates new binding possibilities as in (5).

(5) *John wonders which picture of himself Mary liked*

As demonstrated by Dejima (1999) and others, Japanese scrambling exhibits the same effect. Given total reconstruction of scrambling, this poses a problem for the hypothesis that the Binding theory applies at LF. I assume Quicoli's (2008) phase-based Binding theory, and show that the theory, with a refinement on the interpretive mechanism of chains, accommodates examples of this kind, that is, both (5) and its scrambling counterpart. Then, I suggest that the theory leads to an explanation for the anti-reconstruction property of English wh-phrases in situ. (6) illustrates this property.

(6) *??[Which picture of whom]$_j$ does John wonder who$_i$ t_i bought t_j*

This example can only be interpreted as a matrix multiple wh-question with *whom* taking matrix scope, and does not allow the wh-phrase to have embedded scope. The precise account for this is unclear if *picture of whom* or *of whom* reconstructs at LF as widely assumed. I suggest that the phase-based interpretation of chains employed in the analysis of (5) and its scrambling counterpart leads to a solution for this problem.

In the following section, I briefly review the proposals on (2), including Saito's (1985) in terms of the proper binding condition, Kitahara's (1997) based on Attract, and Takita's (2010) in terms of linearization. Then, in Section 3, I present and discuss supporting evidence for Takita's approach. Section 4 concerns examples such as (5) and its scrambling counterpart. There, I suggest a refinement of Quicoli's (2008) theory with a phase-based interpretation of chains. In Section 5, I discuss the problem (6) poses in some detail, and suggest that it is resolved by the analysis presented in Section 4. Section 6 concludes the paper.

2. Proper Binding Effects with Japanese Scrambling

In Saito (1985), I argued that Japanese scrambling is nothing but an instance of Move-α (Move anything anywhere). This necessitated the demonstration that the illicit cases of scrambling are ruled out by independent principles. Examples of the following kind, which instantiate (2), were considered in this context:

(7) *[[$_{CP}$ *Hanako-ga* t_i *iru to*]$_j$ [*Sooru-ni*$_i$ [$_{TP}$ *Taroo-ga* t_j *omotteiru*]]] (*koto*)
Hanako-NOM be C Seoul-in Taroo-NOM think fact
'[That Hanako is t_i]$_j$, in Seoul$_i$, [Taroo thinks t_j]'
(= 'Taroo thinks that Hanako is in Seoul')

This example can be derived from (8a) by first scrambling *Sooru-ni* 'Seoul-in' out of the embedded CP as in (8b) and then scrambling the embedded CP itself to the initial position of the matrix clause.

(8) a. [$_{TP}$ *Taroo-ga* [$_{CP}$ *Hanako-ga* *Sooru-ni iru to*] *omotteiru*] (*koto*)
Taroo-NOM Hanako-NOM Seoul-in be C think fact
'Taroo thinks that Hanako is in Seoul'

b. [*Sooru-ni*$_i$ [$_{TP}$ *Taroo-ga* [$_{CP}$ *Hanako-ga* t_i *iru to*] *omotteiru*]] (*koto*)
Seoul-in Taroo-NOM Hanako-NOM be C think fact
'In Seoul$_i$, Taroo thinks that Hanako is t_i'

The derivation should be allowed because (8b) is grammatical and further, CP scrambling and multiple scrambling are both possible as illustrated in (9a) and (9b) respectively.

(9) a. [[$_{CP}$ *Hanako-ga* *Sooru-ni iru to*]$_i$ [$_{TP}$ *Taroo-ga* t_i *omotteiru*]] (*koto*)
Hanako-NOM Seoul-in be C Taroo-NOM think fact
'[That Hanako is in Seoul]$_i$, Taroo thinks t_i'

b. [*Sono hon-o*$_i$ [*Hanako-ni*$_j$ [$_{TP}$ *Taroo-ga* [$_{CP}$ *Ziroo-ga* t_j t_i
that book-ACC Hanako-DAT Taroo-NOM Ziroo-NOM
watasita to] *omotteiru*]]] (*koto*)
handed C think fact
'That book$_i$, to Hanako$_j$, Taroo thinks that Ziroo handed t_i t_j'
(= 'Taroo thinks that Ziroo handed that book to Hanako')

What I proposed in Saito (1985) is that (7) is ruled out by the proper binding condition, which prohibits unbound traces (Fiengo 1977). In this example, the trace of *Sooru-ni* 'Seoul-in' is in

violation of this condition.

The analysis of (7) just mentioned implies that there is a constraint that prohibits remnant movement, i.e., the proper binding condition. However, as noted above, the radical reconstruction property of Japanese scrambling raises doubts on this analysis. In this section, I first illustrate this problem and then introduce the alternative analyses for (7) proposed by Kitahara (1997) and Takita (2010). I present supporting evidence for the latter in the following section.

Let us first consider the following examples, which provide the necessary background to illustrate the radical reconstruction property:

(10) a. *[$_{TP}$ Taroo-ga [$_{CP}$ [$_{TP}$ dare-ga sono hon-o katta] ka] siritagatte iru]*
Taroo-NOM who-NOM that book-ACC bought Q want to know
(*koto*)
fact
'[Taroo wants to know [Q [who bought that book]]]'
(= 'Taroo wants to know who bought that book')

b. **[$_{TP}$ Dare-ga [$_{CP}$ [$_{TP}$ Taroo-ga sono hon-o katta] ka] siritagatteiru]*
who-NOM Taroo-NOM that book-ACC bought Q want to know
(*koto*)
fact
'[Who wants to know [Q [Taroo bought that book]]]' (Harada 1972)

(10a) is a straightforward example with an embedded wh-question. The wh-phrase *dare* 'who' is contained within the question sentence, and the example is grammatical. (10b), on the other hand, is totally ungrammatical. In this example, *dare* is not contained within the question sentence it should be interpreted with. Given this contrast, Harada (1972) proposed the following generalization:

(11) A wh-phrase must be contained within the CP where it takes scope.

This generalization applies to English as well, as shown in (12).

(12) a. *Who$_i$ t$_i$ wonders [which picture of whom]$_j$ Mary bought t$_j$*
b. ?? *[Which picture of whom]$_i$ does John wonder who$_j$ t$_j$ bought t$_i$*

As van Riemsdijk and Williams (1981) point out, (12a) is ambiguous. The wh-elements that moved to Spec, CP take scope at their surface positions. Thus, *who* takes matrix scope and *which* takes embedded scope. But *whom*, which was only pied-piped to the embedded Spec,

CP, can take either embedded or matrix scope. This is consistent with (11) because the wh-phrase is contained within the embedded CP as well as the matrix CP. Although (12b) is a Subjacency violation and hence is marginal, its interpretive property is clear. This example is not ambiguous, in contrast with (12a). *Whom*, which was pied-piped to the matrix Spec, CP, can only take matrix scope. This too is consistent with (11) because *whom* in this example is contained only in the matrix CP.[2]

With this background, let us now consider the examples in (13).

(13) a. *[$_{TP}$ Taroo-ga [$_{CP}$ [$_{TP}$ Hanako-ga dono hon-o yonda] ka]*
Taroo-NOM Hanako-NOM which book-ACC read Q
siritagatteiru] (koto)
want to know fact
'[Taroo wants to know [Q [Hanako read which book]]]'
(= 'Taroo wants to know which book Hanako read')

b. *[Dono hon-o$_i$ [$_{TP}$ Taroo-ga [$_{CP}$ [$_{TP}$ Hanako-ga t_i yonda] ka]*
which book-ACC Taroo-NOM Hanako-NOM read Q
siritagatteiru]] (koto)
want to know fact
'[Which book$_i$, Taroo wants to know [Q [Hanako read t_i]]]'
(= 'Taroo wants to know which book Hanako read')

(13a), like (10a), is a straightforward example with an embedded wh-question. In (13b), the wh-phrase *dono hon* 'which book' is scrambled out of the embedded question CP. The example is not only grammatical but also receives the same interpretation as (13a). This is unexpected because the wh-phrase is not contained within the question CP, just as in the totally ungrammatical (10b). I proposed then in Saito (1989) that a scrambled phrase can be placed back to its initial position before it receives interpretation at LF. This came to be called 'radical reconstruction' so that it is distinguished from 'partial reconstruction', which applies to the pied-piped elements in operator movement. It makes (13b) consistent with (11) if the generalization applies at LF. *Dono hon* in (13b), if it is reconstructed to the embedded object position, is contained within the embedded question CP at LF.

The same argument for radical construction can be constructed on the basis of (14).

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[2] (12b) raises an interesting question as noted in Section 1. In the present context, if (11) holds at LF and *picture of whom* or *of whom* is reconstructed at this level, it is not obvious why the embedded scope of *whom* is disallowed. This question is discussed in Section 5.

(14) a. *[$_{TP}$Taroo-ga [$_{CP}$[$_{TP}$ minna-ga [$_{CP}$ Hanako-ga dono hon-o yonda to]*
Taroo-NOM all-NOM Hanako-NOM which book-ACC read C
omotteiru] ka] siritagatteiru] (koto)
think Q want to know fact
'[Taroo wants to know [Q [everyone thinks [that Hanako read which book]]]]'
(= 'Taroo wants to know which book everyone thinks that Hanako read')

b. ? *[[$_{CP}$ Hanako-ga dono hon-o yonda to]$_i$ [$_{TP}$ Taroo-ga*
Hanako-NOM which book-ACC read C Taroo-NOM
[$_{CP}$[$_{TP}$ minna-ga t_i omotteiru] ka] siritagatteiru]] (koto)
all-NOM think Q want to know fact
'[[That Hanako read which book]$_i$, Taroo wants to know [Q [everyone thinks t_i]]]'
(= 'Taroo wants to know which book everyone thinks that Hanako read')

(14a) is like (13a) but the wh-phrase is further embedded in an additional CP. (14b) is derived by scrambling the most deeply embedded CP to the matrix initial position. The wh-phrase is no longer contained within the question CP because of this scrambling, and yet, the example is only slightly marginal. This too is expected if the scrambled CP is reconstructed to its initial position at LF.

As I discussed in detail in Saito (1989), the radical reconstruction property of scrambling has implications for the proper binding account for (7), repeated below as (15).

(15) * *[[$_{CP}$ Hanako-ga t_i iru to]$_j$ [Sooru-ni$_i$ [$_{TP}$ Taroo-ga t_j omotteiru]]] (koto)*
Hanako-NOM be C Seoul-in Taroo-NOM think fact
'[That Hanako is t_i]$_j$, in Seoul$_i$, [Taroo thinks t_j]'
(= 'Taroo thinks that Hanako is in Seoul')

If the scrambled CP in (15) is reconstructed, then there is no unbound trace at LF. And if *Sooru-ni* 'Seoul-in' is also reconstructed, there is no trace at all at the level. The conclusion of Saito (1989) was that the proper binding condition applies at S-structure. But this cannot be maintained under the Minimalist approach, where S-structure is dispensed with as a level of representation. Thus, an alternative account for (15) becomes necessary.

Kitahara (1997) was the first to suggest an alternative analysis for examples such as (15). His aim was to propose an explanation for Müller's (1996) generalization, shown in (16).

(16) A phrase containing a trace of movement cannot undergo movement of the same type (operator movement, scrambling, NP-movement).

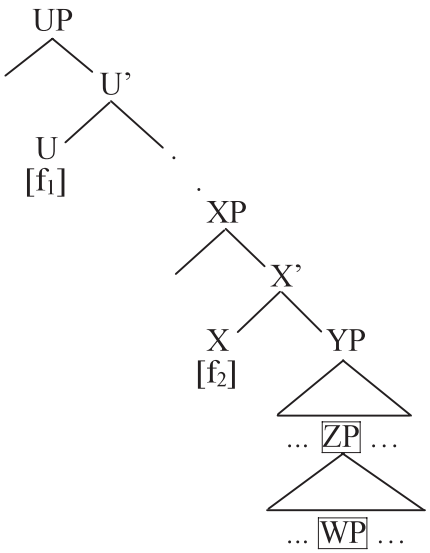
(16) states that remnant movement is illicit if it is of the same type as the movement that produced the trace in the remnant. The following English examples illustrate the generalization:

(17) a. **[Which picture of t_i]$_j$ does John wonder who$_i$ Mary liked t_j*
b. *[How likely [t_i to win]]$_j$ is John$_i$ t_j*

(17a) is ungrammatical because the movement of *[which picture of t_i]* and the movement of *who$_i$* are both operator movement. (17b), on the other hand, is allowed because the remnant *[how likely [t_i to win]]* undergoes operator movement whereas t_i is produced by NP movement.

Kitahara (1997) argues that the generalization follows from the minimal link condition or Attract. Let us consider the configuration in (18).

(18)



Remnant movement obtains if f_2 attracts WP to Spec, XP and f_1 attracts the remnant ZP to Spec, UP. Suppose that WP and ZP undergo the same type of movement. Then, f_1 and f_2 are the same feature, and both WP and ZP qualify as the target for this feature. Consequently, f_2 should attract the closest ZP and should never be able to attract WP over ZP. Hence, Müller's (1996) generalization follows. Nothing prevents the attraction of WP by f_2 if WP and ZP undergo difference types of movement and hence, f_1 and f_2 are distinct features. Kitahara (1997) then suggests that the ungrammatical (15) may be explained in the same way because it is derived by two applications of scrambling and falls under Müller's generalization.

Although Kitahara's (1997) suggestion is quite attractive, I raised a couple of questions in Saito (2003). First, the account he suggested for (15) implies that Japanese scrambling is

feature-driven, but this, I argued, is dubious.[3] Secondly, a similar prohibition on remnant movement is observed even in cases that do not fall under Müller's generalization. (19) illustrates this.

(19) *[$_{TP}$ [PRO t_i *iku koto*]-ga$_j$ *Sooru-made*$_i$ *Taroo-ni* t_j *meizirareta*]
go N-NOM Seoul–to Taroo-DAT ordered-was
'[To go t_i]$_j$, to Seoul$_i$, was ordered Taroo t_j'
(= 'It was ordered Taroo to go to Seoul')

This example is derived from (20a) by first scrambling *Sooru-made* 'Seoul-to' out of the control complement to the position following the matrix subject as in (20b).

(20) a. *Hanako-ga Taroo-ni [PRO Sooru-made iku koto]-o meizita*
Hanako-NOM Taroo-DAT Seoul-to go N-ACC ordered
'Hanako ordered Taroo to go to Seoul'
b. *Hanako-ga Sooru-made*$_i$ *Taroo-ni [PRO* t_i *iku koto]-o meizita*
Hanako-NOM Seoul-to Taroo-DAT go N-ACC ordered
'Hanako, to Seoul$_i$, ordered Taroo to go t_i'
c. *[PRO Sooru-made iku koto]-ga*$_j$ *Taroo-ni* t_j *meizirareta*
Seoul-to go N-NOM Taroo-DAT ordered-was
'[To go to Seoul]$_j$ was ordered Taroo t_i'

The control complement in (20a, b) is headed by a formal noun *koto* and is the object of the sentence. Because of this, it can move to the subject position once the sentence is passivized. (20c) is a passive counterpart of (20a). (19) obtains when (20b) is passivized in the same way. This example is derived by scrambling and NP-movement, and hence does not fall under Müller's generalization. Yet, it is completely ungrammatical just like (15). It seems then that Kitahara's (1997) suggestion does not quite succeed in accounting for the relevant facts.[4]

Another proposal to explain the proper binding phenomenon of traces produced by scrambling is made in Takita (2010). His analysis adopts the theory of linearization proposed by Fox and Pesetsky (2005) and developed by Ko (2007). The basic idea is that the linear

[3] Note that the radical reconstruction property by itself raises doubts on the feature-based analysis of Japanese scrambling. If scrambling is feature driven, the sole function of the relevant feature must be to trigger scrambling and the feature must be void of any semantic content. See Kawamura (2004) for detailed discussion on this point.

[4] It is desirable to pursue an alternative to Kitahara's (1997) analysis on conceptual grounds as well if Chomsky's (2008, 2013) proposal is adopted to dispense with Attract and assume that internal Merge, like external Merge, freely applies and simply forms a constituent out of two elements.

order of constituents is fixed at each spell-out domain. Ko (2007), in particular, demonstrates that the theory provides a solution to an outstanding problem in Japanese/Korean syntax. I first illustrate the theory by way of presenting Ko's analysis.

Kuroda (1980) examines the distribution of floating numeral quantifiers in Japanese and presents an argument for scrambling as a movement operation. In (21a, b), numeral quantifiers occur adjacent to the noun phrases they modify.

(21) a. *Gakusei-ga san-nin sake-o nonda*
student-NOM 3-person sake-ACC drank
'Three students drank sake'
b. *Gakusei-ga sake-o san-bon nonda*
student-NOM sake-ACC 3-bottle drank
'A student drank three bottles of sake'

The marginality of (22) indicates that the adjacency is indeed required of numeral quantifiers.

(22) ??*Gakusei-ga sake-o san-nin nonda*
student-NOM sake-ACC 3-person drank
'Three students drank sake'

However, Kuroda notes that (23a) is perfectly grammatical even though the subject intervenes between *sake* and *san-bon* 'three-bottle'.

(23) a. *Sake-o gakusei-ga san-bon nonda*
sake-ACC student-NOM 3-bottle drank
'A student drank three bottles of sake'
b. [object$_i$ [$_{TP}$ subject [$_{VP}$ t_i 3-bottle drank]]]

He then argues that (23a) is derived as in (23b) by scrambling, and the example is grammatical because the adjacency holds between the trace of the object and the numeral quantifier.

Kuroda's argument is persuasive, but one question remains in the analysis. That is, it is not clear why (22) cannot be derived by multiple scrambling as in (24).

(24) [subject$_j$ [object$_i$ [$_{TP}$ t_j 3-person [$_{VP}$ t_i drank]]]

The question is amplified with the VP-internal subject hypothesis. (22) can then be derived by simply scrambling the object to the edge of *v*P as in (25).

(25) $[_{TP}$ subject$_i$ $[_{vP}$ object$_j$ [t_i 3-person $[_{VP}$ t_j drank]]]]

Ko (2007) shows that Fox and Pesetsky's (2005) theory of linearization provides a solution to this problem. The basic idea of the theory, as noted above, is that the relative word order is fixed once and for all at each spell-out domain, and Ko assumes that *v*P is a spell-out domain in Korean and Japanese. Then, in the absence of scrambling, the subject-object-verb order is established as *v*P is spelled out. This is illustrated in (26a).

(26) a. $[_{vP}$ subject $[_{VP}$ object V]] … subject < object < verb
b. $[_{vP}$ object$_i$ [subject $[_{VP}$ t_i V]]] … object < subject < verb

If the object is to precede the subject, it must be preposed to the edge of *v*P before spell-out as in (26b). In either case, the order established at *v*P must be maintained throughout the derivation. Given this, let us reconsider (25), which must be excluded to account for the ungrammaticality of (22). There are two possibilities at the point *v*P is spelled out.

(27) a. $[_{vP}$ subject 3-person $[_{VP}$ object V]] … subject < 3-person < object < verb
b. $[_{vP}$ object$_i$ [subject 3-person $[_{VP}$ t_i V]]] … object < subject < 3-person < verb

(27a) obtains if the object is not scrambled to the edge of *v*P, and (27b) if it is. Neither yields the order subject < object < 3-person < verb. Consequently, if the derivation continues to yield the structure in (24) or (25), a contradiction with linearization arises. Thus, these structures are successfully ruled out.[5]

What Takita (2010) points out is that Ko's (2007) analysis outlined above automatically rules out the illicit examples of "proper binding violations." Let us consider again (15) and (19), repeated below as (28a, b).

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[5] This account presupposes that the subject cannot be moved across the object to the outer edge of *v*P as in (i).

(i) $[_{vP}$ subject$_j$ [object$_i$ [t_j 3-person $[_{VP}$ t_i V]]]]

In (i), the subject originates in Spec, *v*P and moves to a higher Spec, *v*P. Ko (2007) assumes that this type of movement is impossible because movement is attraction by a head. Spec is not included in the search domain of a head and as a result, *v* cannot attract the subject to its Spec position. Takita (2010), on the other hand, appeals to Abels' (2003) anti-locality, which excludes movement that merges the moved item to the same head for the second time. In (i), the subject is merged with (a projection of) *v* at the initial site and the movement merges it again with (a projection of) the same *v*.

(28) a. *[[$_{CP}$ *Hanako-ga* t_i *iru to*]$_j$ [*Sooru-ni*$_i$ [$_{TP}$ *Taroo-ga* t_j *omotteiru*]]] *(koto)*
Hanako-NOM is C Seoul-in Taroo-NOM think fact
'[That Hanako is t_i]$_j$, in Seoul$_i$, [Taroo thinks t_j]'
(= 'Taroo thinks that Hanako is in Seoul')

b. *[$_{TP}$ [*PRO* t_i *iku koto*]-*ga*$_j$ *Sooru-made*$_i$ *Taroo-ni* t_j *meizirareta*]
go N-NOM Seoul-to Taroo-DAT ordered-was
'[To go t_i]$_j$, to Seoul$_i$, was ordered Taroo t_j'
(= 'It was ordered Taroo to go to Seoul')

The initial spell-out domain in (28a) may be the *v*P in the preposed CP or the preposed CP itself. Whichever it is, the order *Sooru-ni* < *iru* is established at that point. The CP, for example, is as in (29) at the point of spell-out.

(29) [$_{CP}$ Sooru-ni$_i$ [$_{TP}$ Hanako-ga$_j$ [$_{vP}$ [$_{VP}$ t_i t_j iru]]] to]

The surface order is in contradiction with this order, and hence the example is predicted to be ungrammatical. The ungrammaticality of (28b) follows in the same way. The order *Sooru-made* < *iku* is established within the control complement, and the surface order contradicts this.

Takita (2010) demonstrates that the theory of linearization developed by Ko (2007) accounts for a number of other restrictions on Japanese scrambling as well. But even when we restrict our attention to the "proper binding" phenomenon, the analysis outlined above seems to be the only viable option at this point. As the analysis appeals to linearization to account for (28a, b), it denies that there is a syntactic constraint against unbound traces or remnant movement. In the following section, I present a piece of supporting empirical evidence for this approach.

3. Evidence for Takita's PF Approach and the Generality of Remnant Movement

While the proper binding analysis attributes the ungrammaticality of (28a, b) to unbound traces, Takita's (2010) PF approach implies that it is due to a failure of linearization between the moved constituent and its predicate. These two analyses could make different predictions with empty operator movement. Constraints on traces should apply in the same way whether the trace is produced by movement of an overt constituent or by movement of an empty operator. On the other hand, as Takita points out, an empty operator may be exempted from linearization requirements as it lacks phonetic content. In this section, I discuss two cases of empty operator movement, clefts and comparatives, and show that only the PF

approach can successfully accommodate the relevant facts.

The empty operator movement analysis of Japanese clefts was first proposed by Hoji (1990). The contrast in (30) shows that Subjacency effects are observed with this construction.

(30) a. *[$_{CP}$ [$_{TP}$ Taroo-ga [$_{CP}$ doroboo-ga e_i genkin-o nusunda to] itta] no]-wa*
Taroo-NOM thief-NOM cash-ACC stole C said C-TOP
sono ginkoo-kara$_i$ da
that bank-from Cop.
'It is from that bank that Taroo said that a thief stole cash'

b. *[$_{CP}$ [$_{TP}$ [$_{DP}$ [$_{TP}$ e_i genkin-o nusunda] doroboo]-ga kinoo taihosareta]
cash-ACC stole thief-NOM yesterday arrested-was
no]-wa sono ginkoo-kara$_i$ da
C-TOP that bank-from Cop.
'*Lit.* It is from that bank that the thief stole cash was arrested yesterday'

The gap is contained within a complex NP in (30b), and the ungrammaticality of the example already suggests that it is derived by movement. Hoji (1990) points out a further contrast between (30b) and (31).

(31) [$_{CP}$ [$_{TP}$ [$_{DP}$ [$_{TP}$ e_i genkin-o nusunda] doroboo]-ga kinoo taihosareta]
cash-ACC stole thief-NOM yesterday arrested-was
no]-wa sono ginkoo$_i$ da
C-TOP that bank Cop.
'*Lit.* It is that bank that the thief stole cash (from) was arrested yesterday'

The focus is a PP in (30b) whereas it is a DP in (31). Hoji then proposes that the two examples have the structures in (32a, b) respectively.

(32) a. [$_{CP}$ Op$_i$ [$_{TP}$ … t_i …] C]-wa PP$_i$-da
b. [$_{CP}$ [$_{TP}$ … *pro*$_i$ …] C]-wa DP$_i$-da

That is, a cleft sentence is derived by empty operator movement when the focus is a PP, and it

can involve binding of *pro* when the focus is a DP.[6]

The analysis is confirmed by another contrast shown in (33).

(33) *[$_{CP}$ [$_{TP}$ [$_{DP}$ [$_{TP}$ Soko-kara genkin-o nusunda] doroboo]-ga kinoo taihosareta]*
there-from cash-ACC stole thief-NOM yesterday arrested-was
no]-wa sono ginkoo(-kara) da*
C-TOP that bank -from Cop.
'*Lit.* It is that bank that the thief stole cash from there was arrested yesterday'

This example shows that an overt resumptive pronoun is allowed only with a DP focus. The *pro* in (32b) is then nothing but a covert counterpart of the pronoun in (33). Also, as a pronoun is disallowed in PP clefts, the gap in (32a) cannot be *pro* but must be produced by movement.

Another Japanese construction that involves empty operator movement is comparatives, as demonstrated by Kikuchi (1987). This construction too exhibits clear Subjacency effects, as shown in (34).

(34) a. *Taroo-wa [$_{TP}$ minna-ga [$_{CP}$ Hanako-ga e_i yonda to] omotteiru] yorimo*
Taroo-TOP all-NOM Hanako-NOM read C think than
ooku-no hon$_i$-o yonda
many-GEN book-ACC read
'Taroo read more books than everyone thinks that Hanako read'

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[6] More precisely, a bare DP. Hoji (1990) shows that Case-marked DPs pattern with PPs. The analysis in (32b) is refined by Murasugi (1991). She argues that the *no* in this case is not a C but a pronoun that occurs in examples like (i).

(i) *akai no*
red one
'a red one'

Then, the example is an equative sentence of the form 'DP = DP'. According to this analysis, the first DP contains a relative clause headed by *no* 'one'. It is known since Perlmutter (1972) that Japanese relative clauses can have *pro* as the gap and hence, do not exhibit Subjacency effects. This structure is excluded when the focus is a PP or a Case-marked DP because an equative sentence of the form 'DP = PP' or 'DP = DP-Case' does not make sense. The structure must then be as in (32a) in these cases.

b. **Taroo-wa* [$_{TP}$ *Hanako-ga* [$_{DP}$ [$_{TP}$ e_i *yonda] hito]-o sitteiru] yorimo*
Taroo-TOP Hanako-NOM read person-ACC know than
ooku-no *hon$_i$-o* *yonda*
many-GEN book-ACC read
'*Lit.* Taroo read more books than Hanako knows a person who read'

The gap is contained within a complex NP in (34b), and the example is totally ungrammatical. (35) demonstrates that comparatives do not allow resumptive pronouns, just like PP clefts.

(35) **Taroo-wa* [$_{TP}$ *Hanako-ga* [$_{DP}$ [$_{TP}$ *sore-o yonda] hito]-o sitteiru] yorimo*
Taroo-TOP Hanako-NOM it-ACC read person-ACC know than
ooku-no *hon-o* *yonda*
many-GEN book-ACC read
'*Lit.* Taroo read more books than Hanako knows a person who read them'

Kikuchi (1987) proposes that the complement of *yorimo* 'than' is a CP with an empty operator in its Spec. This is illustrated in (36).

(36) [$_{CP}$ Op$_i$ [$_{TP}$ … t_i …]] yorimo

Given that PP clefts and comparatives are derived by empty operator movement, I next examine examples with the following configurations:

(37) a. [$_{TP}$ … [$_{CP2}$ Op$_i$ [$_{TP2}$ … [$_{CP1}$ t_i' [$_{TP1}$ … t_i …]]]]]
b. [$_{CP1}$ t_i' [$_{TP1}$ … t_i …]]$_j$ [$_{TP}$ … [$_{CP2}$ Op$_i$ [$_{TP2}$ … t_j ...]]]

In (37a), an empty operator is moved out of CP1 to the Spec, CP2 position. Then, in (37b), the lower CP1 is scrambled out of the higher CP2 so that the trace of the empty operator becomes unbound. If an unbound trace that results from two applications of scrambling, as in (15), repeated below as (38), is ruled out by the proper binding condition, examples of the form in (37b), which involve operator movement and scrambling, are expected to be illicit as well.

(38) **[[$_{CP}$ Hanako-ga* t_i *iru to]$_j$ [Sooru-ni$_i$* [$_{TP}$ *Taroo-ga* t_j *omotteiru]]] (koto)*
Hanako-NOM be C Seoul-in Taroo-NOM think fact
'[That Hanako is t_i]$_j$, in Seoul$_i$, [Taroo thinks t_j]'
(= 'Taroo thinks that Hanako is in Seoul')

On the other hand, if (38) is ruled out because of conflicting linearization requirements, as Takita (2010) argues, then it would not be surprising if (37b) turns out to be a legitimate configuration. Suppose that the operator is overt. Then, by the CP1 cycle, linear order is fixed so that the operator precedes everything within TP1. This order is preserved when the operator moves to Spec, CP2. But when CP1 is scrambled to the sentence-initial position as in (37b), a contradiction in linearization occurs. On the other hand, it is quite possible that a phonetically null operator does not participate in linearization, as Takita (2010) notes. If this is the case, no contradiction arises in (37b). CP1 can move successive-cyclically so that it is at the left edge in each spell-out domain. This would suffice to guarantee consistency in linearization.

(39b) is a concrete example instantiating (37b), and it is indeed far better than (38).

(39) a. *[$_{TP}$ Taroo-wa [$_{CP}$ [$_{CP}$ Op$_i$ [$_{TP}$ minna-ga [$_{CP}$ Hanako-ga t$_i$ itta to] omotteiru]*
Taroo-TOP all-NOM Hanako-NOM went C think
no]-wa Sooru-e$_i$ da to] hookokusita]
C-TOP Seoul-to Cop C reported
'Taroo reported that it is to Seoul$_i$ that everyone thinks [$_{CP}$ that Hanako went t_i]'

b. ? *[$_{CP}$ Hanako-ga t$_i$ itta to]$_j$ [$_{TP}$ Taroo-wa [$_{CP}$ [$_{CP}$ OP$_i$ [$_{TP}$ minna-ga t$_j$*
Hanako-NOM went C Taroo-TOP all-NOM
omotteiru] no]-wa Sooru-e$_i$ da to] hookokusita]
think C-TOP Seoul-to Cop C reported
'[$_{CP}$ That Hanako went t_i]$_j$, Taroo reported that it is to Seoul$_i$ that everyone thinks t_j'
(= 'Taroo reported that it is to Seoul that everyone thinks that Hanako went')

A cleft sentence is embedded in (39a). Then, the most deeply embedded CP, which is a remnant of operator movement, is scrambled to the matrix-initial position in (39b). The example is slightly off, but is in clear contrast with the totally ungrammatical (38).[7] It then provides support for Takita's (2010) PF approach to (38), and at the same time, indicates that empty operators are exempted from linearization. If empty operators are subject to linearization, the PF approach would predict incorrectly, like the proper binding analysis, that (39a) has the ungrammatical status of (38).

The following examples with an embedded comparative sentence lead to the same conclusion:

[7] The example is slightly off, I suspect, because a CP is scrambled out of a wh-island. It indeed has a status similar to (14b).

(40) a. *Taroo-wa* $[_{CP}$ *Op*$_i$ $[_{TP}$ *minna-ga* $[_{CP}$ *Hanako-ga* t_i *yonda to] omotteiru]]*
Taroo-TOP all-NOM Hanako-NOM read C think
yorimo ooku-no hon-o yonda (= (34a))
than many-GEN book-ACC read
'Taroo read more books than everyone thinks that Hanako read'

b. ? $[_{CP}$ *Hanako-ga* t_i *yonda to*$]_j$ $[_{TP}$ *Taroo-wa* $[_{CP}$ *Op*$_i$ $[_{TP}$ *minna-ga* t_j
Hanako-NOM read C Taroo-TOP all-NOM
omotteiru]] yorimo ooku-no hon-o yonda]
think than many-GEN book-ACC read
'$[_{CP}$ That Hanako read $t_i]_j$, Taroo read more books than everyone thinks t_j'

A CP remnant of operator movement is scrambled to the sentence-initial position in (40b). It is clearly in violation of the proper binding condition however the condition is formulated. On the other hand, it does not involve contradiction in linearization as long as the empty operator does not participate in the process. Once the empty operator is ignored, the example can be linearized in the same way as more straightforward examples with long-distance scrambling of CP.

It was argued above that (39b) and (40b) constitute evidence for Takita's (2010) PF approach to (38) over the proper binding analysis of Saito (1985). They are consistent with Müller's (1996) generalization and Kitahara's (1997) explanation for it because the remnant CP is created and preposed by two distinct operations, operator movement and scrambling. However, as noted in the preceding section, (19), repeated below as (41), does not fall under Müller's generalization.

(41) * $[_{TP}$ *[PRO* t_i *iku koto]-ga*$_j$ *Sooru-made*$_i$ *Taroo-ni* t_j *meizirareta]*
go N-NOM Seoul-to Taroo-DAT ordered-was
'[To go $t_i]_j$, to Seoul$_i$, was ordered Taroo t_j'
(= 'It was ordered Taroo to go to Seoul')

The example is produced by scrambling and passive. Hence, Takita's (2010) analysis in terms of linearization is the only one that can successfully accommodate all the examples in (38)-(41). And the analysis implies that there is no syntactic constraint that prohibits movement of a remnant created by scrambling.

The examples (39b) and (40b), at the same time, provide additional evidence for the radical reconstruction property of Japanese scrambling. The empty operators in these examples clearly must bind their traces at LF for proper interpretation. This is possible only if the scrambled CP is placed back to a position within the domain of the empty operator. In the following section, I discuss implications of radical reconstruction for the formulation of the

Binding conditions and the interpretation of movement chains.

4. Radical Reconstruction and Binding

Sufficient evidence, I believe, was presented for the radical reconstruction property of Japanese scrambling in the preceding sections. Given this, it is somewhat curious that scrambling extends the binding possibility for anaphors as in (42), cited from Dejima (1999).

(42) a. *Taroo-ga$_i$ [$_{CP}$ Hanako-ga$_j$ [$_{CP}$ Ziroo-ga$_k$ zibunzisin-o$_{i*, j*, k}$ hihansita to]*
Taroo-NOM Hanako-NOM Ziroo-NOM self-ACC criticized C
itta to] omotteiru (koto)
said C think fact
'Taroo$_i$ thinks [that Hanako$_j$ said [that Ziroo$_k$ criticized self$_{i*, j*, k}$]]'

b. *Taroo-ga$_i$ [$_{CP}$ Hanako-ga$_j$ [$_{CP}$ zibunzisin-o$_{i*, j, k}$ Ziroo-ga$_k$ t hihansita to]*
Taroo-NOM Hanako-NOM self-ACC Ziroo-NOM criticized C
itta to] omotteiru (koto)
said C think fact
'Taroo$_i$ thinks [that Hanako$_j$ said [that self$_{i*, j, k}$, Ziroo$_k$ criticized *t*]]'

c. *Taroo-ga$_i$ [$_{CP}$ zibunzisin-o$_{i, j, k}$ Hanako-ga$_j$ [$_{CP}$ Ziroo-ga$_k$ t hihansita to]*
Taroo-NOM self-ACC Hanako-NOM Ziroo-NOM criticized C
itta to] omotteiru (koto)
said C think fact
'Taroo$_i$ thinks [that self$_{i, j, k}$, Hanako$_j$ said [that Ziroo$_k$ criticized *t*]]'

Nakamura (1996) argues that *zibun-zisin* 'self-self', as opposed to the long-distance reflexive *zibun* 'self', is a (subject-oriented) anaphor that requires a local antecedent. The claim is controversial, but it is clear that only the local subject qualifies as its antecedent in standard examples like (42a). But when it is scrambled to the initial position of the most deeply embedded CP as in (42b), the middle subject also becomes a possible antecedent. And further scrambling to the initial position of the middle CP makes the antecedent of *zibun-zisin* three-ways ambiguous, including the matrix subject.

If scrambled phrases are reconstructed at LF and the binding conditions apply at this level, the differences among (42a, b, c) are surprising. The straightforward prediction is that all three examples are interpreted as (42a) because this is roughly the LF for those examples. (42b, c) clearly show that scrambling has effects on interpretation. Given these examples and (43), among others, I argued in Saito (2003) that Condition (A) is an anywhere condition, as proposed by Belletti and Rizzi (1988).

(43) *Zibunzisin-o*$_i$ *Taroo-ga*$_i$ t_i *semeta* *(koto)*
self-ACC Taroo-NOM blamed fact
'Himself$_i$, Taroo$_i$ blamed t_i'

The idea was that Condition (A) can be satisfied as the sentence is constructed and the scrambled phrase is preposed. But the conception of Condition (A) as an anywhere condition makes little sense once we accept the reformulation of the binding conditions as interpretive procedures as proposed in Chomsky (1993) and Chomsky and Lasnik (1993). Their formulation of Conditions (A), (B), (C) is shown in (44).

(44) a. If α is an anaphor, interpret it as coreferential with a c-commanding phrase in D.
b. If α is a pronominal, interpret it as disjoint from every c-commanding phrase in D.
c. If α is an r-expression, interpret it as disjoint from every c-commanding phrase.

In this section, I suggest an analysis of the scrambling examples in (42) that is in line with (44). I first discuss Chomsky's (1993) analysis of reconstruction based on the copy and deletion analysis of movement. Then, I present an analysis for (42), adapting this and Quicoli's (2008) phase-based application of the binding procedures.[8]

Chomsky (1993) attempts to show that binding conditions apply at LF. In that process, he adopts the copy and deletion analysis of wh-movement, illustrated in (46) for (45a).[9]

(45) a. *Which picture of John did Mary buy*
b. Which$_x$ Mary bought [x picture of John]

(46) a. [Which picture of John] Mary bought [which picture of John]
b. [Which [*t* picture of John]] Mary bought [which [*t* picture of John]]
c. [Which ~~[*t* picture of John]~~] Mary bought [~~which~~ [*t* picture of John]]

(45a) is interpreted as in (45b). Wh-movement copies the wh-phrase as in (46a) as the first

[8] Reformulations of Binding theory in terms of phase are proposed in Lee-Schoenfeld (2008) and Charnavel and Sportiche (2013) as well. The analysis to be proposed in this paper is incompatible in some respects with the latter, which has many attractive consequences. I leave it for future research to examine whether these incompatibilities are only superficial or more fundamental in nature.

[9] I ignore the intermediate landing site at the edge of *v*P for the ease of exposition when it does not play a role in the analysis.

step toward this interpretation. Then, in each copy, covert raising applies in order to separate *which*, which serves as a wh-operator, and *[t picture of John]*, which is to be interpreted as the object argument of the verb *buy*.[10] Finally, the argument part is deleted at CP Spec and the operator part is deleted at the object position as in (46c). He argues that this mechanism accounts for the well-known reconstruction phenomenon, illustrated by (47a, b).

(47) a. *Which picture of himself did John buy*
b. * *Which picture of John$_i$ did he$_i$ buy*

These examples have the LFs in (48).

(48) a. [Which ~~[*t* picture of himself]~~] John bought [~~which~~ [*t* picture of himself]]
b. [Which ~~[*t* picture of John$_i$]~~] he$_i$ bought [~~which~~ [*t* picture of John$_i$]]

Consequently, (47a) satisfies Condition (A) and (47b) is in violation of Condition (C) at LF.

Chomsky (1993) extends this analysis to examples like (49a), where wh-movement creates a new binding possibility.

(49) a. *Which picture of himself does John think that Mary bought*
b. [Which ~~[*t* picture of himself]~~] John thinks [$_{CP}$ ~~[which [*t* picture of himself]]~~ that Mary bought [~~which~~ [*t* picture of himself]]]

The straightforward application of the copy and deletion analysis yields (49b), which incorrectly predicts the example to be ungrammatical. Chomsky then adopts the anaphor movement analysis illustrated in (50).

(50) a. [Which picture of himself] John thinks [$_{CP}$ [which picture of himself] that Mary bought [which picture of himself]]
b. [Which picture of himself] John-himself$_i$ thinks [$_{CP}$ [which picture of himself$_i$] that Mary bought [which picture of himself]

[10] This covert movement itself should be analyzed in terms of copy and deletion. A wh-element contains two parts, one to be interpreted as a wh-operator and the other as a variable. Hence it occupies two positions by wh-movement. The wh-operator part is interpreted at Spec, CP and the variable part at the initial site. Then, the movement in (46b) can be construed as copying, followed by the deletion of the variable part at the landing site and the wh-operator part at the initial site. I continue to indicate a copy of a wh-element that is to be interpreted as a variable by *t*, when there is no room for confusion.

c. [Which ~~[*t* picture of himself]~~] John-himself$_i$ thinks [$_{CP}$ [~~which~~ [*t* picture of himself$_i$]] that Mary bought [~~which~~ [*t* picture of himself]]]

d. [Which ~~[*t* picture of himself]~~] John-himself$_i$ thinks [$_{CP}$ [~~which~~ [*t* picture of himself$_i$]]$_j$ that Mary bought t_j]

Wh-movement takes place successive-cyclically. Then, the wh-movement in (49a) creates (50a) with copying. When *himself* takes the DP *John* as its antecedent, its instance that is in local relation with *John* adjoins to the DP as in (50b). The copy of a wh-phrase in an intermediate Spec, CP is normally deleted as it has no contribution to interpretation. But the deletion is impossible in the case of (50b) because it would make the instance of *himself$_i$* adjoined to *John* a member of a singleton chain without a theta-position. Consequently, the intermediate copy is retained as in (50c) and then (50d), and the anaphor receives proper interpretation. Based on this analysis, Chomsky proposes that the deletion of intermediate copies and the pied-piped material in an operator position must apply as long as it does not create illicit chains. This guarantees that *John* in (47b) is deleted at Spec, CP and retained within the object so that the example is ruled out by Condition (C).

This analysis, interestingly, does not straightforwardly extend to the similar examples with scrambling in (42). The simpler example in (51) suffices to illustrate this point.

(51) *Taroo-ga$_i$* *[$_{CP}$ zibunzisin-o$_{i,j}$* *Hanako-ga$_j$* *t* *hihansita* *to]* *itta* *(koto)*
Taroo-NOM self-ACC Hanako-NOM criticized C said fact
'Taroo$_i$ thinks [that self$_{i,j}$ Hanako$_j$ criticized *t*]'

Suppose that *zibunzisin* 'self' is at the edge of the embedded CP just like the intermediate wh-phrase in (50a). If it adjoins to the antecedent *Taroo*, the following structure is derived:

(52) Taroo-zibunzisin$_i$ [$_{CP}$ zibunzisin$_i$ [$_{TP}$ Hanako-ga zibunzisin-o hihansita] to] itta

Here, the two instances of *zibunzisin$_i$* form an A-chain. But this chain does not contain a theta-position. The deletion of the instance in Spec, CP does not help. Further, if *zibunzisin* in the embedded object position is included in the chain so that there is a theta-position, the chain will be an improper chain of the form A-A'-A. Hence, it is unclear how (51) can be analyzed with anaphor movement.

A more clearly problematic example can be constructed with a quantified DP. Japanese exhibits scope rigidity as in (53).

(53) *Dareka-ga [ni-satu-no hon]-o karidasita*
someone-NOM two-volume-GEN book-ACC checked-out
'Someone checked out two books' (some > two)

At the same time, it is known since Kuroda (1971) that scrambling yields scope ambiguity. This is shown in (54).

(54) a. *[Ni-satu-no hon]-o$_i$ dareka-ga t_i karidasita*
two-volume-GEN book-ACC someone-NOM checked-out
'Two books, someone checked out *t*' (some > two, two > some)
b. *Nanika-o$_i$ [hutari-no hito]-ga t_i katta*
something-ACC two-person-GEN person-NOM bought
'Something, two people bought *t*' (two > some, some > two)

However, Oka (1990) points out that this effect is confined to clause-internal scrambling. In (55b), for example, *ni-satu-no hon* 'two books' cannot take wide scope over *dareka* 'someone' though it is scrambled to the matrix-initial position out of the embedded CP.

(55) a. *Dareka-ga [$_{CP}$ Hanako-ga [ni-satu-no hon]-o karidasita to] itta*
someone-NOM Hanako-NOM two-volume-GEN book-ACC checked-out C said
'Someone said [that Hanako checked out two books]' (some > two)
b. *[Ni-satu-no hon]-o$_i$ dareka-ga [$_{CP}$ Hanako-ga t_i karidasita to] itta*
two-volume-GEN book-ACC someone-NOM Hanako-NOM checked-out C said
'Two books$_i$, someone said [that Hanako checked out t_i]' (some > two)

This indicates that *ni-satu-no hon* 'two books' in (55b) takes embedded scope even though it is scrambled into the matrix clause.

Given this background, let us now consider the crucial example in (56).

(56) *Taroo-ga$_i$ [$_{CP}$ [zibunzisin-no$_i$ ni-satu-no hon-o]$_j$ dareka-ga*
Taroo-NOM self-GEN two-volume-GEN book-ACC someone-NOM
[$_{CP}$ Hanako-ga t_j karidasita to] itta to] omotteiru (koto)
Hanako-NOM checked.out C said C think fact
'Taroo$_i$ thinks [that [self's$_i$ two books]$_j$, someone said [that Hanako checked out t_j]]'
(some > two)

The configuration of the example is shown in (57).

(57) Taroo$_i$ said [$_{CP}$ [self's$_i$ two books]$_j$ that [$_{TP}$ someone thinks [$_{CP}$ that Hanako checked out t_j]]]

Zibunzisin-no ni-satu-no hon 'self's two books' is scrambled so that *Taroo* qualifies as the antecedent of *zibunzisin*. At the same time, *nisatu-no hon* 'two books' takes embedded scope, and hence narrow scope with respect to *dareka* 'someone', just as in (55b). This state of affairs is not predicted by Chomsky's (1993) analysis because the scope of 'self's two books' implies that it is deleted at the landing site as in (58).

(58) Taroo$_i$-self$_i$ said [$_{CP}$ ~~[self's$_i$ two books]~~ that [$_{TP}$ … [self's two books] …

This deletion should result in a failure for 'self$_i$' to be assigned a theta-role. Then, an alternative analysis should be pursued for examples like (51) and (56).

An analysis of (49a), repeated below as (59), that is in line with Chomsky's more recent works (2000, 2008) is proposed by Quicoli (2008).

(59) *Which picture of himself does John think that Mary bought*

He proposes that the Binding theory applies cyclically at each phase. In the remainder of this section, I first outline his theory and then show that it successfully accommodates the examples of scrambling discussed above.

Let us first consider the simple examples in (60).

(60) a. *John$_i$ recommended himself$_i$*
b. **John$_i$ recommended him$_i$*

The *v*P phases of these examples are as in (61a, b) respectively.

(61) a. [$_{vP}$ John$_i$ [$_{VP}$ recommend himself$_i$]]

b. [$_{vP}$ John$_i$ [$_{VP}$ recommend him$_i$]]

Both *himself* and *him* are bound internal to the phase. Hence, these examples can be accounted for if Condition (A) requires anaphors to be bound and Condition (B) prohibits pronouns from being bound within a phase. The analysis can be stated more precisely in terms of transfer operation to the C-I interface. When VP is transferred to the C-I interface upon the completion of the *v*P phase, an anaphor within the VP must be transferred with its reference specified and a pronoun within the VP is transferred with the information that it is disjoint from any c-commanding DP in the phase.[11, 12]

Quicoli (2008) extends this analysis to (59). The embedded *v*P phase of the example looks like (62a).

(62) a. [$_{vP}$ [which picture of himself] [Mary [$_{VP}$ buy [which picture of himself]]]]
b. [$_{vP}$ [which picture of himself] [John$_i$ [$_{VP}$ think [$_{CP}$ [which picture of himself$_i$] [$_{TP}$ …

VP is transferred at this point.[13] But if the relevant requirement on *himself* is that its reference

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[11] I followed Ko (2007) and Takita (2010) above and assumed that when a *v*P phase is completed, all elements within the *v*P is linearized. On the other hand, I assume here as in Chomsky (2000, 2008) that only the complement VP is transferred to the C-I interface. This discrepancy makes sense because fixation of the relative order among the elements in *v*P has no grave consequences whereas phrases at the edge of *v*P can move on and receive interpretation at a position in a higher transfer domain.

[12] Here, I do not discuss Condition (C) in any detail. But I suspect that it can most plausibly formulated as in (i), departing from Quicoli (2008).

(i) Condition (C): Interpret a DP α as disjoint from an R-expression β if α c-commands every instance of β in the amalgamated transfer domain of α.
(the amalgamated transfer domain of α = the amalgamation of all transfer domains up to the one that includes α.)

This formulation successfully distinguishes between (ii) and (iii). (See Lebeaux 1988 and Chomsky 1993 for discussion of these examples.)

(ii) * Which picture of John$_i$ did [$_{TP}$ he$_i$ like (which picture of John$_i$)]
(iii) [$_{TP}$ The picture of John$_i$ seemed to him$_i$ [$_{TP}$ (the picture of John$_i$) to be attractive]]

The amalgamated transfer domain that includes *he* in (ii) is the TP. As *he* c-commands every instance of *John* in this domain, it is disjoint from *John*. On the other hand, the relevant transfer domain is the matrix TP in (iii). *Him* does not c-command every instance of *John* in this domain and hence, there is no Condition (C) effect in the example.

[13] In (62a) and subsequent examples, the shaded part indicates the domain that is transferred to the C-I interface.

must be determined by the end of the derivation, it can be left pending because its copy appears in a higher transfer domain. At the matrix *v*P phase, *himself* within the embedded Spec, CP is bound by *John*. Thus, the information on the reference of *himself* can be sent to the C-I interface as the matrix VP is transferred.

Before applying this analysis to the scrambling examples, let us make it a little more precise by adding Chomsky's (1993) theory of chain interpretation to it. I assume, following Chomsky (1993) that *which* in *which picture of himself* is raised covertly as in (63) so that the operator *which* is separated from *[t picture of himself]*, which serves as an argument.

(63) [which [*t* picture of himself]]

Then, the configuration in (64a) obtains when the wh-phrase moves to the edge of the embedded *v*P.[14]

(64) a. [$_{vP}$ [which [*t* picture of himself]] [Mary [$_{VP}$ buy [which [*t* picture of himself]]]]]
b. [$_{vP}$ [which [*t* picture of himself]] [Mary [$_{VP}$ buy [~~which~~ [*t* picture of himself]]]]]

At this point, the VP is transferred to the C-I interface with the reference of *himself* pending, as Quicoli (2008) proposes. But one more thing needs to be said to make this transfer successful as illustrated in (64b). That is, it is necessary to make sure that *[t picture of himself]* is interpreted as the object whereas *which* receives no interpretation in the VP. I simply state this as the interpretive procedure in (65).

(65) a. An argument is interpreted only in a θ-position.
b. An operator is interpreted only in a criterial operator position.

Given this, *which* receives no interpretation in the VP in (64) because it is not in a criterial position for a wh-operator in the sense of Rizzi (2010). On the other hand, *[t picture of himself]* is interpreted as the object of the verb *buy*.

The wh-phrase *which picture of himself* moves on to the edge of the embedded CP as in (66).

(66) [$_{CP}$ [which [*t* picture of himself]] [$_{TP}$ Mary [$_{vP}$ ~~[which [*t* picture of himself]]~~ [Mary [$_{v'}$ *v* [$_{VP}$ …

[14] Here, I assume the single cycle model of Bobaljik (1995), where covert movement applies concurrently with overt movement as structures are constructed. Thus, the covert raising of *which* applies prior to the overt movement of the wh-phrase to the edge of *v*P in (64).

The embedded TP is transferred to the C-I interface at this point. The wh-phrase at the edge of *v*P receives no interpretation because *which* is not in a wh-operator position and *[t picture of himself]* is not in a θ-position. (67) obtains after the wh-phrase moves to the edge of the matrix *v*P.

(67) [$_{vP}$ [which [*t* picture of himself]] [John$_i$ [$_{VP}$ think [$_{CP}$ ~~[which [*t* picture of himself$_i$]]~~ [$_{TP}$ …

As the VP is transferred to the C-I interface, *himself* picks up its reference from *John* as Quicoli (2008) proposes. At the same time, neither *which* nor *[t picture of himself]* receives an interpretation at the edge of the embedded CP because of (65). Finally, the wh-phrase moves to the edge of the matrix CP as in (68).

(68) [$_{CP}$ [which ~~[*t* picture of himself]]~~ [$_{TP}$ John [$_{vP}$ ~~[which [*t* picture of himself]]~~ [John [$_{v'}$ *v* [$_{VP}$ …

The wh-phrase at the edge of *v*P receives no interpretation for reasons that should be clear by now. At the edge of the matrix CP, *[t picture of himself]* again receives no interpretation because it is not in a θ-position, but *which* is interpreted as a wh-operator according to (65b). It is in a criterial position for an interrogative operator. Thus, an operator-variable chain is successfully formed as illustrated in (69).

(69) [$_{CP}$ [which ~~[*t* picture of himself]~~] [$_{TP}$ … [$_{CP}$ … [$_{TP}$ … [$_{VP}$ buy [~~which~~ [*t* picture of himself]]]]]]]

The analysis for (59) just illustrated is basically Quicoli's (2008). But the added (65) makes it possible to account for the scrambling example (51), repeated below as (70), in a way that is consistent with the radical reconstruction property of scrambling.

(70) *Taroo-ga$_i$ [$_{CP}$ zibunzisin-o$_{i,j}$ Hanako-ga$_j$ t hihansita to] itta (koto)*
Taroo-NOM self-ACC Hanako-NOM criticized C said fact
'Taroo$_i$ thinks [that self$_{i,j}$ Hanako$_j$ criticized *t*]'

The embedded *v*P is formed as in (71).

(71) [$_{vP}$ *zibunzisin-o* [*Hanako-ga* [$_{v'}$ [$_{VP}$ *zibunzisin-o hihansita*] *v*]]]

The VP is transferred to the C-I interface at this point. *Zibunzisin* 'self' receives interpretation as the object of *hihansita* 'criticized' because it is an argument in a θ-position. It can pick up reference from *Hanako* at the same time, but can also leave the reference pending because a copy appears in a higher transfer domain. Next, *zibunzisin* moves to the edge of the embedded CP as in (72a) and then the matrix *v*P is formed as in (72b).

(72) a. [$_{CP}$ *zibunzisin-o* [$_{TP}$ *Hanako-ga* [$_{vP}$ *zibunzisin [Hanako-ga* [$_{v'}$ [$_{VP}$ …] *v*] …
b. [$_{vP}$ *Taroo-ga* [$_{v'}$ [$_{VP}$ [$_{CP}$ *zibunzisin-o* [$_{TP}$ …]] *itta*] *v*]]

Zibunzisin at the edge of *v*P in (72a) receives no interpretation when the shaded TP is transferred to the C-I interface, as it is neither in a θ-position nor in a criterial operator position. It does not receive an interpretation when the VP in (72b) is transferred, for the same reason. But it can pick up its reference from *Taroo* as part of the transfer. Thus, the ambiguity of *zibunzisin* in (70) follows.

The analysis of (70) outlined above is consistent with the radical reconstruction property of scrambling because *zibunzisin* can pick up its reference from *Taroo* and yet it is interpreted only at the initial site. Before concluding this section, I apply the mechanism to (13b), the original example that motivated radical reconstruction, to confirm this. (13b) is repeated below as (73).

(73) *[Dono hon-o$_i$ [$_{TP}$ Taroo-ga [$_{CP}$ [$_{TP}$ Hanako-ga t_i yonda] ka]*
which book-ACC Taroo-NOM Hanako-NOM read Q
siritagatteiru]] (koto)
want to know fact
'[Which book$_i$, Taroo wants to know [Q [Hanako read t_i]]]'
(= 'Taroo wants to know which book Hanako read')

The derivation is illustrated phase by phase in (74).

(74) a. [$_{vP}$ [dono [*t* hon]]-o [Hanako-ga [$_{v'}$ [$_{VP}$ [~~dono~~ [*t* hon]]-o yonda] *v*]]]
b. [$_{CP}$ [dono [*t* hon]]-o [$_{C'}$ [$_{TP}$ Hanako-ga [$_{vP}$ ~~[dono [*t* hon]]-o~~ [Hanako-ga [$_{v'}$ [$_{VP}$ …] *v*]]] ka]]
c. [$_{vP}$ [dono [*t* hon]]-o [Taroo-ga [$_{v'}$ [$_{VP}$ [$_{CP}$ [dono ~~[*t* hon]]-o~~ [$_{C'}$ [$_{TP}$ …] ka] siritagatteiru] *v*]]]
d. [$_{CP}$ ~~[dono [*t* hon]]-o~~ [$_{TP}$ Taroo-ga [$_{vP}$ ~~[dono [*t* hon]]-o~~ [Taroo-ga [$_{v'}$ [$_{VP}$ …] *v*]]]]]

In (74a), *dono hon-o* 'which book-ACC' moves to the edge of the embedded *v*P. Only the argument part, *[t hon-o]*, is interpreted as the object of the verb *yonda* 'read'. In (74b), the

wh-phrase moves to the edge of the embedded CP. The copy receives no interpretation at the edge of the embedded *v*P as it is neither a θ-position nor a criterial operator position. The wh-phrase moves on to the edge of the matrix *v*P in (74c). At this point, *dono* 'which' is interpreted as a wh-operator at the edge of the embedded CP as it is in a criterial interrogative operator position.[15] Finally, the wh-phrase reaches the final landing site, the edge of the matrix CP, in (74d). Neither the operator part *dono* nor the argument part *[t hon-o]* receives interpretation at the edges of the matrix CP and *v*P because these positions are not θ-positions or criterial interrogative operator positions. Thus, the scrambling from the edge of the embedded CP to the matrix initial position is semantically vacuous.

In this section, it was shown that Quicoli's (2008) phase based binding theory, augmented by a mechanism of chain interpretation, successfully accounts for the fact that scrambling extends the binding possibility of local reflexives in a way that is consistent with its radical reconstruction property. In the following section, I suggest that the same mechanism provides an account for an outstanding problem with the scope of pied-piped wh-phrases in English.

5. The Anti-Reconstruction Phenomenon of Pied-Pied Wh-Phrases

In Sections 1 and 2, I touched on the apparent proper binding effects observed with English wh-movement. The relevant examples, (6) and (12b), are repeated below as (75a, b) respectively.

(75) a. * *[Which picture of t_i]$_j$ does John wonder who$_i$ Mary liked t_j*
b. ?? *[Which picture of whom]$_i$ does John wonder who$_j$ t_j bought t_i*

Although *who* fails to bind its trace in (75a), the example is interpreted as in (76) with reconstruction.

(76) Which$_j$ John wonders who$_i$ Mary liked [t_j picture of t_i]

As the operator-variable relations in (76) are legitimate, it is not obvious why (75a) should be totally ungrammatical. (75b) is a covert counterpart of (75a). The example is a Subjacency

[15] This assumes, following Huang (1982), Lasnik and Saito (1984), Richards (2001), among others, that Japanese wh's are interrogative operators. The analysis is in accord with the claim of Kuroda (1988) and Takahashi (1994) that scrambling of a wh-phrase to its scope position counts as wh-movement.

violation but it still allows the interpretation with *whom* taking matrix scope. What it resists is the reading in which *whom* takes embedded scope. This fact, too, is puzzling because *picture of whom* should reconstruct as in (77).

(77) Which$_i$ John wonders who$_j$ t_j bought [t_i picture of whom]

Both (75a) and (75b) appear to be illicit examples of remnant movement. A remnant *[which picture of t]* moves in (75a), and *which picture of whom* in (75b) is also a remnant of covert movement, if *whom* moves covertly to the edge of the embedded CP when it takes scope at that position. Thus, the examples pose a potential problem for the hypothesis that there are no constraints that specifically ban unbound traces or remnant movement. In this section, I suggest a solution to this problem. I argue that the ungrammaticality of (75a) as well as the scope property of (75b) can be analyzed on the basis of the chain interpretation mechanism considered in the preceding section.[16]

Let us first take a closer look at the derivation of (75b). The embedded *v*P phase is formed as in (78).

(78) [$_{vP}$ [whom$_i$ [which$_j$ [t_j picture of t_i]]] [who [*v* [$_{VP}$ bought [~~whom$_i$~~ [~~which$_j$~~ [t_j picture of t_i]]]]]]]

Whom and *which* are raised covertly so that the wh-operators and *[t picture of t]*, which is interpreted as the object, are separated in the wh-phrase. Then, the wh-phrase moves to the edge of the embedded *v*P. As the VP is transferred to the C-I interface, only the argument, *[t_j picture of t_i]*, is interpreted in the object position. The wh-phrase then moves to the edge of the matrix *v*P and on to the edge of the matrix CP. This yields the configuration in (79).

(79) [$_{CP}$ [whom$_i$ [which$_j$ ~~[t_j picture of t_i]~~]]] [$_{TP}$ John [$_{vP}$ ~~[whom$_i$ [which$_j$ [t_j picture of t_i]]]~~] [John [*v* [$_{VP}$ …

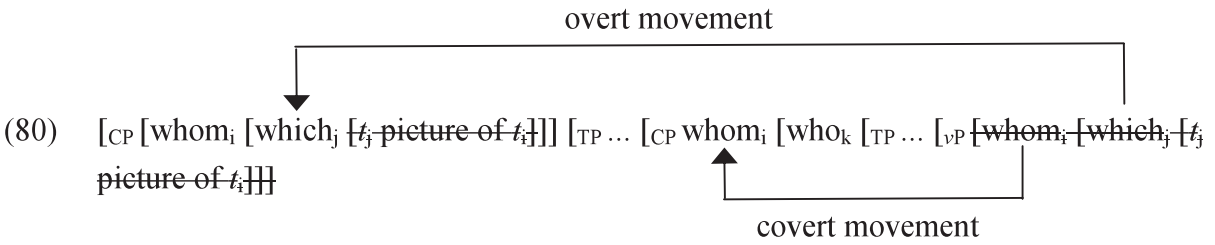
[16] The ungrammaticality of (75a) may follow from the linearization mechanism discussed in Section 2 under the plausible assumption that DP is a spell-out domain. As *who* is extracted out of *which picture of who*, it first has to move to the edge of the DP as in (i).

(i) [$_{DP}$ who$_i$ [which [$_{NP}$ picture of t_i]]]

If linearization applies at this point, the order 'who < which' is established. As (75a) contradicts this, the example is ruled out exactly as the apparent proper binding violations with scrambling. However, I do not pursue this analysis because it does not extend to (75b). In this example, *whom* remains in situ and the order 'which < whom' is preserved throughout the derivation.

Here, note the interpretation that the wh-phrase receives at the edge of the CP. Since it is a criterial interrogative operator position, both *whom* and *which* should be interpreted as wh-operators whereas the argument, *[t_j picture of t_i]*, receives no interpretation. Thus, the chain interpretation mechanism entertained in the preceding section predicts correctly that *whom* takes matrix scope in (75b).

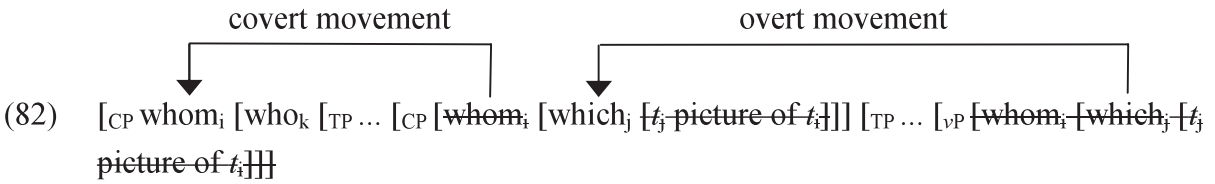
It should be noted that a slightly more complex analysis is required if covert movement is assumed for wh-phrases in situ. Under this assumption, the initial *whom* in (78) covertly moves to the edge of the embedded CP when it takes embedded scope. Then, the following configuration obtains:[17]



This configuration is straightforwardly ruled out because *whom* receives interpretation as a wh-operator in two distinct positions, the edges of the matrix and embedded CPs. But a complication arises when the example is compared with van Riemsdijk and William's (1981) (12a), repeated below as (81).

(81) *Who$_i$ t_i wonders [which picture of whom]$_j$ Mary bought t_j*

In this example, *whom* can take matrix scope as well as embedded scope. This indicates that the following configuration is legitimate:



That is, *whom* at the edge of the embedded CP can covertly move to the edge of the matrix CP and be interpreted only at the final landing site.

What distinguishes (80) and (82) is that the two instances of *whom* at the edges of the matrix and embedded CPs are parts of a single chain in the latter whereas they head their

[17] More precisely, the wh-phrase moves overtly to the edge of the matrix CP through the edge of the matrix *v*P. I ignored the intermediate landing site in (80) because it is not important for the discussion.

respective chains in the former. Then, (83) enables us to allow (82) while maintaining the account for (80).

(83) An operator must be interpreted in a criterial operator position if it heads a chain.

In (80), the two instances of *whom* head chains, and hence must both be interpreted as wh-operators. On the other hand, only *whom* at the edge of the matrix CP heads a chain in (82). The one at the edge of the embedded CP, then, need not receive interpretation.

Although (83) is a stipulation, it seems to be in line with the phase theory. Let us consider the two configurations in (84), where the edge of CP is a criterial interrogative operator position.

(84) a. $[_{vP}\ wh_i \ldots \quad [_{VP} \ldots [_{CP}\ wh_i\ [_{TP} \ldots$

b. $[_{vP} \ldots\ldots\ldots \quad [_{VP} \ldots [_{CP}\ wh_i\ [_{TP} \ldots$

In both cases, VP is transferred to the C-I interface. In the case of (84a), there is a copy of the wh in the higher transfer domain. Hence, the interpretation of the wh can wait and need not take place at the edge of the CP. On the other hand, there is no such option in the case of (84b). If the wh does not receive interpretation at the edge of the CP, it never will. Thus, it is plausible that (83) is part of the phase-based interpretive mechanism. The situation is in fact somewhat similar to that of anaphor interpretation discussed above.

(85) a. $[_{vP} \ldots [\ldots \text{self} \ldots]_i \ldots \quad [_{VP} \ldots [\ldots \text{self} \ldots]_i \ldots$

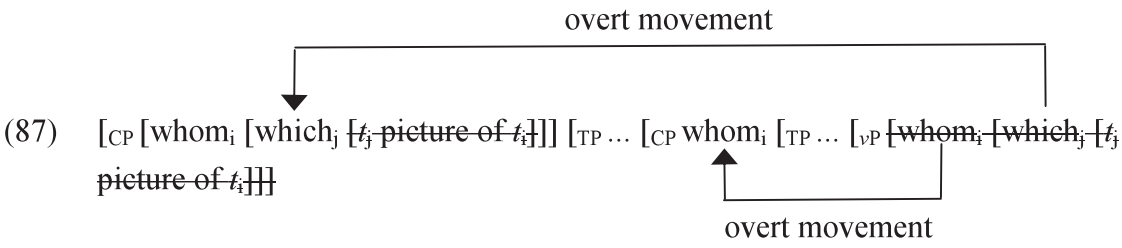
b. $[_{vP} \ldots\ldots\ldots\ldots\ldots \quad [_{VP} \ldots [\ldots \text{self} \ldots]_i \ldots$

In the case of (85a), the reference of the anaphor can be left pending when the VP is transferred to the C-I interface because there is a copy in the higher transfer domain. On the other hand, it must be determined in the case of (85b) as the anaphor will not be able to pick up its reference later in the derivation.

The analysis just outlined for (75b) also accounts for the ungrammaticality of (75a), repeated below as (86).

(86) **[Which picture of t_i]$_j$ does John wonder who$_i$ Mary liked t_j*

The example is derived as in (87).



The only notable difference between (80), the derivation of (75b) for *whom* taking embedded scope, and (86) is that the movement of *whom* to the edge of the embedded CP is covert in the former whereas it is overt in the latter. But this difference does not affect the interpretation of *whom*. Just as in (80), *whom* receives interpretation as an interrogative operator at the edges of both the matrix and embedded CPs in (87). The example is excluded because a wh cannot take scope at two distinct positions. Thus, the ungrammaticality of (86) and the scope property of *whom* in (75b) receive a uniform analysis.

6. Conclusion

As reviewed in Section 2, there are abundant cases of illicit remnant movement that preposes a remnant created by scrambling. In Section 3, I presented a new piece of evidence for their analysis by Takita (2010) in terms of linearization. One of the crucial examples, (40b), is repeated below as (88).

(88) ?*[CP Hanako-ga ti yonda to]j [TP Taroo-wa [CP Opi [TP minna-ga tj omotteiru]]*
Hanako-NOM read C Taroo-TOP all-NOM think
yorimo ooku-no hon-o yonda]
than many-GEN book-ACC read
'[CP That Hanako read t_i]$_j$, Taroo read more books than everyone thinks t_j'

I argued that examples of this kind can be accommodated under Takita's PF approach but not under the proper binding analysis. This supports his claim that there are no syntactic constraints, such as the proper binding condition, against remnant movement.

Examples like (88) provide additional evidence for the radical reconstruction property of Japanese scrambling. The preposed CP in (88) must reconstruct so that Op binds it trace. In Section 4, I presented an analysis for examples such as (51), repeated below as (89), where scrambling extends the binding possibility of a local reflexive.

(89) *Taroo-ga$_i$ [$_{CP}$ zibunzisin-o$_{i,j}$ Hanako-ga$_j$ t hihansita to] itta (koto)*
Taroo-NOM self-ACC Hanako-NOM criticized C said fact
'Taroo$_i$ thinks [that self$_{i,j}$ Hanako$_j$ criticized *t*]'

This is unexpected if *zibunzisin* 'self' reconstructs and the Binding theory applies at LF. I argued that Quicoli's (2008) phase-based Binding theory, augmented by a chain interpretation mechanism, allows the explanation of (89) in a way that is consistent with the radical reconstruction property of scrambling.

Finally, in Section 5, I considered the scope property of wh-in-situ in examples such as (75b), repeated below as (90).

(90) ??*[Which picture of whom]$_i$ does John wonder who$_j$ t$_j$ bought t$_i$*

As discussed in detail, *whom* can only take matrix scope and cannot have embedded scope in this example. This may be regarded as a "proper binding effect" because if *whom* covertly moves to the edge of the embedded CP, it fails to bind its trace. But the analysis is untenable if *picture of whom* is reconstructed as widely assumed. It appears then that a stipulation must be made to ban the movement of a remnant created by covert wh-movement. I suggested that the phase-based interpretive mechanism of chains, proposed in Section 4, makes it possible to provide an alternative account for the example without making this stipulation.

As noted at the outset of this paper, the apparent proper binding effects and the radical reconstruction property have been considered major characteristics of Japanese scrambling and have been discussed extensively in the literature. If the proposals in this paper are on the right track, the former provides important data for the examination of linearization as Takita (2010) argues, and the latter can be employed to investigate the precise formulation of the Binding theory and the chain interpretation mechanism.

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