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Contents

Copular Sentences and Coordinate Structures[*]

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1. Introduction

The traditional taxonomy of copular sentences classifies examples like (1), in which the pre-copular and post-copular DPs are interpreted as referring to the same entity, as *equative* copular sentences (cf., for example, Declerck 1988, Higgins 1979, Rapoport 1987).[1]

(1.) *Equative copular sentences*
    a. Your opinion of Edinburgh is my opinion of Philadelphia.
            (Heycock and Kroch 1996: 8, (28b); 1999: 373, (28b))
    b. Your grade in Syntax II is my grade in Phonology I.

   In this type of copular sentences, a *wh*-phrase cannot be extracted from the pre- or post-copular DP, as shown in (2)–(3).

(2.) *Extraction from pre-copular DPs*
    a. ***Which city**$_i$ is your opinion of t_i my opinion of Philadelphia?
               (Heycock and Kroch 1999: 378, footnote 9)
    b. ***Which class**$_i$ is your grade in t_i my grade in Phonology I?

(3.) *Extraction from post-copular DPs*
    a. ***Which city**$_i$ is your opinion of Edinburgh my opinion of t_i?
      (ibid.)
    b. ***Which class**$_i$ is your grade in Syntax II my grade in t_i?

   In (2), a *wh*-phrase is extracted from the pre-copular DP, and in (3), extraction occurs out of the post-copular DP. In both cases, the examples are ungrammatical. Based on this observation, one might suggest that there is a constraint which prohibits extraction from pre- or post-copular DPs. Let us refer to this putative constraint as *the CopDP Constraint.*

(4.) *CopDP Constraint*
    In a copular sentence, no element contained in the pre- or post-copular DP may be moved out of that DP.

   What is interesting is that the CopDP Constraint can be violated when extraction occurs from both the pre-copular DP and the post-copular DP at

the same time. This is shown in (5).

(5.) *Across-the-board (ATB) extraction in copular sentences*
    a. **Which city$_i$** is your opinion of t_i my opinion of t_i?
             (ibid.)
    b. **Which class$_i$** is your grade in t_i my grade in t_i?

In these examples, a *wh*-phrase is extracted out of both the pre- and post-copular DPs, and the result is grammatical. To the best of our knowledge, so far no explanation has been given to the data in (2)–(3) and (5) (see Den Dikken 2005, 2006 and Heycock and Kroch 1996, 1999 for related discussions).

As Heycock and Kroch (1999: 378, note 9) point out, the pattern of grammaticality seen in the above examples is reminiscent of the well-known pattern of grammaticality exhibited by extraction from coordination. Just as extraction from one of the two DPs linked by a copular verb is disallowed, extraction from one of the two conjuncts linked by a conjunction is disallowed, as shown by the example in (6).

(6.) *Extraction from a conjunct*
    ***What** did Mary [send *t* on Monday] and [receive the parcel on Wednesday]?

Since Ross 1967, the ungrammaticality of examples like this has been attributed to the Coordinate Structure Constraint (CSC).

(7.) *Coordinate Structure Constraint (cf. Ross 1967)*
    In a coordinate structure, no element contained in a conjunct may be moved out of that conjunct.[2]

Crucially, just as CopDP Constraint effects are not observed when extraction occurs from both the pre-copular DP and the post-copular DP at the same time, CSC effects are not observed when extraction occurs from both conjuncts of a coordinate structure at the same time, as illustrated by the example in (8).

(8.) *ATB extraction from coordination*
    What did Mary [send *t* on Monday] and [receive *t* on Wednesday]?

With this background, the aim of this paper is to offer a unified analysis of CopDP Constraint effects and CSC effects. It is argued below that these two types of effects are both derived from a certain parallelism requirement. The rest of this paper is organized as follows. Section 2 introduces the analysis of CSC effects that we adopt in this paper, under which the effects are explained in terms of a parallelism requirement. Section 3 proposes to extend this analysis to CopDP Constraint effects, showing that the proposed analysis can explain not only the grammaticality of examples like (2)–(3) and (5), which involve overt *wh*-extraction, but also an interesting new observation concerning the behavior of *wh*-in-situ in copular sentences. Section 4 summarizes the discussion.

2. CSC Effects

It is argued by a number of researchers that CSC effects should be explained in terms of LF (or semantic) representations (cf., for example, Fox 2000, Goodall 1987, Kato 2006, 2010a, Lin 2001, Munn 1993). Following Fox (2000), Kato (2006, 2010a), and Lin (2001), we assume that CSC effects are attributed to constraints on LF representations under the assumptions in (9).

(9.) *LF Representational CSC*
  a. A sentence is well-formed only if each of its component structures independently satisfies grammatical constraints.
  b. Component structures of a sentence $=_{def}$ structures each of which results from removing the conjunction and all but one of the conjuncts from each coordinate structure

               (Kato 2010a: 3, (4))

 For the sake of discussion, in what follows, we will refer to the analysis of CSC effects based on the assumptions in (9) as *the LF Representational CSC*.

 Now, let us consider how the unacceptability of (6), repeated below as (10), in which a *wh*-phrase is moved out of one of the two conjuncts, is dealt with under this approach.

(10.) *Extraction from a conjunct*
  ***What** did Mary [send *t* on Monday] and [receive the parcel on Wednesday]? = (6)

 According to (9b), this example has the following two component structures:

(11.) *Component structures of (10)*
  a. **what** did Mary send *t* on Monday
  b. **what** did Mary receive the parcel on Wednesday

 In one of these structures, (11b), the *wh*-phrase fails to bind a variable, violating the ban on vacuous quantification (or Full Interpretation (Chomsky 1995: 151–152)). According to (9a), this is why the example is ill-formed.

 Next, let us consider why example (8), repeated as (12), where a *wh*-phrase is moved out of a coordinate structure in an ATB manner, is acceptable.

(12.) *ATB extraction from coordination*
  What did Mary [send *t* on Monday] and [receive *t* on Wednesday]?
  = (8)

 The two component structures of this example are the following:

(13.) *Component structures of (12)*
    a. **what** did Mary send *t* on Monday
    b. **what** did Mary receive *t* on Wednesday

Neither of these structures violates the ban on vacuous quantification (or any other grammatical constraints). Thus, the condition in (9a) correctly predicts that the example is acceptable.

As pointed out by Fox (2000), the LF Representational CSC can also explain contrasts as in (14) (for more arguments in favor of the LF Representational CSC, see Kato 2006, 2010a, and Lin 2001).

(14.) a. *I wonder who [took **what** from Mary] and [gave a book to Fred]
    b. I wonder who [took **what$_i$** from Mary] and [gave **it$_i$** to Fred]
                                          (Ruys 1993: 36, (94))

These examples show that an in-situ *wh*-phrase appearing in one of the conjuncts induces a CSC effect, but when a pronoun bound to the *wh*-phrase appears in the other conjunct, the effect is repaired.[3] This contrast is what the LF Representational CSC predicts. Suppose, for the sake of discussion, the in-situ *wh*-phrase undergoes covert *wh*-movement to be licensed.[4] Then, according to (9b), the example in (14a) should have the component structures in (15) at LF.

(15.) *Component structures of (14a)*
    a. I wonder [who$_j$ **what$_i$** [*t$_j$* [took *t$_i$* from Mary]]]
    b. I wonder [who$_j$ **what$_i$** [*t$_j$* [gave a book to Fred]]]

In (15b), the covert movement of the *wh*-phrase *what* results in vacuous quantification. Thus, the example is correctly ruled out by the condition in (9a). Next, consider (14b), which should have the component structures in (16).

(16.) *Component structures of (14b)*
    a. I wonder [who$_j$ **what$_i$** [*t$_j$* [took *t$_i$* from Mary]]]
    b. I wonder [who$_j$ **what$_i$** [*t$_j$* [gave **it$_i$** to Fred]]]

In each of these component structures, there is no violation of the ban on vacuous quantification (and any other grammatical constraints). In particular, unlike in (15b), the covert movement of *what* does not result in vacuous quantification in (16b), because it binds a bound pronoun there. Thus, the grammaticality of (14b) is correctly predicted.

To sum up, this section has shown that the CSC effects induced by overt *wh*-extraction and by *wh*-in-situ are naturally derived from the condition in (9a), assumed under the LF Representational CSC.

3. CopDP Constraint Effects

In section 1, it was shown that extraction from the pre- or post-copular DP

in copular sentences may induce CopDP Constraint effects. We now claim that these effects should also be reduced to the condition in (9a) (repeated here as (17)), the core assumption of the LF Representational CSC.

(17.) A sentence is well-formed only if each of its component structures independently satisfies grammatical constraints. = (9a)

Specifically, we propose an extension of the definition of "component structure" such that copular sentences have component structures as stated in (18).[5]

(18.) The component structures of a copular sentence are (i) a structure which results from removing the pre-copular DP and (ii) another which results from removing the post-copular DP.

This proposal correctly explains the CopDP Constraint effects observed in examples like (2) and (3), repeated here.

(19.) *Extraction from pre-copular DPs* = (2)
a.***Which city$_i$** is your opinion of t_i my opinion of Philadelphia?
b.***Which class$_i$** is your grade in t_i my grade in Phonology I?

(20.) *Extraction from post-copular DPs* = (3)
a.***Which city$_i$** is your opinion of Edinburgh my opinion of t_i?
b.***Which class$_i$** is your grade in Syntax II my grade in t_i?

These examples, where *wh*-extraction occurs out of the pre- or post-copular DP, are ungrammatical. To illustrate our account of this fact, let us take (19a). According to (18), this example has the component structures in (21).

(21.) *Component structures of (19a)*
a. **which city$_i$** is your opinion of t_i
b. **which city$_i$** is my opinion of Philadelphia

In (21b), the *wh*-phrase *which city* fails to bind a variable, resulting in a violation of the ban on vacuous quantification. Therefore, the example is correctly ruled out by the condition in (17).

Our proposal also offers an explanation of the absence of the CopDP Constraint effect in examples like (5a), repeated as (22), which involves "ATB-style" extraction.

(22.) **Which city$_i$** is your opinion of t_i my opinion of t_i? = (5a)

The component structures of this example should be like (23).

(23.) *Component structures of (22)*
a. **which city$_i$** is your opinion of t_i
b. **which city$_i$** is my opinion of t_i

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Neither of the component structures in (23) violates the ban on vacuous quantification. Therefore, on the assumption that other grammatical constraints are also satisfied by these component structures, example (22) is correctly predicted to be grammatical.[6]

In section 2, we presented the data in (14), repeated below as (24), where an in-situ *wh*-phrase appears in one of the conjuncts of the coordinate structure.

(24.) a.*I wonder who [took **what** from Mary] and [gave a book to Fred]
b. I wonder who [took **what$_i$** from Mary] and [gave **it$_i$** to Fred] = (14)

Recall that this set of data shows the repair effect with the bound pronoun that appears in the second conjunct of the coordinate structure. Now, the discussion of coordinate structures and copular sentences so far leads us to expect that contrasts as in (24) can also be observed in copular sentences. This is indeed what we observe, as shown in (25)–(26).

(25.) a.*I wonder who said that your grade in **which class** is my grade in Syntax II.
b. I wonder who said that your grade in **which class$_i$** is my grade in **it$_i$**.

(26.) a.*I wonder who said that your opinion of **which city** is my opinion of Philadelphia.
b. I wonder who said that your opinion of **which city$_i$** is my opinion of **it$_i$**.

Both *a* and *b* examples of (25)–(26) contain an in-situ *wh*-phrase in the pre-copular DP. They differ in that only in the *b* examples, a pronoun bound to the *wh*-phrase appears in the post-copular DP. The result is that the *a* examples are unacceptable, while the *b* examples are acceptable. Thus, as we expected, the repair effect as observed with *wh*-in-situ in coordinate structures is also observed with *wh*-in-situ in copular sentences.

Let us then consider how contrasts as in (25)–(26) are explained under our proposal, by taking (25) for illustration. First, (25a) has the component structures in (27) at LF.

(27.) *Component structures of (25a)*
a. I wonder [who$_j$ **which class$_i$** [t_j said that [your grade in t_i] is]]
b. I wonder [who$_j$ **which class$_i$** [t_j said that is [my grade in Syntax II]]]

In (27b), the covert movement of the in-situ *wh*-phrase *which class* leads to a violation of the ban on vacuous quantification. This is why the example is ungrammatical. Next, example (25b), where a bound pronoun appears in the post-copular DP, has the component structures in (28).

(28.) *Component structures of (25b)*
a. I wonder [who$_j$ **which class$_i$** [t_j said that [your grade in t_i] is]]

b. I wonder [who$_j$ **which class$_i$** [t_j said that is [my grade in **it$_i$**]]]

In (28b), unlike in (27b), the covertly moved *wh*-phrase *which class* binds the pronoun *it* in the post-copular DP. As a result, the ban on vacuous quantification is satisfied in each of the component structures in (28). We therefore correctly predict that the example is acceptable.[7]

To summarize the discussion in this section so far, it has been shown that the CopDP Constraint effects are explained in terms of the well-formedness condition of the LF Representational CSC in (17), coupled with an extension of the definition of component structure for copular sentences given in (18). Two kinds of data have been discussed: copular sentences that involve overt *wh*-extraction and those that contain *wh*-in-situ.

Before closing this section, we would like to present another set of data which may possibly show further parallelism between coordinate structures and copular sentences. It has been observed in the literature that the CSC can be violated in some cases (see Goldsmith 1985, Lakoff 1986, Postal 1998, and Ross 1967, among others). This is illustrated by the examples in (29).

(29.)　　*Exceptions to the CSC*
　　　　　a. **What** did Harry go to the store and buy *t*?
　　　　　　　(Lakoff 1986: 152, (1))
　　　　　b. **Who** did Mike remain celibate and yet still date *t*?
　　　　　　　(Postal 1998: 80, (108a))

Exceptional cases like these are observed when the conjuncts are linked by certain "asymmetrical" semantic relations (see references cited above). Providing an account of the exceptional cases as in (29) or the correct characterization of the semantic relations they involve is beyond the scope of this paper. However, we would like to point out that similar exceptions can be found for the CopDP Constraint, as expected under our approach to this constraint.

Besides equative copular sentences, there are several other types of copular sentences, one of which is referred to as *predicational* copular sentences (cf. Declerck 1988, Higgins 1979, Rapoport 1987).[8] Some examples are given in (30).

(30.)　　*Predicational copular sentences*
　　　　　a. A picture of the wall is the cause of the riot.
　　　　　　　(Moro 1997: 2, (5))
　　　　　b. The photograph of the president may have been the cause of the
riot.
　　　　　　　　　　　　　　　　　　(Heycock 1994: 195, (87a))

While in equative sentences, the pre-copular and post-copular DPs are both referential, in predicational sentences like (30), only the pre-copular DP is referential (see Akmajian 1979, Higgins 1979, Mikkelsen 2005, Rapoport 1987, and others, for related discussions). Thus, in this type of sentences, the semantic relation between the two DPs can be thought to be more "asymmetrical" than in equative copular sentences.

Interestingly, authors such as Heycock (1994) and Moro (1997) make an observation that in predicational copular sentences, *wh*-extraction out of the post-copular DP is permitted. This is shown in (31).

(31.)   *Extraction from post-copular DPs*
        a. **Which riot$_i$** was a picture of the wall the cause of t_i?
            (Moro 1997: 2, (6b))
        b. **What$_i$** do you think the photograph of the president may have been the cause of t_i?

<div align="right">(Heycock 1994: 196, (88a))</div>

These examples do not exhibit CopDP Constraint effects. Therefore, we find exceptions to the CopDP Constraint in "asymmetrical" copular sentences, just as we find exceptions to the CSC in "asymmetrical" coordination. This fact may be taken to lend further support to the current approach, where CSC effects in coordinate structures and CopDP Constraint effects in copular sentences are treated in a parallel way.

To sum up, this section has argued that CopDP Constraint effects should be reduced to the condition in (17), assumed under the LF Representational CSC.

4. Conclusion

In section 1, it was shown that CopDP Constraint effects and CSC effects, which may be induced by extraction out of pre- or post-copular DPs and extraction out of conjuncts, respectively, display analogous patterns. In section 2, it was shown that CSC effects follow naturally from the LF Representational CSC. Finally, in section 3, it was argued that CopDP Constraint effects can also be captured under the core assumption of the LF Representational CSC.

In a nutshell, this paper offered a unified explanation of CopDP Constraint effects and CSC effects. We argued that the two symmetrical constructions in natural language, copular sentences and coordinate structures, comply with the same requirement on parallelism.

Notes

[1] Declerck (1988) and Higgins (1979) use the term *identity* sentences for examples like (1). Since the term *equative* is more common in the subsequent literature, in the present paper, we use *equative* to refer to this type of sentences.

[2] This is only a part of Ross's original CSC, which also says "(in a coordinate structure) no

conjunct may be moved," ruling out examples like (i).

>   (i) *__What__ did Mary buy a bike and *t*?

In this paper, assuming that the ban on extraction of conjuncts and the ban on extraction out of conjuncts are of different nature (cf. Grosu 1973, 1981, Kato 2010a, b, Merchant 2001), we focus on the latter and put aside examples like (i). Similarly, in the present paper, we do not discuss examples of copular sentences involving extraction of the pre- or post-copular DP like (ii).

>   (ii) *__Whose opinion of Philadelphia__ do you think that your opinion of Edinburgh is *t*?

>   (Heycock and Kroch 1996: 9, (33a); 1999: 377, (42a))

[3] There is a linear ordering restriction on Ruys' (1993) paradigm in (14) (cf. Kasai 2004, Potts 2002): the example in (i), where, unlike in (14b), the bound pronoun appears in the first conjunct, is unacceptable.

>   (i) *I wonder who [took __it$_i$__ from Mary] and [gave __what$_i$__ to Fred].

In this paper, we do not discuss how to account for this fact (see Kasai 2004, Kato 2006, 2010a, Potts 2002, for possible accounts), but see note 7 below.

[4] Note that the contrast as in (14) can also be accounted for by the LF Representational CSC, even if it turns out that an in-situ *wh*-phrase is licensed by Agree (cf. Chomsky 2000, 2001) (see Kato 2010b for details).

[5] Given this extension, a natural next step would be to provide a generalized definition of "component structure." See Asada, in preparation, for an attempt.

[6] A question that arises is how the Theta Criterion is satisfied by the component structures. One possibility seems to be that the copular verb *be* is a one-place predicate, as claimed, for example, by Partee (1986) and Williams (1983). See Asada, in preparation, for further exploration of the issue.

[7] Interestingly, a linear ordering restriction as observed with Ruys' (1993) paradigm in (24) (see note 3 above) is also observed in copular sentences, as shown in (i).

>   (i) *I wonder who said that your grade in __it$_i$__ is my grade in __which class$_i$__.

Unlike the acceptable example, (25b), where a bound pronoun appears in the post-copular DP, the example in (i), where such a pronoun appears in the pre-copular DP, is unacceptable. This fact could be viewed as potential support for the present work, which proposes the parallelism between CSC effects and CopDP Constraint effects.

[8] Higgins's (1979) classic typology of copular sentences recognizes yet another type, *specificational* copular sentences, exemplified by (i) (see also Akmajian 1979, Declerck 1988).

>   (i)   a. The cause of the riot is a picture of the wall.
>   (Moro 1997: 3, (8))
>   b. The first candidate for the trip to Mars is Spiro Agnew.
>   (Akmajian 1979: 162, (1))

Specificational copular sentences are distinguished from equative and predicational copular sentences in their particular function: they are used to specify some entity or a particular member of a set (see references cited above for related discussion). It has been observed in the literature that in various syntactic contexts, specificational copular sentences behave like the equative type, not like the predicational type (cf. Heycock and Kroch 1996, 1999, Rapoport 1987). For example, as shown in (ii), *wh*-extraction out of the pre- or post-copular DP in specificational copular sentences is banned, inducing CopDP Constraint effects, just like in equatives.

>   (ii)   a. *__Which riot$_i$__ was the cause of *t$_i$* a picture of the wall?

      b. *__Which wall__$_i$ was the cause of the riot a picture of *t*$_i$?
          (Moro 1997: 3, (9))

For further exploration of this topic, see Asada, in preparation.

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Revisiting Some Counterexamples
to the Partitive Constraint
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1. Introduction

The restriction that the embedded NP of partitive construction must be definite is well-known in the literature as the Partitive Constraint (cf. Jackendoff 1977, Barwise and Cooper 1981, Ladusaw 1982). The Partitive Constraint, introduced by Jackendoff (1977), is the restriction that the embedded NP of partitive construction must be definite. Indefinite NPs, including those containing the quantifiers all and few are disallowed in the embedded position, hence the ungrammaticality of examples in (2).

(1) Some of the books/many of those books/each of these books

(2) *Some of all books/*many of no books/*each of few books

The first formal account of the Partitive Constraint can be traced to Barwise and Cooper (1981) who are credited with the following semantic definition of definite NP:

> A determiner D is definite if for every model M = <E, ||D||> and every A for which ||D||(A) is defined, there is a non-empty set, so that ||D||(A) is the principal filter generated by B {X ⊆ E| B ⊆ X}   (Barwise and Cooper 1981)

According to Barwise and Cooper, NP denotes a principal filter if there is some non-empty set B which is a subset of all sets contained in the family of sets the NP denotes. This set B is called the generator of the NP. Their proposal then explains why the partitive phrases in (1) but not those in (2) are acceptable. Essentially, NPs like 'the books', 'these books' and 'those books' in (1) denote the filters generated by the contextually indicated sets of books. On the other hand, 'all books', 'no books' and 'few books' in (2) do not have filters as their

denotation. There is no generator present (other than the empty set) and hence, such NPs are not acceptable in partitive phrases.

It has been pointed out by many (Ladusaw 1982, Abbott 1996, Reed 1996 among others), however, that there are some counterexamples to the Partitive Constraint. These problems then led several people to argue in favor of a pragmatic rather than a semantic account of the Partitive Constraint (see Reed 1991, 1996; Abbott 1992, 1996). In this paper, I show that these well-known counterexamples can in fact be straightforwardly explained with a semantic account via inverse linking in the sense of May (1977). That is to say, an account for the problematic partitives based on pragmatic or discourse principle, though informative, is probably unnecessary.

2. The Partitive Constraint and Its Problems

As noted by Ladusaw and others, there are cases in which weak determiners such as cardinals, 'several' and 'some', in the embedded position that bypass the restriction set by the Partitive Constraint, thus challenging the assumption that the embedded NP in partitives must be definite. The classic examples are repeated below:

(3) That book could belong to one of three people.   (Ladusaw 1982: 240)

(4) Ants had gotten into most of some jars of jam Bill had stored in the basement

(5) We put two strawberries on each of three pies (and kiwi slices on the rest)

(6) Three quarters of half the population will be mothers at some point in their lives   (Abbott 1996: 30)

To accommodate these problematic cases, revision to the Partitive Constraint has been proposed. Ladusaw (1982), for example, suggested that the embedded NP must be, if not definite, at least specific in some sense. For instance, the speaker may have a particular group of individuals in mind and this group can function as the generator set in the denotation of the weak NP: [these examples] "are appropriately used only when the user has a particular group of individuals in mind. It seems that the pragmatic notion of an introduced discourse entity is relevant here" (p. 240). Consider the following example from Ladusaw (1982).

(7) That book could belong to one of three people

As Ladusaw points out, despite the fact that the embedded NP in (7) is not syntactically definite, it might be characterized as semantically referential or specific. The sentence in (7) invites a continuation like "- namely, Jane, Jacky and Robert", a kind of list-reading if one will. Or, it might be that the particular group the speaker has in mind consists of three people who have been looking at the book just before the time of utterance. Either way, Ladusaw states, it is not the case that the book in (7) could belong to just any three people for the sentence to be true.

  Abbott (1996), however, rejects this approach on the basis of examples like (8), in which there is not one particular group of individuals that the weak NP refers to; i.e. that is not semantically referential or specific.

(8) Every year only one of many applicants is admitted to the program

Similarly, Hoeksema (1996) also provided the following that could clearly be used by a speaker who has no particular individual in mind as referents of the indefinites.

(9) John was apparently one of several students who arrived late- I have
     no idea how many or who the others were.

Thus, partitives containing weak NPs are still problematic for Ladusaw's (1982) semantic analysis of the Partitive Constraint. This subsequently led her and others (cf. Reed 1996) to argue in favor of a pragmatic rather than a semantic account of the Partitive Constraint.

3.   Pragmatic Accounts of PC

Reed (1996) follows from previous studies (Heim 1988, Webber 1979)
which have argued that the distribution of indefinite and definite noun phrases can be explained in terms of a discourse model. In the earlier discourse models, it was assumed that the occurrence of an indefinite NP creates a discourse entity which can be accessed by some later phrase(s). Consider the following simple version of discourse model, taken from Reed (1996:144).

(9) A storm came up suddenly and we weren't ready for it.

(10) The lightning hit a tree and a dog and the dog died.

(11) Some trees fell but they were old and rotten.

As pointed out by the proponents of discourse model, an indefinite noun phrase will evoke a discourse entity which may later be accessed by a pronoun or definite noun phrase. Thus in (9) the pronoun 'it' can access discourse entities that were evoked by 'a storm' and in (10) the definite noun phrase 'the dog' by the preceding 'a dog'.

Along this line, Reed applies the idea to a pragmatic account of the Partitive Constraint. Specifically, she proposes that the function of partitives is to introduce subgroups of existing discourse groups. In terms of the notion "evoke/access", the partitive is said to access a discourse group and evoke a subgroup of them. The effect of the partitive function, accessing and evoking discourse entities, is illustrated in the following passage from Lilian Rubin's *Worlds of Pain* (cited in Reed 1996):

(12) But things change when an economy begins to contract. Because I have
     kept in touch with *many of the families* and, through *them*, heard about
     others, I already know of *some of those changes*…"   (Rubin 1976: 206)

According to Reed, 'many of the families' accesses a discourse group of families, which has been the subject of Rubin's chapter, and evokes a subgroup (= many) of them, which the following 'them' can access. 'Some of those changes' accesses indirectly a discourse group of changes evoked by association with the first sentence assertion that things change.

Thus, Reed claims that there is no formal restriction on determiners in partitives, but that the interpretation for partitives demands that the embedded NP access a discourse group. Now, indefinites may occur in partitives if explicit modification or the discourse context makes the discourse entity evoked by the indefinite more accessible, in the sense discussed earlier. In the partitives in (13)-(14), the embedded NP is said to access a discourse group.

(13) The dog was stoned by two of some boys playing in that field.

(14) Only one of many people who saw the accident would testify.

In (13) and (14), for example, it is the presence of an identifying description in the discourse model which allows the indefinite to access the discourse entity - the first identifies particular boys by the adverbial 'playing in that field' and the second the particular individuals by the relative clause 'who saw the accident would testify'.

Abbott (1996) also claims that there is no formal (syntactic or semantic) restriction on the embedded NPs in partitives. Instead, she likewise proposes that pragmatic principles determine the well-formedness of partitives. The pragmatic principle that Abbott claims is a very general one that prohibits mentioning entities unless there is some reason for mentioning them. In making

her case, Abbott first asks us to consider the following examples, which would be judged unacceptable or at best strange by many.

(15) *One of several students

(16) *Most of some jars

(17) *Few of many questions

As pointed out by Abbott, there are two main things to notice about these examples. One is that they are given without any context - not even a surrounding sentence - and the other is that we know what they mean; we can interpret them without any trouble at all. While the examples cited as ungrammatical are odd in isolation, Abbott has reasons to think that they are not *un*interpretable, but rather unusual for quite general pragmatic reason and that if they can be provided with a suitable context, they would sound more natural. For example, contextualization should turn examples that are judged ill-formed into well-formed constructions.

(18) I haven't looked closely at the response pattern, but I'm sure that each
     student only answered few of many questions they might have been
     able to get with a little thought.   (Abbott 1996: 41)

(19)?John was one of several students

(20) John was one of several students who arrived late

As argued by Abbott, outside of any context at all, one's reaction to (18)-(20) is one of being left holding an empty bag: "one wants to know why the 'outer' containing group needs to be mentioned at all" (Abbott 1996:41). According to Abbott, this does not mean that the containing group has to be specific in some sense - e.g. to exist or be identifiable in the discourse. All it means is that some reason must be provided for mentioning the outer group and all that is needed is sufficient prepositional or contextual material to explain the relevance of the embedded NP, as the examples have shown. In (20), for instance, the relative clause 'who arrived late' identifies the several students.

4. Inverse Linking: An Alternative Proposal

While the pragmatic principles discussed in the literature offer unique insights into the rather unexpected well-formedness of the counterexamples, perhaps one needs not look further to a pragmatic account than to a classic semantic

restriction involving quantification. Indeed, it is interesting that the very thing making these counterexamples problematic to PC (e.g. *Ants got into most of some jars*, *Only one among many applicants is admitted*) is not addressed in the discourse-based accounts - namely, the embedded quantifiers themselves. In the following, then, I suggest that a discourse-based account is unnecessary if we consider the phenomena as cases of inverse linking in the sense of May (1977). As shown, the structures and operations employed to account for inversely linked sentences can be used to account for the counterexamples in the partitive literature.

  Inverse linking is a term coined by May (1977) to describe the most salient readings of sentences such as (21). The importance of the phenomenon is seen in the following sentence that has inverse linking combined with pronominal binding:

(21) Someone from every city despises it.

What is interesting about this sort of sentence is that the embedded quantifier phrase preferentially receives a wide-scope interpretation. For example, (19) can be interpreted with the quantifier "every city" binding the pronoun 'it'. That is, 'every city' has scope over 'someone' so that it is naturally read as meaning that for each city, there is at least one person that despises that city.

(22) [Someone from every city] despises it → [∀ cities x][∃y in x] y despises x

Syntactically, the interpretation is such that the embedded quantifier (every city) is raised out of the clause.

FIGURE 1
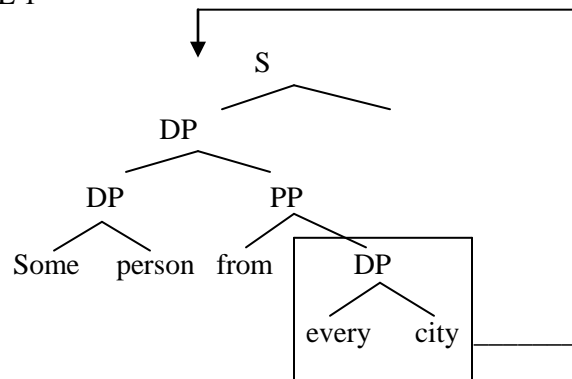
As May shows, on the standard assumption that this form of binding requires c-command, and on the assumption that the object position of the preposition does not c-command the verb phrase, 'every city' must move from its apparent surface position to a higher position c-commanding the pronoun.

 Now, we can do the same with the counterexamples pointed out in the partitive literature. Take the example in (23a) for instance.

(23) a. Ants got into most of some jars.

Here we also have a case of inverse linking, just like 'someone from every city' or 'some pen for every person'. The basic idea is this: Originally we have the first quantifier c-command the second quantifier. To get the right interpretation, 'some jar' is raised out and gets wide-scoped, leaving behind [Most of t] and what we have is a variable - an R-expression - and R-expressions are definites. The semantics of (23a) is derived below.

(23) b. [$\exists X$: | X| > 2 & ($\forall y \in X$) jar (y)][Most $z \in X$] ants got into z

Similarly for (24a), where the second quantifier 'many' is moved out to bind the pronoun and we get the inversely linked interpretation in (24b), i.e. there is many applicants such that only one of its members is admitted.

(24) a. Only one among many applicants is admitted.

   b. [$\exists X$: many(X) & ($\forall y \in X$) applicant (y)][One $z \in X$] applicants is
      admitted.

The idea of binding of plural by non-c-commanding quantifier has also been discussed in Higginbotham (1987). Crucially, what is to be noted here is the general form of the argument employed: syntactic constraints can explain the restricted interpretation of inversely linked constructions, thus providing evidence that covert QR exists as a mechanism for explaining (21). And as shown here, inverse linking can also account for the well-known counterexamples in the partitive literature. In other words, there is perhaps no need to look further to a pragmatic account than a class semantic restriction involving quantification.

5. References

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Postnuclear Glides and Coda Nasals in Taiwan Mandarin: Evidence from Experimental Elicitation of Speech Errors

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1. Introduction

Given the development of the phonological theory, syllable structure has already raised many researchers' interests. The cognitive status of the syllable, both regarding representation and processing, has been the issue studied by many phonologists and psycholinguists. The syllable structure of Mandarin has already been tackled by many scholars especially concerning the status of prenuclear glides (Bao, 2002; Y. Lin, 2002; Yip, 2002; Huang, 2002; Duanmu, 2002; Wan, 2002a). However, not so much works deal with the status of postnuclear glides and coda nasals in Mandarin (Y. Lin, 1989; Bao, 1990; Wan, 2006).

Analyzing speech errors have long been an important way of examining the reality of phonological theories and cognitive processing models (Fromkin, 1973a; Stemberger, 1983; Shattuck-Hufnagel, 1979). The performance of speech errors has been believed to reflect the organizing status of the syllable in phonological processing, focusing on the mapping from phonological representations to the surface forms. In segmental errors, the target and the source almost always occupy the same syllable positions. In the past two decades, speech errors have also been used to investigate various psycholinguistic issues in Mandarin Chinese (Wan, 1997, 2003; Wan & Jaeger, 1998, 2003). In this paper, experimental elicitation of speech errors is used to examine the status of postnuclear glides and final nasals in Taiwan Mandarin and to find out whether or not postnuclear glides sit in the same syllable position as final nasals. Moreover, this paper also attempts to sort out whether or not postnuclear glides are more closely affiliated with nuclei than final nasals. The questions that will be dealt with are as follows.

(1) In experimental elicitation of speech errors involving postnuclear glides, does the postnuclear glide interact more with the postnuclear glide, vowels, prenuclear glides, or the coda nasal? Does the final nasal interact more with the postnuclear glide, coda nasal, prenuclear glide, or vowel? Namely, what

position do they interact with?

(2) In experimental elicitation of speech errors, are the vowel and postnuclear glide regarded as an error unit more often than the vowel and the final nasals are? That is, do postnuclear glides affiliate more closely with vowels than coda nasals do, or vice versa?

2. Literature review

There are 12 possible syllables in Mandarin; they are V, CV, GV, VG, VN, CVG, CVN, CGV, GVG, GVN, CGVG, and CGVN. In Mandarin, syllables can be divided into three parts (C. Cheng, 1973). The first part is the initial, which is the initial consonant. The second part is composed of all the segments following the initial consonant, which can be the prenuclear glide, vowel, postnuclear glide, and the final nasal, but the postnuclear glide and the final nasal cannot occur together. The third part is the tone.

In the traditional analysis of Mandarin syllables, many studies indicate that postnuclear glides sit in the same syllable position as final nasals, which means that postnuclear glides and final nasals are codas. However, according to Wan's research by analyzing speech errors (1997, 2003), it is evident that both prenuclear glides and postnuclear glides are derived from vowels in the underlying representation. Thus, it raises the question about whether postnuclear glides are really codas, occupying the same syllable position as final nasals.

Wan (2006) used speech errors collected in spontaneous utterances to determine the positions of postnulear glides and coda nasals in Taiwan Mandarin. She indicated that postnuclear glides and final nasals do not occupy the same syllable position. Postnuclear glides are derived from vowels and still associated with the vowel in the phonetic level as the right branch of the nucleus. She also suggested that final nasals are true consonants; postnuclear glides and vowels form a constituent in Mandarin, located in the right-most branch of the nucleus. In this paper, unlike Wan's research, the experimental elicitation of speech errors is used to explore the status of postnuclear glides and coda nasals in Mandarin. The following two syllable structures will be tested in this research.

A.   B.
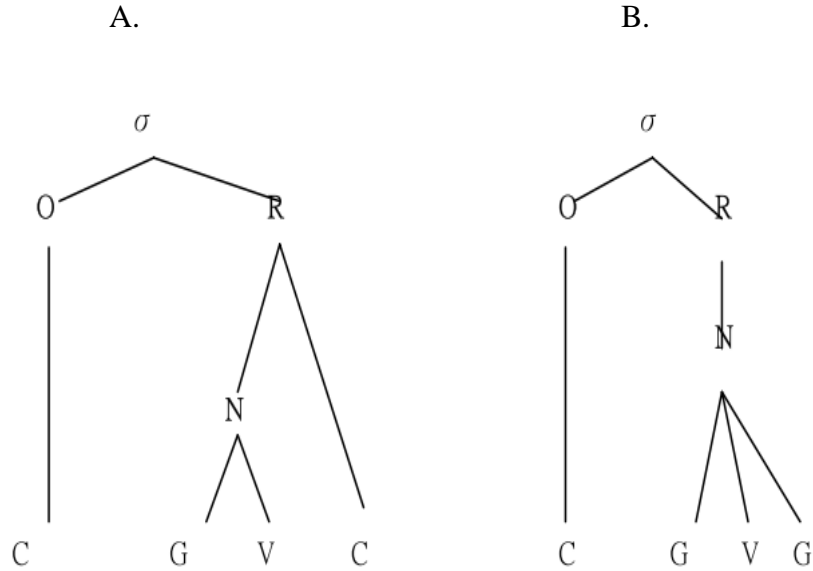
3. Methods

3.1 Experiment 1

In experiment 1, pairs of CVG-CVG, CVG-CVN, and CVN-CVN stimuli were presented visually by the form of *Zhu Yin* (ie, a kind of spelling system in Taiwan) for fear that the forms of the Chinese characters and the frequencies of the characters would have affected the results. The purpose of the experiment 1 was to compare the interaction between the post-nuclear glide and the post-nuclear glide, the post-nuclear glide and final nasal, as well as the final nasal and the final nasal to investigate whether these segments substitute or exchange for each other in experimental elicitation of speech errors.

Materials. Using the set of consonant phonemes /p, p^h, t, t^h, k, k^h/, the vowel /a/, the set of postnuclear glides /j, w/, and the set of coda nasals / n, ŋ/, we constructed pairs of CVG-CVG, CVG-CVN, and CVN-CVN syllables. Syllables in each pair differed from each other only at the final segments, and the tones of all syllables were 55. There were 12 pairs in total, which were composed of 4 CVG-CVG pairs, 4 CVG-CVN pairs, and 4 CVN-CVN pairs. For example, one CVG-CVG pair was [k^haj55 k^hɑw55], in which the two syllables were different from each other only at the two post-nuclear glides. One CVG-CVN pair was [kan55 kaj55], in which the two syllables differed from each other at the final segments. One CVN-CVN pair was [tan55 tɑŋ55], in

which the two syllables can be distinguished from each other by the two post-vocalic nasals.

Design. Each of the 12 test stimuli was preceded by three identical bias pairs of syllables which were constructed analogously to the test CVX pair set and in which the order of the initial consonants and the vowels was preserved but that of the final segments was reversed. For example, for the test stimulus [pɑw55 paj55], the presentation order was [pɑw55 paj55, pɑw55 paj55, pɑw55 paj55, paj55 pɑw55]. In order to prevent subjects from anticipating a switch after three identical CVX pairs, the other 40 pairs, which were all possible syllables in Mandarin, were presented as distracters in groups of one (e.g., [pʰu55 pʰa55]), two (e.g., [mɑw55 mjɑw55, mɑw55 mjɑw55]), three (e.g., [kʰi55 kʰa55, kʰi55 kʰa55, kʰi55 kʰa55]) and four (e.g., [kʰan55 fan55, kʰan55 fan, kʰan55 fan55, kʰan55 fan55]). The presentation of the test stimuli and distracters was in pseudorandom order. There were a total of 88 pairs of syllables presented to subjects.

Subjects. The subjects recruited in this experiment were six linguistically naive Taiwan Mandarin speakers (three males/three females), whose ages were between 22 and 30.

Apparatus and procedure. The pairs of syllables from experiment 1 to 6 were all together shown to the subjects by the computer ACER Aspire One Series in the form of Power Point. There are over all 364 pairs, including the test stimuli from experiment 1 to 6 and all of the distracters. The interval between each pair was 1 second. Subjects were asked to enunciate each syllable pair aloud. During the experiment, subjects listened to white noise presented over sʌmsung earphones for the purpose of encouraging them to read as loudly as possible and to prevent them from monitoring their own utterances. Subjects' responses to the stimuli were recorded by a Skype microphone onto the computer ACER Aspire One Series for later analysis.

3.2 Experiment 2

In experiment 2, pairs of CVG-CVG, CVG-CVN, and CVN-CVN stimuli were presented visually by the form of *Zhu Yin* (ie, a kind of spelling system in Taiwan) for fear that the forms of the Chinese characters and the frequencies of the characters would have affected the results. The purpose of this experiment was to investigate whether the rimes of each pair interact with each other as an error unit, and to whether the G and N interact with V.

Materials. Pairs of CVG-CVG, CVG-CVN, and CVN-CVN syllables were constructed. Syllables in each pair differed from each other only at the rimes, and the tones of all syllables were 55. There were 12 pairs in total, which were composed of 4 CVG-CVG pairs, 4 CVG-CVN pairs, and 4 CVN-CVN pairs. For example, one CVG-CVG pair was [tʂaj55 tʂow55], in which the two syllables were different from each other only at the rimes. One CVG-CVN pair was [sow55 san55], in which the two syllables differed from each other at the rimes. One CVN-CVN pair was [tʂən55 tʂɑŋ55], in which the two syllables can

be distinguished from each other by the rimes.

Design. The design of experiment 2 was the same as that of experiment 1.

Subjects. The subjects of experiment 2 were the same as those of experiment 1.

Apparatus and procedure. The apparatus and procedure of experiment 2 were the same as those of experiment 1.

3.3 Experiment 3

In experiment 3, pairs of CV-CVG, and CV-CVN stimuli were presented visually by the form of *Zhu Yin* (ie, a kind of spelling system in Taiwan) for fear that the forms of the Chinese characters and the frequencies of the characters would have affected the results. The purpose of this experiment was to investigate whether the post-nuclear glide is much easier to be deleted or shifted to the other post-nuclear position than the final nasal, or vice versa?

Materials. Pairs of CV-CVG, and CV-CVN syllables were constructed. Syllables in each pair differed from each other by the extra final segment, and the tones of all syllables were 55. There were 8 pairs in total, which were composed of 4 CV-CVG pairs, and 4 CV-CVN pairs. For example, one CV-CVG pair was [ka55 kɑw55], in which the two syllables were different from each other by the additional post-nuclear glide. One CV-CVN pair was [ta55 tɑŋ55], in which the two syllables differed from each other by the extra final nasal.

Design. The design of experiment 3 was the same as that of experiment 1.

Subjects. The subjects of experiment 3 were the same as those of experiment 1.

Apparatus and procedure. The apparatus and procedure of experiment 3 were the same as those of experiment 1.

3.4 Experiment 4

In experiment 4, pairs of CV-CVG, and CV-CVN stimuli were presented visually by the form of *Zhu Yin* (ie., a kind of spelling system in Taiwan) for fear that the forms of the Chinese characters and the frequencies of the characters would have affected the results. The purpose of this experiment was to investigate whether the post-nuclear glide is much easier to be deleted or shifted to the other post-vocalic position than the final nasal, or vice versa, and whether the rime VG and the rime VN function as an error unit to interact with the vowel.

Materials. Pairs of CV-CVG, and CV-CVN syllables were constructed. Syllables in each pair differed from each other at the rimes, and the tones of all syllables were 55. There were 8 pairs in total, which were composed of 4 CV-CVG pairs, and 4 CV-CVN pairs. For example, one CV-CVG pair was [sa55 sow55], in which the two syllables were different from each other at the rimes. One CV-CVN pair was [sa55 sən55], in which the two syllables differed from each other at the rimes.

Design. The design of experiment 4 was the same as that of experiment 1.

Subjects. The subjects of experiment 4 were the same as those of experiment 1.

Apparatus and procedure. The apparatus and procedure of experiment 4 were the same as those of experiment 1.

3.5 Experiment 5

In experiment 5, pairs of CVG-CGV, and CVN-CGV stimuli were presented visually by the form of *Zhu Yin* (ie, a kind of spelling system in Taiwan) for fear that the forms of the Chinese characters and the frequencies of the characters would have affected the results. The purpose of this experiment was to investigate whether the post-nuclear glide interacts more often with the pre-nuclear glide than the final nasal does, or vice versa.

Materials. Pairs of CVG-CGV, and CVN-CGV syllables were constructed. Syllables in each pair differed from each other by the pre-nuclear glide, post-nuclear glide and the final nasal, and the tones of all syllables were 55. There were 8 pairs in total, which were composed of 4 CVG-CGV pairs, and 4 CVN-CGV pairs. For example, one CVG-CGV pair was [k^hwa55 k^haj55], in which the two syllables were different from each other by the pre-nuclear glide /w/ and the post-nuclear glide /j/. One CVN-CGV pair was [tʂwa55 tʂɑŋ55], in which the two syllables can be distinguished from each other by the final nasal and the pre-nuclear glide.

Design. The design of experiment 5 was the same as that of experiment 1.

Subjects. The subjects of experiment 5 were the same as those of experiment 1.

Apparatus and procedure. The apparatus and procedure of experiment 5 were the same as those of experiment 1.

3.6 Experiment 6

In experiment 6, pairs of CV-CVG, and CV-CVN stimuli were presented visually by the form of *Zhu Yin* (ie, a kind of spelling system in Taiwan) for fear that the forms of the Chinese characters and the frequencies of the characters would have affected the results. The purpose of this experiment was to investigate whether the post-nuclear glide and final nasal interact with the initial consonant.

Materials. Pairs of CV-CVG, and CV-CVN syllables were constructed. Syllables in each pair differed from each other at the initial consonants and the final segment, and the tones of all syllables were 55. There were 8 pairs in total, which were composed of 4 CV-CVG pairs, and 4 CV-CVN pairs. For example, one CV-CVG pair was [ʂa55 k^haj55], in which the two syllables were different from each other not only at the initial consonants but at the final segment. One CV-CVN pair was [p^ha55 kan55], in which the two syllables can be distinguished from each other by the initial consonants as well as the final nasal.

Design. The design of experiment 6 was the same as that of experiment 1.

Subjects. The subjects of experiment 6 were the same as those of experiment 1.

Apparatus and procedure. The apparatus and procedure of experiment 6 were the same as those of experiment 1.

4. Results

The results of the experiments would be shown in this part to concern the issue about the syllable structure status of post-nuclear glides and final nasals. The results from experiment 1 to 6 would be discussed altogether, not separately. Only those errors that were elicited within each pair are discussed here. Those errors that were non-contextual or influenced by the other syllables in the other pairs are not discussed here.

Regarding the interactions between postnuclear glide-vowel, postnuclear glide-prenuclear glide, postnuclear glide-postnuclear glide, postnuclear glide-final nasal, and final nasal-final nasal, there are over all 22 speech errors. 3 postnuclear glide-postnuclear glide interactions include 1 exchange error and 2 substitution errors, as exemplified in (1). 3 postnuclear glide-final nasal interactions include 1 exchangh error and 2 substitution errors, as illustrated in (2). 11 final nasal-final nasal interactions are all substitution errors, as shown in (3). 1 postnuclear glide-vowel interaction is the substitution error, as exemplified in (4). 4 postnuclear glide-prenuclear glide interactions are all substitution errors, as illustrated as (5).

Table1: Interaction errors involving postnuclear glides and final nasals
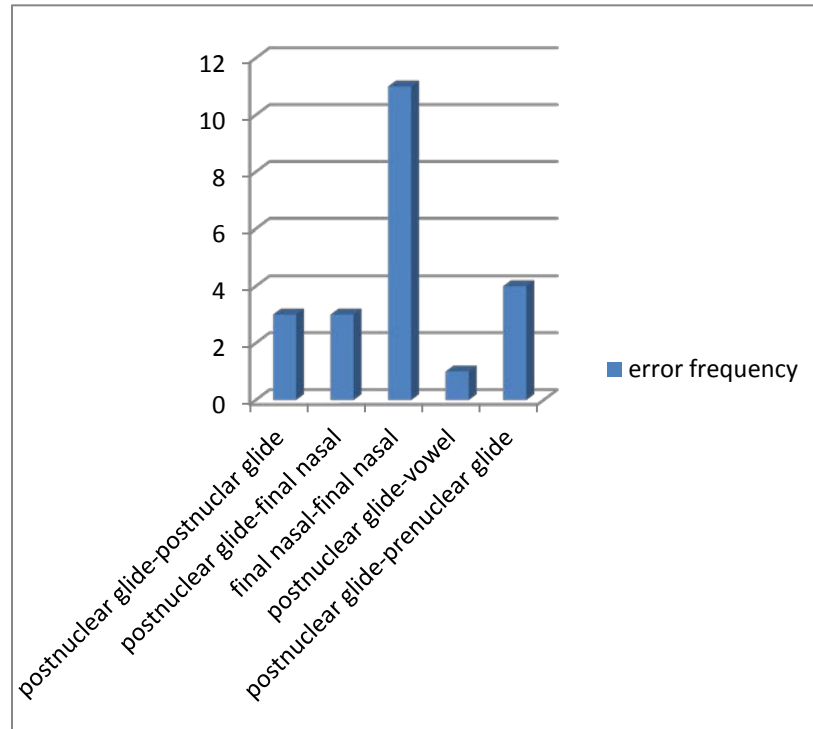
(1) kɑ**w**55 ka**j**55 → ka**j**55 kɑ**w**55

In example (1), the postnuclear glides [w] and [j] exchange their positions. The low vowel [ɑ] changes to [a] because it is followed by [j]. The low vowel [a] switches to [ɑ] for the following [w].

(2) kɑ**ŋ**55 ka**n**55 → kɑ**ŋ**55 kɑ**ŋ**55

In example (2), the velar nasal is perseverated and substitutes for the alveolar nasal. The front low vowel [a] in the second syllable is phonetically realized as back low vowel [ɑ]owing to the following velar nasal.

(3) ka**j**55 ka**n**55 → ka**j**55 ka**j**55

In example (3), the postnuclear glide is perseverated and replaces the alveolar nasal [n].

(4) kʰa55 kʰ**ɑw**55 → kʰa55 kʰ**uw**55

In example (4), the postnuclear glide is anticipated and substitute for the low back vowel [ɑ]. The postnuclear glide keeps its underlying form /u/ and surfaces to the phonetic level as [u].

(5) k**w**a55 kʰa**j**55 → k**w**a55 kʰɑ**w**55

In example (5), the prenuclear glide [w] is perseverated and replaces the

postnuclear glide [j]. The low front vowel /a/ then surfaces as [ɑ] due to the following [w].

Given the results illustrated above, it can be suggested that postnuclear glides should occupy different syllable positions from final nasals. The frequency that postnuclear glides interact with postnuclear glides, the vowel, and prenuclear glides is 8, which outnumbers the frequency that postnuclear glides interact with final nasals. In addition, the frequency that final nasals interact with final nasals is 11, which also overwhelmingly outnumbers the frequency that postnuclear glides interact with final nasals. These speech errors indicate that postnuclear glides and final nasals are in different syllable positions; that is why postnuclear glides cannot interact often with final nasals. It is also inferred that postnuclear glides is more like prenuclear glides and vowels underlyingly; that is why postnuclear glides can substitute for prenuclear glides and vowels, but final nasals cannot.

The above data are about single segment substitution and exchange errors. The following data shows that the rimes form an error unit. The rimes in each pair substitute and exchange for each other. There are overall 13 errors involving rimes substitution and exchange errors. 4 are VG-VG interactions, including 2 exchange errors and 2 substitution errors, as exemplified in (6). 2 are VG-VN interactions, including 1 exchange error and 1 substitution error, as shown in (7). 3 are VG-GV interactions, including 2 exchange errors and 1 substitution error, as illustrated in (8). 4 are V-VG interactions, including 3 exchange errors and 1 substitution error, as exemplified in (9). It can be noted that there are no VN-VN, VN-GV, and V-VN interactions.

Table 2: Interaction errors involving rimes
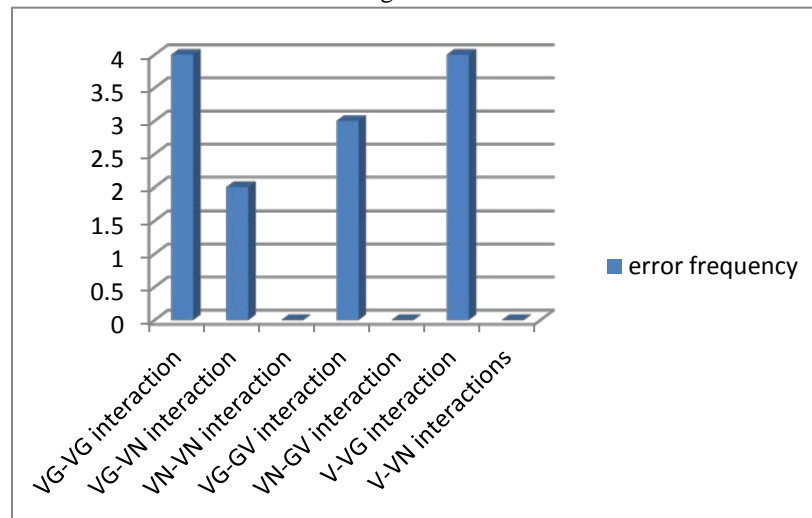
(6) tʂ**aj**55 tʂ**ow**55 → tʂ**ow**55 tʂ**aj**55

In example (6), the rimes [aj] and [ow] are error units and exchange for each other.

(7) s**an**55 s**ow**55 → s**ow**55 s**an**55

In example (7), the rimes [an] and [ow] are error units and exchange for each other.

(8) tʂ**aj**55 tʂ**wa**55 → tʂ**wa**55 tʂ**aj**55

In example (8), the rimes [aj] and [wa] are error units and exchange for each other.

(9) s**a**55 s<u>ow</u>55 → s<u>ow</u>55 s<u>ow</u>55

In example (9), the rime [ow] is anticipated and substitute for the vowel [a] of the previous syllable.

According to the data above, it is indicated that vowels and postnuclear glides can form error units to substitute or exchange for the other rimes with different components. Nevertheless, vowels and final nasals cannot form error units to substitute or exchange for the other rimes, except for the VG units. The number of VG-VG interaction is 4, which outnumbers the number of VG-VN interaction. It can be suggested that the postnuclear glide sits in the different syllable positions from final nasals. Otherwise, the error frequencies of VG-VG interaction and VG-VN interaction should be evenly distributed. Besides, VG can form an error unit to interact with both GV and V; however, VN cannot form an error unit to interact with GV, V, and VN. This finding infers that the postnuclear glide has much closer relation with vowel than the final nasal, which means that the postnuclear glide and the vowel are sisters; they are the daughters of the same mother node, nucleus. Nonetheless, the final nasal and the vowel are not sisters; they are not the daughters of the same mother node. Therefore, the postnuclear glide and the vowel form a constituent, but the final nasal and the vowel do not. Finally, there is still one question unanswered, which is about the GV and VG interaction. The number of GV-VG interaction is 4, which is identical to the number of VG-VG interaction. This finding indicates that GV can form an error unit to interact with VG, which means that the prenuclear glide is a part of the rime not a part of the consonant. This finding also shows that the prenuclear glide, the vowel, and the postnuclear glide may be sisters; they are the daughters of the same mother node, nucleus. The prenuclear glide and the vowel form a structural constituent; so do the postnuclear glide and the vowel. Consequently, GV can form an error unit to interact with VG.

The above data focuses on the substitution and exchange errors, the data below put emphasis on the addition and omission errors in different syllable positions. There are entirely 56 errors involving addition or omission errors. Among all the errors, 6 are postnuclear glide shift errors, as exemplified in (10). 10 are postnuclear glide addition errors, as illustrated in (11). 3 are postnuclear glide omission errors, as shown in (12). 3 are final nasal shift errors, as exemplified in (13). 18 are final nasal addition errors, as illustrated in (14). 2 are final nasal omission, as shown in (15). 3 are prenuclear glide and postnuclear shift errors, as exemplified in (16). 10 are postnuclear glide added to prenuclear

glide position errors, as illustrated in (17).

Table 3: errors involving addition, omission, and shift
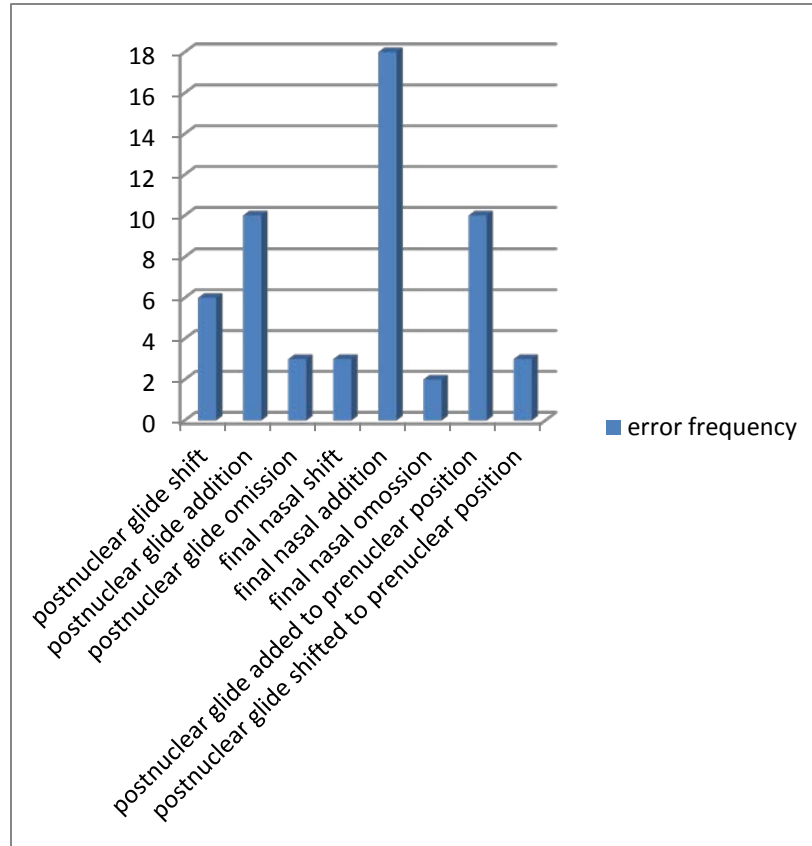
(10) kʰa55 kʰɑw̲55 → kʰɑw̲55 kʰa55

   In example (10), the postnuclear glide in the first syllable shift to the postnuclear position in the second syllable. The low vowel /a/ surfaces as the low back vowel [ɑ] when it is followed by [w].

(11) tsow̲55 tsa55 → tsow̲55 tsɑw̲55

   In the example (11), the postnuclear glide [w] is perseverated and is added to the postnuclear position in the second syllable. The low vowel /a/ surfaces as the low back vowel [ɑ] because it is followed by [w].

(12) pan55 paj̲55 → pan55 pa55

   In the example (12), the postnuclear glide [j] is deleted from the second syllable.

(13) ta55 ta**n**55 → ta**n**55 ta55

In example (13), the final velar nasal shift from the second syllable to the first syllable. The low vowel /a/ surfaces as different phonetic forms owing to the following velar consonant. When /a/ is followed by [ŋ], it surfaces as [ɑ].

(14) kwa55 ka**n**55 → kwa**n**55 ka**n**55

In example (14), the alveolar nasal in the second syllable is anticipated and added to the final position of the first syllable.

(15) tʰa**n**55 tʰa55 → tʰa55 tʰa55

In example (15), the velar nasal [ŋ] is deleted, so that the first syllable is more like the second syllable. The low vowel in the first syllable surfaces as [a] due to the omission of the following velar nasal.

(16) tsa55 tso__w__55 → ts__w__a55 tso__w__55

In example (16), the postnuclear glide [w] is anticipated and is added to the prenuclear position of the first syllable.

(17) tʰɑw55 ʂa55 → tʰwa55 ʂa55

In example (17), the postnuclear glide shifts to the prenuclear position within the same syllable. The low vowel /a/ surfaces as [a] when the postnuclear glide [w] moves to the prenuclear position.

Given the data above, it can be seen that the number of the errors involving postnuclear glides is 32, which is more than that of the errors involving final nasals. However, it cannot be the whole story. Because nasals cannot occupy the prenuclear position in Mandarin Chinese, it is impossible for the final nasals [n] and [ŋ] to be shifted or added to the prenuclear position. As a result, the number of the errors concerning the postnuclear glide added to the prenuclear position and the postnuclear glide shifted to prenuclear positoin should be subtracted, so that the number of errors regarding final nasal shift, addition, and omission can be compared with that of errors concerning postnuclear glide shift, addition, and omission in a fair way. The error number involving final nasal shift, addition, and omission is 23, which is more than that involving postnuclear glide shif, addition, and omission (19). This finding infers that final nasals are true consonants, while postnuclear glides are more like vowels owing to the fewer involving errors, because in the speech error research, it is found that consonant involve more speech errors than vowels do.

Another finding which can be investigated in the above data is the interaction between the postnuclear glide and the prenuclear position. There are totally 13 errors of this kind, which infers that postnuclear glides and prenuclear glides are of the same quality underlyingly. Hence, postnuclear glides can sit in the prenuclear position in the surface level.

5. Discussion and conclusion

From the results above, it is evident that postnuclear glides and final nasals

should be in different syllable positions. That is why the error frequency of the interaction between postnuclear glides and final nasals is much fewer than that between final nasals and final nasals. If postnuclear glides and final nasals are in the same syllable position, they should interact with each other as frequently as final nasals interact with final nasals. However, one could argue that the reason why postnuclear glide-final nasal interaction is fewer is because postnuclear glide and final nasal differ from each other by more than one phonetic feature, while final nasals differ from each other only by the place feature. It has been attested that the more phonetic features the two segments share; the more possibility they will interact with each other (Fromkin, 1973a; Stemberger, 1983; Wan, 1999). Wan (1999) indicated that in Mandarin speech errors, 54 percent of consonant pairs differ from each other by one feature; 46 percent of consonant pairs differ from each other by more than one feature. Nevertheless, the results show that the percentage of final nasal-final nasal interaction is 78.6, which is much higher than the chance expectancy (54%). Besides, the error frequency of postnuclear glide-postnuclear glide interaction (21.4%) is much lower than that of final nasal-final nasal interaction (78.6%), which can also prove that shared phonetic features do not play an important role here, since [w] and [j] differentiate from each other only by the place feature, the same as the two nasals [n] and [ŋ], but the error frequency of postnuclear glide-postnuclear glide is overwhelmingly lower than that of final nasal-final nasal. Consequently, it is suggested that the much higher error rate of final nasal-final nasal interaction is not because of the more phonetic features they share, but because of the same syllable position they occupy.

In rime errors, the results show that the percentages of VG-VG interaction and V-VG interaction are all 40, which are significantly higher than what the chance would expect (16.7%). To the contrary, the percentages of VN-VN interaction and V-VN interaction are all zero, which is significantly lower than what the chance would expect. This finding indicates that the postnuclear glide is closely associated with the vowel, whereas the final nasal is not. Therefore, the vowel and the postnuclear glide can be an error unit to interact with another vowel-postnuclear glide constituent and the vowel and postnuclear glide form a structural constituent located in the right-most branch of the nucleus, which is compatible with Wan's research (2006). The final nasal should be immediately dominated by the node rime in the Mandarin syllable structure, not by the node nucleus, so that it can hardly form an error unit with the vowel.

In shift, addition, and omission errors, the percentage of errors involving final nasals is 54.8, which is just slightly higher than what is expected by chance. However, final nasal-final nasal substitution errors occur much frequently than postnuclear glide-postnuclear glide substitution errors. This indicates that final nasals are true consonants because vowel errors are fewer than consonantal errors cross-linguistically. Thus, final nasals should be regarded as coda.

In conclusion, the findings of this study is compatible with Wan's (2006). In Mandarin, postnuclear glides should be treated differently from final nasals. The vowel and the postnuclear glide form a constituent and are immediately

dominated by the nucleus. The final nasal should be immediately dominated by the rime, and it is a true consonant and coda.

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Quantifier Scope and Anaphoric Links: Focused on Subordinate Clauses

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1. Introduction

This paper discusses anaphoric links between quantifier phrases and pronouns in sentences with a subordinate clause, particularly where more than one operator occurs as in (1), in terms of the Discourse Representation Theory (DRT).

(1) a. Every boy$_1$ buys a toy when he$_1$ is happy.
  b. ?*When he$_1$ is happy, every boy$_1$ buys a toy.
  c. ?*When he$_1$ likes her, every student$_1$ votes for Jane.
  d. ?*Because he$_1$ liked her$_2$, every boy$_1$ voted for Bree$_2$.
  e. ?*Even though he$_1$ does not like Jane, every student$_1$ votes for her.
  f. *When every student$_1$ had to buy a book, he$_1$ bought a Tolstoy.
  g. *Although every boy$_1$ likes toy cars, he$_1$ does not like toy boats.

The focus is put on why the universal quantifier phrase cannot be an antecedent of the pronoun in the subordinate clause in (1b) through (1e) and why the universal quantifier phrase cannot have wide scope over the subordinate conjunct in (1f) and (1g).

This research provides supporting evidence that subordinate conjunctions are operators like the conditional conjunction *if*, and that restrictor DRSs for subordinate conjuncts are also an island which blocks any quantification or conditional operator inside it from introducing its own restrictor DRS out of it.

2. An approach in KGR's Discourse Representation Theory

This section briefly discusses how the bottom-up version of Discourse Representation Theory, proposed in Kamp, Genabith and Reyle (to appear), deals with the subordinate conjunct clauses and what problems could be raised.

KGR implies that subordinate conjunctions should be analyzed on a par with

coordinate conjunctions, as in below.

> We noted that *and* is only one of a number of words that form logical conjunctions in English. In some cases, like in that of *and* itself these conjunctions take the form of coordinations and in others (e.g. *because*) that of subordinations; but **in all these cases left-to-right order matters to anaphoric and presupposition resolution**, **and therefore requires the use of ; in preliminary representation** for the same reasons why it is needed in the representation of conjunctions with *and*. (KGR p.156. Emphasis in bold is ours.)

Such an analysis of subordinate conjunctions in a similar way with coordinating conjunctions however faces several theory-internal difficulties, as pointed out in Chung (2008 a, b).   The most critical one of them is that it fails to explain in terms of accessibility why the intended reading in (2c) is not allowed. For instance, following KGR's construction rules, the preliminary DRS for (2c) would be identical with the one for (2b), which is to be (3) below.

(2) a. $John_1$ waved to $Mary_2$ when he_1 saw her_2
   b. When he_1 saw her_2, $John_1$ wave to $Mary_2$.
   c. *He_1 waved to her_2 when $John_1$ saw $Mary_2$.

(3) Preliminary DRS for (2b) and (2c)
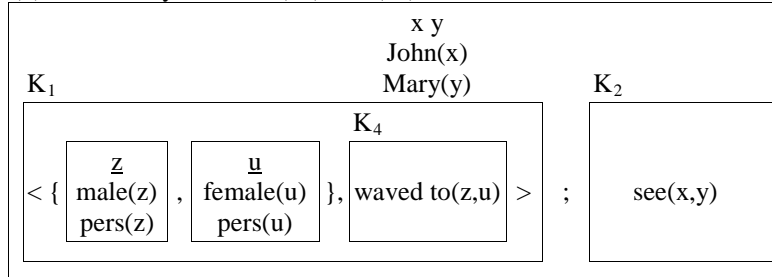
In DRS (3), the discourse referents for *John* and *Mary*, *x* and *y* respectively, are accessible from the discourse referents for the pronouns he and her, *z* and *u*, respectively. The intended reading in (2c) therefore should be theoretically allowed as the one in (2b) is. But such a reading does not fit the intuition of native speakers of English.

3. Dynamic Discourse Representation Theory (Chung 2008a, b)

In this and following chapters, we show that treating subordinate conjunctions as

an operator like the conditional operator *if* and quantifiers will lead to a satisfactory explanation of the grammaticality of sentences (1) and (2) in terms of accessibility. To this end, we adopt the Dynamic Discourse Representation Theory proposed in Chung (2008a, b).

3.1   Basic assumptions and rules of DDRT

We will first briefly review the basic principles construction rules of DDRT. They are given below.

(4) Principles
    a. Every element is processed in the order of occurrence.
    b. Operators in non-sentence (or clause)-initial positions cause the ongoing DRS to split into two DRSs with two indexes (the first of which are the same).
    c. DRSs with the same first index are regarded as one and the same one in terms of accessibility.
    d. **Non-identity Rule (NIR)**: A discourse referent x for a pronoun α in DRS K_i cannot be identified with a discourse referent y for a non-pronoun β such that y is introduced to DRS K_i later than x, (unless y is for a definite description and there is z such that z immediately embeds x and does not embed y).

(5) Construction Rules
    a. If K_1 and K_2 are DRSs, then $K_1 \rightarrow K_2$ is a condition.
    b. If K_1 and K_2 are DRSs, then $K_1 \lozenge K_2$ is a condition.
    c. If K_1 and K_2 are DRSs, then $K_1 \spadesuit K_2$ is a condition.
    d. If K_1 and K_2 are DRSs, then $K_1 \clubsuit K_2$ is a condition.
    …
    g. If K_1 is a DRS, then $K_{1/2} \rightarrow K_{1/1}$ is a condition.
    h. If K_1 is a DRS, then $K_{1/2} \lozenge K_{1/1}$ is a condition.
    i. If K_1 is a DRS, then $K_{1/2} \spadesuit K_{1/1}$ is a condition.
    k. If K_1 is a DRS, then $K_{1/2} \clubsuit K_{1/1}$ is a condition.
    …
    o. If $K_1 \lozenge K_2$ is a condition, then $K_{1\&2/2} \lozenge K_{1\&2/1}$ is a condition, where $K_{1\&2/1}$ is $K_1 \lozenge K_2$.
    p. If $K_1 \rightarrow K_2$ is a condition, then $K_{1\&2/2} \lozenge K_{1\&2/1}$ is a condition, where $K_{1\&2/1}$ is $K_1 \rightarrow K_2$.
    q. If $K_1 \lozenge K_2$ is a condition, then $K_{1\&2/2} \rightarrow K_{1\&2/1}$ is a condition, where $K_{1\&2/1}$ is $K_1 \lozenge K_2$.
    r. If $K_1 \spadesuit K_2$ is a condition, then $K_{1\&2/2} \rightarrow K_{1\&2/1}$ is a condition, where $K_{1\&2/1}$ is $K_1 \spadesuit K_2$.

…

The two important differences which differentiate Chung's DDRT from KGR's DRT are the double indexing system and the different definition of accessibility. To help the readers better understand the differences, these two are briefly discussed below.

Of the two indexes assigned to DRSs, the first ones are the ones which distinguish a DRS from another DRS. Two DRSs with the same first index are regarded as one and the same DRS with respect to accessibility. The second indexes represent the order of construction of DRSs with the same first index. For instance, DRSs $K_{2/1}$ and $K_{2/2}$ in (6b) below are regarded as one and the same DRS and, therefore, discourse referents y and z are accessible to each other. (Note that their coreference is not allowed when z is a discourse referent for a pronoun and y is one for a non-pronoun. Such coreference is blocked by the Non-Identity Rule in (4d).) On the other hand, y is accessible to z and not vice versa in (6a), where the first indexes of the two sub DRSs are different. (K_1 and K_2 can be represented as $K_{1/1}$ and $K_{2/1}$, respectively. The second indexes are left out where not necessary.)
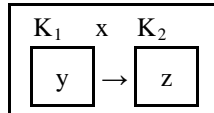
(6) a.   b.
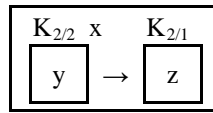
3.2 Advantages of DDRT over DRT

One of the advantages of DDRT over DRT is that it has recoverability. Following KGR's DRT, (7a) and (7b) below are expected to create the same DRS (8), as predicted from the discussion of (2b) and (2c).

(7) a. If John$_1$ loves Mary$_2$, he$_1$ will court her$_2$.
    b. *He$_1$ will court her$_2$, if John$_1$ loves Mary$_2$.

(8)
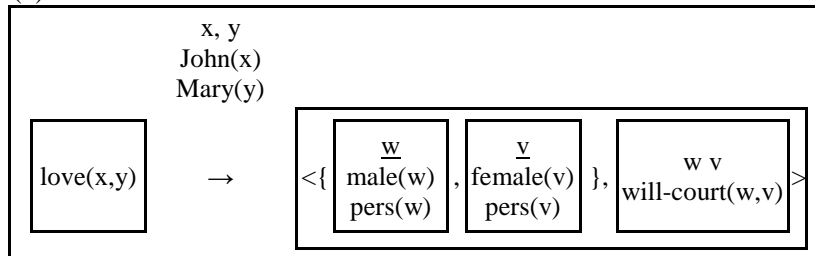
We cannot tell from which of those two sentences (8) is constructed.

On the other hand, according to the construction rules of DDRT, two different DRSs are constructed: (9a) from (7a) and (9b) from (7b).

(9) a.

$$
\begin{array}{|l|}
\hline
\qquad\qquad x,\ y \\
\qquad\qquad John(x) \\
K_1 \qquad Mary(y) \qquad\qquad K_2 \\[2pt]
\boxed{love(x,y)} \quad \rightarrow \quad <\{\ \boxed{\begin{array}{c}\underline{w}\\ male(w)\\ pers(w)\end{array}},\ \boxed{\begin{array}{c}\underline{v}\\ female(v)\\ pers(v)\end{array}}\ \},\ \boxed{\begin{array}{c}w\ v\\ will\text{-}court(w,v)\end{array}}> \\
\hline
\end{array}
$$

b.

$$
\begin{array}{|l|}
\hline
\qquad\qquad x,\ y \\
\qquad\qquad John(x) \\
K_{2/2} \qquad Mary(y) \qquad\qquad K_{2/1} \\[2pt]
\boxed{love(x,y)} \quad \rightarrow \quad <\{\ \boxed{\begin{array}{c}\underline{w}\\ male(w)\\ pers(w)\end{array}},\ \boxed{\begin{array}{c}\underline{v}\\ female(v)\\ pers(v)\end{array}}\ \},\ \boxed{\begin{array}{c}w\ v\\ will\text{-}court(w,v)\end{array}}> \\
\hline
\end{array}
$$
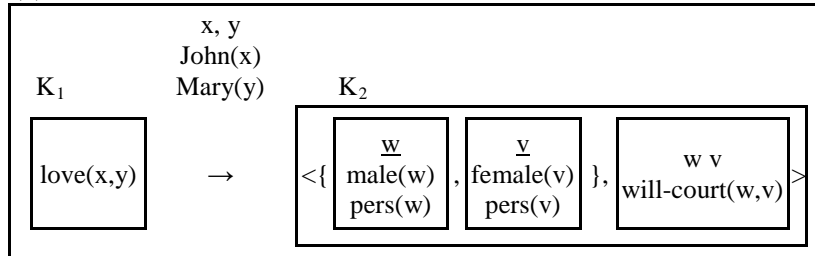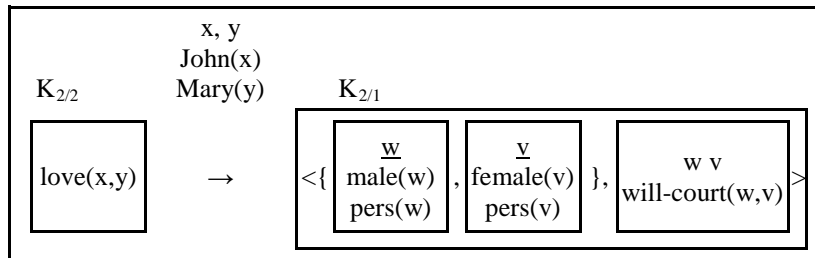
We can tell from the indexes assigned to the DRSs in (9) that (9a) is constructed from (7a) and (9b) from (7b). In (9a), z is accessible to w, but not vice versa. The latter can take the former as its antecedent, resulting in the coreference between them. In (9b), z and w are accessible to each other. Their coreference however is blocked by the NIR.

4. Subordinate Conjunctions as an Operator

In this section, we discuss anaphoric links in subordinate structures such as *when*-clauses, *before*-clauses, and *because*-clauses.

4.1 Subordinate conjunctions are different from coordinating conjunctions

We assume that, unlike Kamp, Genabith and Reyle (to appear)'s claim, anaphoric links in these subordinate structures should not be analyzed in the same way as those in coordinate structures are. Chung(2008a,b) observes the

different patterns of anaphoric links in subordinate and coordinate structures, as shown in (10) and (11).

(10) a. Because John$_1$ likes Mary$_2$, he$_1$ votes for her$_2$.
     b. John $_1$ votes for Bree$_2$, because he$_1$ likes her$_2$.
     c. Because he$_1$ likes her$_2$, John $_1$ votes for Bree$_2$.
     d. *He$_1$ votes for her$_2$, because John $_1$ likes Bree$_2$.
(11) a. John$_1$ likes Mary$_2$ and he$_1$ votes for her$_2$.
     b. ?*He$_1$ likes Mary$_2$ and John$_1$ votes for Mary$_2$.
     c. *And John$_1$ likes Mary$_2$, he$_1$ votes for her$_2$.
     d. *He$_1$ likes hert$_2$ and John$_1$ votes for Mary$_2$.

In subordinate structures, pronouns may precede their antecedents, as shown in (10c), while they cannot in coordinate structures. Rather, a comparison of the examples in (10) and the ones in (12) below reveals that subordinate structures behave in the exactly same way as conditional structures with respect to anaphoric links between two nouns.

(12) a. If John$_1$ likes Mary$_2$, he$_1$ votes for her$_2$.
     b. John$_1$ votes for Mary$_2$ if he$_1$ likes her$_2$.
     c. If he$_1$ likes her$_2$, John$_1$ votes for Mary$_2$.
     d. *He$_1$ votes for her$_2$, if John$_1$ likes Mary$_2$.

This suggests that subordinate conjunctions are an operator.

Another kind of evidence which seems to support our analysis of subordinate conjunctions as an operator is that subordinate clauses provide the context in which their corresponding main clauses are *interpreted and evaluated*, as claimed by many studies including Heim (1982), Hinrichs (1986), Enç (1987), Partee (1987), and Chung (1989, 2008a, b). For instance, in (10a), John's voting for Mary is interpreted based on the context that he likes her, as his voting for her in (12a) is evaluated on the condition that he likes her.

If our assumption above is right, the preliminary DRSs for (2b) and (2c) would be like (13a) and (13b), respectively, as suggested in Chung(2008a, b). ♤ is used to represent the semantics of *when*.

(2) a. John$_1$ waved to Mary$_2$ when he$_1$ saw her$_2$
     b. *He$_1$ waved to her$_2$ when John$_1$ saw Mary$_2$.
     c. When he$_1$ waved to her$_2$, John$_1$ saw Mary$_2$.

(13) a.

$$x\ y$$
$$John(x)$$
$$Mary(y)$$

K_1

$$< \{\ [\underline{w}\ |\ male(w)\ pers(w)]\ ,\ [\underline{v}\ |\ female(v)\ pers(v)]\ \},\ [w\ v\ |\ wave\text{-}to(w,v)]\ >$$

$\spadesuit$

K_2

$$[x\ y\ |\ John(x)\ Mary(y)\ see(x,y)]$$

b.

$$x\ y$$
$$John(x)$$
$$Mary(y)$$

$K_{2/1}$

$K_{2/2}$

$$[x\ y\ |\ John(x)\ Mary(y)\ see(x,y)]$$

$\spadesuit$

$$< \{\ [\underline{w}\ |\ male(w)\ pers(w)]\ ,\ [\underline{v}\ |\ female(v)\ pers(v)]\ \},\ [w\ v\ |\ wave\text{-}to(w,v)]\ >$$
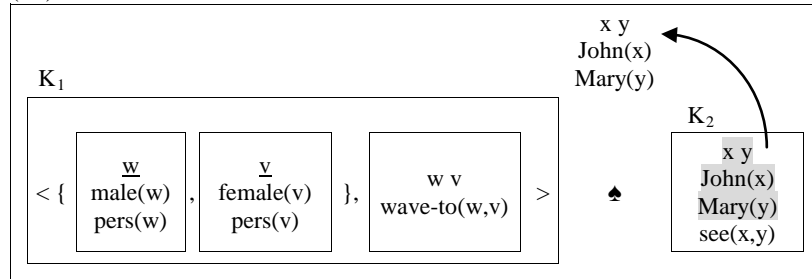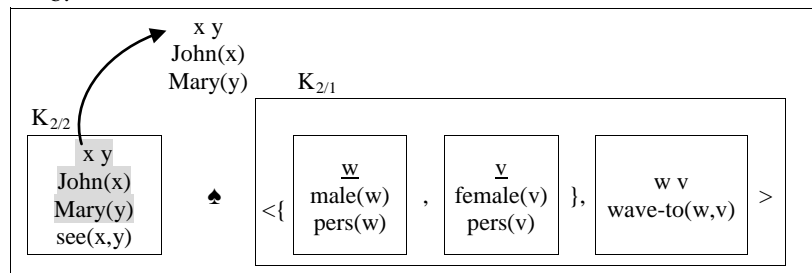
In (13a), the discourse referents introduced by the two proper names, x and y, are accessible from the discourse referents introduced by the two pronouns, w and v. Thus, two identity conditions $x=w$ and $y=v$ can be added to (13a). Such anaphoric links are not against the intuition of native speakers of English.

In (13b), the discourse referents introduced by the two proper names, x and y, also seem to be accessible from the discourse referents introduced by the two pronouns, w and v. Thus, two identity conditions $x=w$ and $y=v$ might be added to (13b). Such anaphoric links, however, are blocked by the NIR because x and y are percolated to the main DRS from the sub-DRS $K_{2/2}$ which is regarded as the same one as $K_{2/1}$, following (4c).

4.2 Scope interactions and anaphoric links

In this section we discuss how the grammaticality of the examples (1b) through (1e), repeated in (14), can be explained in DDRT. We only analyze (1b) for the sake of saving space.

(14) a. Every boy$_1$ buys a toy when he$_1$ is happy.
  b. ?*When he$_1$ is happy, every boy$_1$ buys a toy.
  c. ?*When he$_1$ likes her, every student$_1$ votes for Jane.
  d. ?*Because he$_1$ liked her$_2$, every boy$_1$ voted for Bree$_2$.

e. ?*Even though he$_1$ does not like Jane, every student$_1$ votes for her.

Following the rules in (5), the preliminary DRS for (1b) is (15) below.

(15) Preliminary DRS for (14b)

K$_1$		K$_2$
he is happy	♧	every boy buys a toy
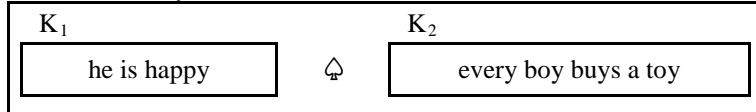
From (15), two different DRSs can be constructed depending on the relative scope of the universal quantifier against the subordinate conjunction. (16) will be derived when the universal quantifier has a narrow scope.

(16) An intermediate DRS for (14b)   (*when > every*)
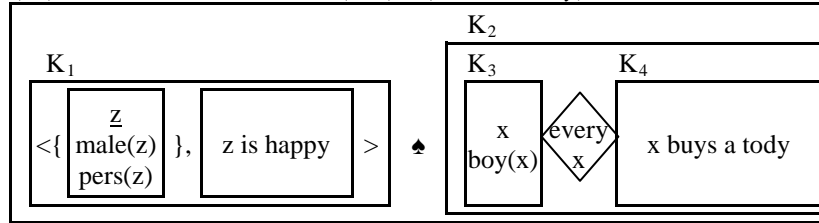
In (16), *y* is not accessible from *z*. Therefore, the coreferential reading of *every boy = he* is not allowed.

When the universal quantifier has a wide scope, (17) is derived.

(17) Another intermediate DRS for (14b)   (*every > when*)
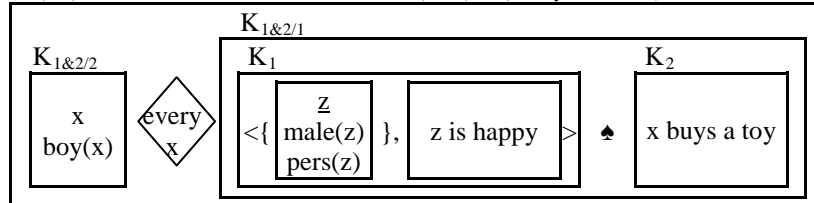
Even though *x* seems to be structurally accessible from *z*, the latter cannot take the former as its antecedent because they are regarded to be in the same DRS and *x* is introduced later than *z*. Thus, their coreference is blocked by the NIR.

4.3 Restrictor DRS as an island

In this section, we show that restrictor DRSs introduced by subordinate conjunctions are also an island as the ones introduced by quantifiers and conditional operators.

Based on the observation that *every* can have wide scope over *most* or *if* in (18), but not in (19), Chung and Lee(2009) claimed that restrictor DRSs are an island which blocks any operators inside it from introducing their own restrictor DRS out of it.

(18) a. *Most representatives who like every senator$_1$ will vote for him$_1$.
    b. *If every senator$_1$ likes Mary$_2$, he$_1$ will vote for her$_2$.
(19) a. Most representatives will vote for every senator.
    b. If a boy likes Mary$_2$, every senator votes for her$_2$.
(20) **Restrictor DRSs as a barrier (or an island)**: (Chung & Lee 2009)
    A restrictor DRS of an (quantification or conditional) operator is a barrier which blocks any operators inside it from introducing their own restrictor DRS out of it.
    (cf. Complex NP Constraint, Wh-island Constraint, …)

This claim also applies to the restrictor DRSs introduced by subordinate conjunctions. The preliminary DRS for (1f), repeated as (21) below, would be (22).

(21) *When every student$_1$ had to buy a book, he$_1$ bought a Tolstoy.
(22) Preliminary DRS for (21)
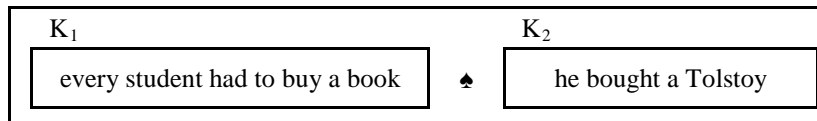
From (22), (23) is derived when the universal quantifier has a narrow scope.

(23)   An intermediate DRS for (22)   (*when > every*)
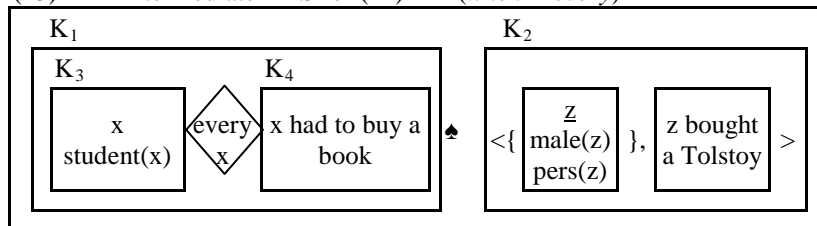
In (23), *x* is not accessible from *z*. And their coreference is not allowed.
   (24) below would be derived if the universal quantifier can have wide scope

over the subordinate conjunction.

(24) Another intermediate DRS for (22)   (*every* > *when*)
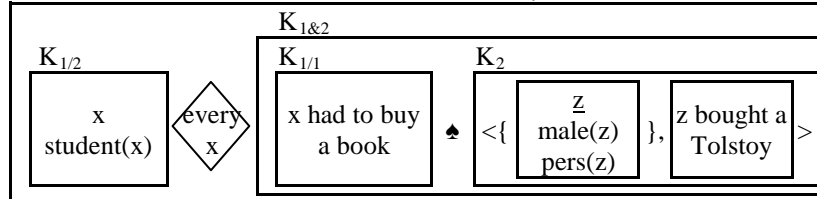
In (24), x is accessible from z. Therefore, z would be able to take x as its antecedent. Such a coreferential reading does not fit our intuition and should be blocked. From this observation, we suggest that subordinate conjunctions create a duplex DRS, the restrictor DRS of which plays a role of an island in the same way as a restrictor DRS for quantifiers and conditional operators. The constraint in (20) therefore blocks the derivation from (22) to (24) and the coreferential reading between *every student* and *he* is not available. (With this constraint, we can explain the Adjunct Islands Constraint proposed by Ross(1967) in terms of DDRT.)

5. Different judgment and different rule

People may have different judgments about the same sentences because they have different linguistic (here, construction) rules. For people who consider (1b) to be grammatical or acceptable, (25) below is derived from (15). (Note that, for people who consider (1b) to be ungrammatical, DRS (16) or (17) is derived from (15).)

(25) From (15)   (*every* > *when*)
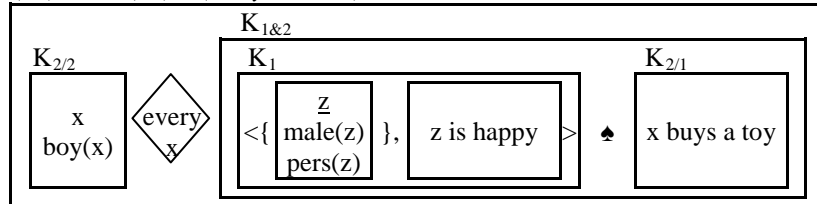
In (25), x is accessible from z. And they belong to two different DRSs, $K_{2/2}$ and K_1. (Note that their first indexes are different.) The coreferential reading of *every boy* and *he* therefore is possible. It is not blocked by the NIR.

6. Ending remarks

We have shown that treating subordinate conjunctions as an operator enables us to explain anaphoric links between pronouns and their antecedents and scope interactions between subordinate conjunctions and other operators such as quantifiers. It also paves a way for us to explain Ross(1967)'s Adjunct Island Constraint in terms of Discourse Representation Theory. Even though our approach is made in the Dynamic Discourse Representation Theory, it can be applied to other versions of DRT in the same or almost similar fashions.

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Investigating the Evolution of Agreement Systems Using an Artificial Language Learning Paradigm

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1. Introduction

The evolution of new agreement systems from grammaticalized pronominal elements is one of the most well-documented processes of linguistic change (Givon 1976; Hopper and Traugott 1993; van Gelderen 2004; Fuss 2005). This pathway can be described by the grammaticalization cline in (1). This paper targets the final stages of this cline, which we hypothesize to be constrained by an implicational hierarchy. A simplified version of this hierarchy, alternately called the Topicality, Definiteness, or Accessibility Hierarchy (Givòn 1976; Ariel 2000; Siewierska 2004), is shown in (2).

(1) *Grammaticalization cline (Hopper and Traugott 1993)*
    independent pronoun → clitic pronoun → agreement affix

(2) *Definiteness Hierarchy*
    Pronoun > Definite DP > Indefinite DP

  We focus on two critical observations about the evolution of new agreement markers: (i) they start out as optional, and gradually become obligatory, and (ii) they are used first with DP types on the left of the Definiteness Hierarchy and are generalized rightward (step-by-step). We argue that the process of making agreement obligatory with a given DP type—*regularization*—and the process of extending agreement to new DP types—*over-generalization*—are driven by the learner, and constrained by the Definiteness Hierarchy.
  To show this, we first provide evidence from the ongoing evolution of new agreement in French. Then we report the results of an artificial language learning experiment modeled after French to directly test our hypotheses. We show that learners in the experiment regularize and over-generalize variable

systems of agreement, but that their behavior is crucially dependent on whether the language is predicted possible by the Definiteness Hierarchy.

2. A Case of Ongoing Change: the French Agreement System

French subject clitics fall somewhere between clitic pronouns and agreement affixes—some authors analyze them as syntactically independent arguments, cliticized phonologically (e.g. Kayne 1975; Rizzi 1986; De Cat 2007), while others treat them as affixal agreement markers (e.g. Auger 1994; Culbertson 2010a). Culbertson (2010a) argues that while in the more conservative Standard French register, they may still function as argumental subjects, in the Colloquial French register they are clearly agreement affixes. That these elements are affixes rather than phonological clitics is based on morphophonological and distributional evidence. Evidence that they function as agreement markers comes from their co-occurrence with pronominal and lexical DP subjects in so-called *subject doubling* constructions. An example is shown in (3).

(3) Lui/Jean il parle.   (4) *Personne il parle.
   him/Jean scl talks   nobody   scl talks
    'Him, Jean (he) is talking.'   'Nobody is talking.' (intended meaning)

   Although French subject doubling has been traditionally analyzed as topic-left-dislocation (the clitic acting as a resumptive pronoun), Culbertson (2010a) shows, on the basis of experimental evidence, that these constructions are not prosodically marked as dislocation, and can occur even when the lexical subject is in-situ. Further, Culbertson (2010a) shows that subject doubling is pervasive in several adult- and child-directed speech corpora of Colloquial French, suggesting it is not a pragmatically marked construction.
   However, even if Colloquial French subject clitics have transitioned from cliticized subjects to affixal agreement markers, this new system of agreement still has room to evolve. In particular, while (3)— doubling of a definite DP—is not only possible, but frequently attested, (4)—doubling of an *indefinite DP*—is impossible. Colloquial French in fact falls in the middle of the Definiteness Hierarchy in (2); subject doubling is obligatory with pronominal DP subjects, optional with definite lexical DPs, and impossible with indefinite lexical DPs.
   To summarize: in the linguistically conservative Standard French register, subject clitics are relatively loosely bound to the verb, and act like argumental subject pronouns. In the Colloquial French register, on the other hand, these elements behave like tightly bound affixal agreement markers, but their appearance depends on the definiteness of the subject DP. It is easy to imagine a future change in which these new agreement markers occur with indefinite subject DPs as well (in fact Picard, a language closely related to French, has

undergone this further change, see Auger 2003). Why is it the case that as a weak pronominal element like the French subject clitic becomes increasingly bound to its host verb, it also tends to be used with greater regularity? The explanation we are suggesting is that language learners play an important role in driving this change, altering the target grammar by using the element more often (regularizing), and with fewer contextual restrictions (over-generalizing).

Evidence that child learners have a tendency to regularize inconsistent variation in their language can be found in work on creolization, (Sankoff and Laberge 1980; Sandler et al 2005), and acquisition of multiple registers (e.g. Smith et al 2007). In the case of French, the fact that subject doubling constructions as in (3) are used more frequently by younger speakers suggests that new generations of speakers are in fact pushing the language along the diachronic path. Figure 1 shows a best-fit linear regression line of doubling rate by age for speakers in three corpora of adult-directed speech.[i]
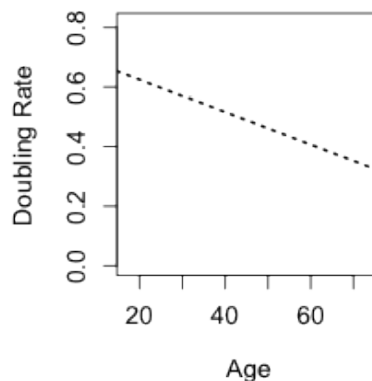
Figure 1. Doubling rate by age in the Coveney, PFC, and CID corpora (r^2=0.46)

Data from French also provide evidence that learners may be responsible for over-generalizing emerging agreement systems. French children's spontaneous speech contains intriguing evidence of non-adult-like use of subject doubling which follows precisely the pattern predicted by the Definiteness Hierarchy. Specifically, they also produce subject doubling with clearly indefinite DP subjects—impossible in the adult grammar. Several examples from the Lyon Corpus (Demuth and Tremblay 2008) are shown below in (5).

(5) a. Un couteau il est là. (Ana 2;9)   b. Un cube il est tombé. (Tim 2;1)
      a knife   scl is there   a block scl is fell
      'A knife is there.'   *'A block fell.'*

Do learners drive the evolution of new agreement systems? Are they responsible for shifting languages along the implicational hierarchy of

Definiteness? Above we have provided some suggestive evidence that French learners may in fact advance the language they acquire along this diachronic pathway. However, the strength of the conclusions we can draw from this evidence is limited.

Below we report the results from an artificial language learning experiment, designed to uncover clear evidence of the potential role of the learner in this type of apparently constrained morphosyntactic change. The experiment investigates a formal bias on the part of the learner to regularize variation present in the input—the *regularization bias*—as well as a *substantive bias* favoring grammars in line with the Definiteness hierarchy. The experiment reveals that learners reliably regularize the variation present *only* when the input follows the hierarchy, when it does not, they shift towards a grammar which better satisfies the substantive bias, rather than regularize the input pattern.

3. Experimental Evidence for the Role of the Learner

The experiment reported here uses an artificial language learning paradigm—similar to that developed in Hudson Kam & Newport (2009)—which takes advantage of the hypothesis that learners will regularize inconsistent variation found in the input. This paradigm is a logical choice to study biases on the part of the learner relevant to language change generally, and the evolution of new agreement systems specifically, since both involve the introduction of variation followed by regularization of a new pattern. Following the basic methodology used in Hudson Kam and Newport (2009), the artificial languages feature a *grammar mixture* that is skewed toward a general pattern, used the majority of the time, but accompanied by some noise. We use this paradigm to explicitly test learners' willingness to regularize linguistic patterns which are predicted to differ based on hypothesized substantive biases.

3.1. Design, methodology and predictions

This experiment exposes learners to a language with a variably present element whose phi-features (here gender and number) match those of the grammatical subject. We label this agreeing element a *clitic* as a descriptive convenience, since its properties are designed to parallel those of the French subject clitic. Following the hypothesis that new agreement systems evolve (in part) through regularization by language learners, the experiment examines the conditions under which learners exhibit a tendency to use a variable element—in this case the clitic—more often than it is present in the input.[ii]

As mentioned above, we are also interested in how learning is influenced by the Definiteness Hierarchy in (2). The hierarchy predicts that a language allowing agreement with definite DPs but not indefinite DPs is possible

(Colloquial French is such a language). By contrast, a language allowing agreement with indefinite DPs but not definite DPs is predicted to be impossible (and is cross-linguistically unattested). By hypothesizing an interaction between the bias to regularize and the substantive bias—the Definiteness Hierarchy—we predict that learners will regularize *only* a language which accords with this hierarchy.

3.2. Lexicon and sentence types

Sentences in the miniature artificial language describe actors, either definite or indefinite, performing some action. The lexicon consists of 4 intransitive verbs (*voitch* 'kick', *ramza* 'wave', *cherg* 'sit', *geeja* 'put hands on face'), 6 definite nouns (*zadgi* 'frog', *blifu* 'lion', *maugi* 'monkey', *nerki* 'lemur', *trefu* 'opossum', *flarmu* 'ant')—half feminine (ending in *–u*), and half masculine (ending in *–i*)—and 2 indefinite nouns (fixed forms, *griftor* 'everybody', *slergor* 'some'). Table 1 shows the paradigm of the clitic, which never bears stress or is separated from the verb, thus resembling a typical clitic or affix. Table 1 also provides the paradigm for two definite DPs. Each is marked for gender, and number (the plural marker is *–la*). The vowel alternation indicating the gender of the clitic is identical to the alternation in the set of masculine and feminine definite DPs. Verbs do not have any additional morphological marking.[iii]

Clitic	Features	DP	Features
si	MASC, SG	nerk-i	MASC, SG
su	FEM, SG	tref-u	FEM, SG
di	MASC, PL	nerk-i-la	MASC, PL
du	FEM, PL	tref-u-la	FEM, PL

Table 1. Artificial language lexicon; clitic and definite DP paradigms.

The grammar generates three sentence types, shown in (7).

(7) *Artificial language sentence types (examples)*
    (i) S → DP Verb   (nerki geeja. *'The lemur waves'*)
    (ii) S → DP Clitic Verb   (nerki si geeja. *'The lemur clitic-waves.'*)
    (iii) S → Clitic Verb   (si geeja. *'(He) clitic-waves.'*)

The DP-types (definite and indefinite) which appear in sentences of types (i) and (ii) vary across conditions (the precise manipulation is discussed below). Sentences of type (iii) are used only when the actor depicted is definite regardless of condition (just as would be the case in French).[iv]
The artificial languages created with this lexicon and set of sentence types are designed to be asymmetrical with respect to the DP-types used; as in natural languages, most sentences have definite as opposed to indefinite subjects.[v]

While this feature makes the artificial languages more realistic, it also introduces the possibility that definite DPs could be learned more successfully than indefinite DPs. To compensate for this asymmetry, each of the 6 definite and 2 indefinite referents were used as the actor(s) in a sentence an equal number of times across training. Since sentences of type (iii), without an overt DP subject, are always definite, this means each individual definite DP will actually be heard *overtly* fewer times than each individual indefinite DP.

3.3. Conditions

Participants in the experiment were randomly assigned to one of two conditions, illustrated in Table 2. In the first, overt definite DP subjects are optional agreement triggers; when an overt definite DP subject is present, it triggers a clitic 75% of the time. Indefinite DP subjects never appear with the clitic. In the second condition, the opposite is true—indefinite DP subjects are optional agreement triggers and when they are present they trigger the clitic 75% of the time. Definite DP subjects never appear with the clitic. The conditions differ critically according to the Definiteness Hierarchy—a language in which definite but not indefinite DPs trigger agreement is perfectly plausible. However, the opposite language, namely one in which clitics are triggered by indefinite but not definite DPs is *impossible*. The first condition is thus labeled the "natural" condition, while the second condition is labeled "unnatural".

	Natural Condition		Unnatural Condition	
	Definite	Indefinite	Definite	Indefinite
(i) S → DP Verb	75%	100%	100%	25%
(ii) S → DP Clitic Verb	25%	0%	0%	75%

Table 2. Conditions; note that this does not include type (iii) sentence, in which no overt DP is present, which are constant across conditions.

3.4. Hypotheses and predictions

The hypotheses this experiment is designed to test, shown in (8), are centered around the idea that learners will generally tend to regularize variation, but are constrained by substantive biases. During the learning process, both biases may cause learners to acquire a grammar which differs systematically from the input. In this section we will outline how these hypotheses can be used to derive predictions about how learners will behave in this experiment.

(8) *General hypotheses*
1. Learners have a *regularization bias*, favoring less variable grammars
2. Learners have a *substantive bias*, favoring grammars which are allowed by the Definiteness Hierarchy.

3. The substantive bias outweighs the regularization bias.
4. Over-generalization is more costly than regularization.

By positing an interaction between substantive bias and the regularization bias, it is possible to generate predictions about learners' behavior given some variable rule in the input grammar. First, learners should regularize the use of a variably present agreeing clitic when the input respects the Definiteness Hierarchy. Learners in the natural condition are therefore predicted to regularize the use of the clitic element with definite DPs. They may also over-generalize, but we assert this is more costly than regularization.[vi] When the input does *not* respect the hierarchy—as in the unnatural condition—the substantive and regularization biases are in conflict, and following Hypothesis 3, the prediction is that learners will *not* regularize.

How might learners in the unnatural condition shift the grammar to bring it *more* in line with the Definiteness Hierarchy? They could move towards a grammar in which *no* DPs trigger the clitic, or towards a grammar in which *all* DPs trigger it. We predict that movement toward the latter is less probable than movement toward the former, since the latter involves over-generalization. (Movement towards a grammar in which definite but not indefinite DPs trigger agreement can be ruled out; this type of shift both fails to regularize *and* involves over-generalization.) These predictions are laid out in (9).

(9) *Predictions*
1. Learners in the natural condition will regularize, may over-generalize.
2. Learners will not regularize in the unnatural condition.
3. Learners in the unnatural condition will shift toward a language which never uses clitics, or uses them will all DP types.

3.5. General procedure

As mentioned above, this experiment is roughly modeled after the method developed in Hudson Kam and Newport (2009). Participants were trained and testing on a miniature artificial language during a single hour-long session using a videogame interface. They were seated in a private testing room in front of a computer display, and wore headphones through which the experiment audio was played. Participants were introduced to a native speaker informant whose utterances they learned from.[vii]

Each session involved two phases of exposure training (200 trials) followed by comprehension and production testing (80 trials each). Throughout, the informant uttered phrases stochastically according to the probabilities specified by the condition the participant was assigned to. Grammars were probabilistic in the sense that given a scene and the vocabulary items which could be used to

describe it, the particular structural realization was determined only by the relative probabilities assigned to the rule expansions in the grammar.

Here we present results from the production testing phase (results from other phases are reported in Culbertson 2010b). In this phase, participants were shown a scene, and were instructed to provide a description of that scene in the language. To ensure that in providing their description participants would have to choose between the critical sentence types (i) and (ii), the informant provided a DP, and participants were told to use it in the sentence.

3.6. Participants

Participants in the experiment were 32 native English speaking undergraduates at Johns Hopkins University (16 in each condition; 7 males, 18-25 years old). One additional participant failed a preliminary vocabulary learning task and was excluded. They received either course credit or $15 for their participation.

3.7. Experiment results and analysis

Figure 2 shows the proportion of participants' utterances which used the clitic with definite and indefinite DP subjects, by condition. As the figure suggests and a one-sample Sign-Test confirms, learners in the natural condition *regularized*—they used clitics with agreement triggering definite DPs more than 75% of the time (*p=0.04*). By contrast, learners in the unnatural condition did not regularize (*p=0.91*), but rather produced clitics with agreement triggering indefinite DPs less than 60% of the time. For DP types which did not trigger clitics in the input—indefinite DPs for the natural condition, and definite DPs for the unnatural condition—95% binomial confidence intervals were constructed for each condition using the mean level of over-generalization.[viii] For both conditions, the 95% confidence intervals did not include 0% (for the natural condition, $5\% \leq \mu \leq 55\%$; for the unnatural condition, $3\% \leq \mu \leq 62\%$), confirming that learners in both conditions over-generalized.

To compare performance across conditions, the data were subjected to mixed-effects logistic regression. A model with clitic use as the dependent variable, participant as a random effect, and condition and DP-type as fixed effects, revealed a significant effect of condition (*β= –1.27, z= –5.91, p<0.0001*) and DP-type (*β= –0.92, z= –5.97, p<0.0001*), as well as an interaction (*β= 2.7, z=17.62, p<0.0001*). This indicates that, (i) overall, learners in the unnatural condition used significantly fewer clitics compared to the natural condition, (ii) overall, learners used clitics significantly less often with indefinites than with definites, and (iii) learners in the unnatural condition were significantly more likely to use clitics with indefinite DPs than learners in the natural condition.

To further investigate these differences, individual planned contrasts were also tested. To confirm that the natural and unnatural conditions differed from one

another with respect to regularization of the clitic with agreement-triggering DPs, a mixed effects model with use of a clitic as the dependent variable, and condition as a fixed effect was fit to the relevant subset of the data. This model revealed a significant difference between the conditions with respect to use of the clitic with agreement-triggering DPs; learners in the unnatural condition used fewer clitics with agreement-triggering DPs than learners in the natural condition did ($\beta=-0.713$, $z=-8.81$, $p<0.0001$). The level of over-generalization in both conditions was also compared, revealing no significant difference between conditions ($\beta=-0.112$, $z=1.34$, $p=0.18$).
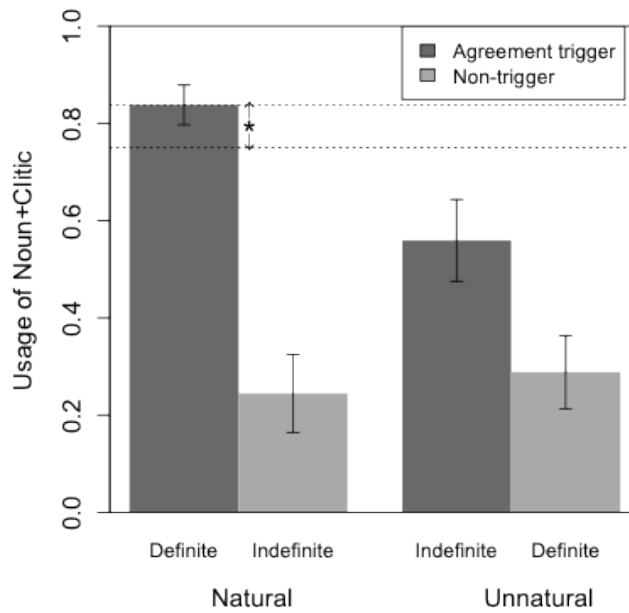
Figure 2. Use of clitic by DP type by condition in the production test.

The results so far reported clearly confirm the predictions in (9). Learners in the natural condition—in which the input pattern conformed to the Definiteness Hierarchy—exhibited regularization. Consistent with our predictions learners also over-generalized clitics to non-agreement-triggering DPs.

As for the unnatural condition—in which the input pattern did not conform to the Definiteness Hierarchy—as predicted, learners did *not* regularize. As a group, learners in the unnatural condition, whose input mixture featured only indefinite DPs as agreement triggers, shifted towards a distribution of grammars which less strongly violates the substantive bias. Specifically, the discrepancy between the use of the clitic with the two DP types in the input was reduced,

with learners using fewer clitics with indefinite DPs and more clitics with definite DPs (as compared to the input).

Because more than one strategy for shifting the input mixture was predicted possible, we now turn to individual learner outcomes. Figure 3 is a plot of the output probabilities for each DP-type for individual participants. The x-axis shows the probability of using a clitic given definite DP subject, and the y-axis the probability of using a clitic given an indefinite DP subject. Each of the corners in the plot represents one of four logically possible deterministic grammars: G1, in which clitics are never used, G2, in which they are always used, G3, in which clitics are triggered by definite DPs only, and G4, the "unnatural" grammar in which clitics are triggered by indefinite DPs only.
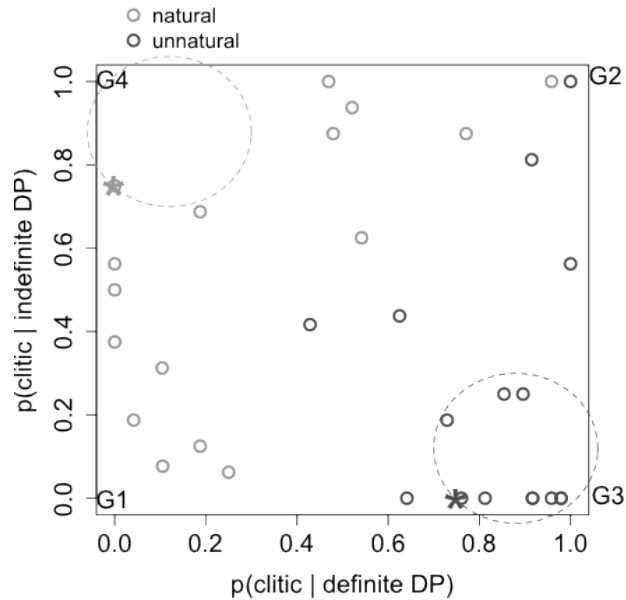
Figure 3. Plot of individual learner outcomes. Asterisks are training points, circles are individual testing points.

The dashed circles in the G3 and G4 corners of the plot are where individual learners should fall if they are regularizing. Supporting the predictions, and confirming the conclusions drawn above based on mean performance, learners in the natural condition were very likely to shift toward the G3 corner—falling within the circle surrounding that corner. A number of learners not only regularized but over-generalized as well, shifting toward the G2 corner. However, no learners fell into the circle surrounding the G4 corner, rather learners in the unnatural condition overwhelmingly moved toward the G1 and G2 corners, as predicted.

4. Discussion

When weakened pronominal clitics become new agreement markers, they start out by appearing only variably with triggering DPs. Over time, they are regularized and extended to new DP types. In the case of French, the use of subject doubling constructions involving lexical DP subjects and subject clitics, has increased over generations, and has spread from pronominal to definite DPs (as in (3) above). This construction, which once involved left-dislocation, has become an agreement dependency (Culbertson 2010). The role of the learner in change along this trajectory is important from the perspective of both diachrony and language acquisition. The biases learners exhibit are crucial to understanding how language change is actuated and how changes spread. At the same time, evidence for both substantive and formal learning biases (like the regularization bias) reveal both structural and formal preferences on the part of the learner that inform our theories of the knowledge the learner brings to the acquisition task.

Although we have some evidence supporting the role of French learners in this particular case, here we have used an artificial language learning experiment to provide clear behavioral evidence for our hypotheses. Learners in the experiment reported here were exposed to a language in which a clitic-like element, whose features agreed with those of the sentential subject, appeared only optionally, and co-occurred with only some types of DP subjects. We were able to show that when the input language respected the Definiteness Hierarchy, learners tended to regularize the variation present in the input. Similar to what is found with child learners of French, learners also over-generalized the agreeing clitic to new types of DP subjects, namely indefinites. This result bolsters support for the claim that regularization and extension of new agreement systems are driven in part by biases on the part of the learner to increase the regularity in grammatical systems.

Critically, however, when learners were exposed to a typologically *unnatural* language—a language predicted impossible by the Definiteness Hierarchy hypothesized to constraint agreement systems—they behaved quite differently. In particular, learners did *not* regularize, but shifted the language, bringing it in line with the Definiteness Hierarchy—exactly as predicted if the hierarchy acts as a substantive bias constraining acquisition. Although change in natural languages undoubtedly involves many factors, the differences in behavior found across conditions in the experiment suggests that biases on the part of the learner may play a critical role. Further, these differences strongly suggest that grammar learning involves more than tracking probabilities; in this case, learning is crucially influenced by substantive constraints on agreement patterns.

The artificial languages learners were exposed to here incorporate an asymmetry in the type (although not token) frequency of definite and indefinite DP subjects—maintaining a realistic feature of natural languages including French. This leaves open the possibility that the differences found in the use of the clitic across conditions was due in some part to this asymmetry. If this effect can be ruled out (see Culbertson 2010b for some evidence that it can), then the results of this experiment provide strong evidence that language-specific biases need to be incorporated into theories of language acquisition to account for typological constraints on linguistic patterns (contra Evans and Levinson 2009; Goldberg 2006, and others). This will be addressed in detail in future work.

Notes

[i] The linear regression model has clitic doubling rate as the dependent variable, and age and corpus as fixed effects. Age is a significant factor (p<0.001) in the model.

[ii] By investigating the extent to which participants will regularize this kind of variation, this experiment is similar to Hudson Kam and Newport (2009). However, here we are interested in testing regularization of a variable *agreement dependency*—that is, regularization of a morphological element whose form varies according to the features of the sentential subject).

[iii] The clitic provides the only morphological dependency between the subject and verb, similar to Colloquial French where suffixal morphology for about 90% of verbs is not phonologically distinct.

[iv] These sentences are potentially important—learners might be more likely to form a representation of the clitic and the verb as a single unit if they hear a large number of such sentences, and therefore at the point of lexical retrieval might be more likely to retrieve the clitic+verb unit rather than the verb alone. This cohesive representation could encourage learners to use of the clitic with DP subjects more, (this is itself a hypothesis, however it is assumed here rather than explicitly tested).

[v] Indefinite subjects are rare cross-linguistically, and in fact some languages do not allow them at all (for general discussion see Comrie 1989).

[vi] While regularization and over-generalization both alter the input grammar, the latter takes a DP-type whose probability of co-occurring with a DP is *zero* and increases it.

[vii] The informant's speech was synthetically generated using Apple's text-to-speech software (OS 10.5, speaker "Alex").

[viii] Since clitics are never used with these DP types in the input, a Sign-Test cannot be used to test for over-generalization. Confidence intervals can be used instead to estimate a range of values which are likely to include some population parameter, like the mean, with some level of confidence (here 95%). If the range for the population parameter does not include that value, we can be 95% confident that this is not the true parameter value. The data in this case are proportions, so we use binomial confidence intervals constructed using the Wilson score interval (Agresti and Coull 1998).

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Pragmatic Processing Factors in
Negative Island Contexts

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1. Introduction

Sentences like (1a) in which an adjunct *wh*-phrase has been extracted over negation are judged less acceptable than sentences like (1b) in which an object *wh*-phrase has been extracted. In the absence of negation, the two *wh*-extractions are equally acceptable (2a-b). Likewise, in the absence of *wh*-extraction, negative yes/no-questions seem perfectly acceptable (3).

(1) a.   How precisely didn't the student report her results __?
     b.   Which results didn't the student report __ very precisely?
(2) a.   How precisely did the student report her results __?
     b.   Which results did the student report __ very precisely?
(3)   Didn't the student report her results very precisely?

The term *negative island* has been used to refer to the degraded acceptability of constructions like (1a) (Ross 1984), and various accounts have been provided for the contrast in (1a-b). In particular, negative islands have been attributed to global constraints within syntax (Rizzi 1990; 1992) or semantics (Szabolcsi & Zwarts 1993; Abrusan 2008).
  In other work (Gieselman *et al.* 2011, in preparation), we have argued against global grammatical constraints and in favor of a new approach to negative islands in which a multiplicity of factors may play a role. In particular, we have used experimental studies of acceptability to isolate the various processing factors that figure in negative island contexts and cumulatively lead to the perception of unacceptability (inspired by suggestions in Ross (1987) and J. D. Fodor (1983)). These factors include independent processing costs of negation, extraction and referentiality (see Gieselman *et al.* 2011, in preparation). In addition to its processing cost, negation imposes restrictions on the discourse context (see Givón 1978; Potts 2010; Nieuwland & Kuperberg 2008; Staab 2007; Tian *et al.* 2010 a.o.). The relation between the processing

cost and the discourse conditions of negation remains largely uninvestigated: prior work on negative islands has considered neither the pragmatic requirements nor the processing cost of negation, and work on negation processing has not addressed negative islands.

In this paper, we investigate the hypothesis that, rather than the syntactic or semantic properties of negation, it is the processing costs underlying the pragmatic demands of negation that lead to the perception of negative island violations (together with other processing factors, for which see Gieselman *et al.* 2011, in preparation). We test our hypothesis experimentally by using acceptability judgments to compare *wh*-extraction across both negation and the presupposition trigger *also*, i.e., another lexical item that imposes further requirements on the discourse context. Our novel results are inconsistent with the view that negative islands are a strictly syntactic or semantic phenomenon. We argue instead for an explanation based on the processing demands induced by pragmatic requirements to interpret a negative sentence with respect to its discourse context.

2. Background

There are three factors that play a role in the perception of negative island violations: the presence of negation, extraction of a *wh*-expression over negation and the level of referentiality of the extracted constituent (the more referential an expression, the more acceptable the sentence).

In other work (Gieselman *et al.* 2011, in preparation), we have provided evidence from acceptability judgment studies that negation is the most prominent factor in negative island contexts. Our results showed robust effects of extraction (object vs. subject *wh*-questions) and of referentiality (*which* NP vs. *how many* NP) only in the presence of negation, while effects of negation were evident even in the absence of these other factors.

We further argued on the basis of our results that negative islands are not likely due to a global grammatical constraint. Crucially, though grammatical and felicitous, sentence types in which negation and extraction (*Which project didn't the intern complete?*) or negation and referentiality interact (*How many interns didn't complete the project?*) lead to robust drops in acceptability. This is not expected under a grammatical account relying on a global constraint and raises questions about possible alternative explanations.

Given the prominent role that negation appears to play in negative islands, and given the fact that the effects of negation are apparent even in the absence of grammatical violations, we set out to investigate the specific properties of negation that might interact with other factors to yield negative island effects.

Let us start by considering the role that negation plays in prominent theoretical accounts of negative islands. The perhaps best-known syntactic explanation

(Rizzi 1990; 1992) for the contrast in (1-2) relies on syntactic assumptions about negation, while the most prominent semantic account (Szabolsci & Zwarts 1993) relies on the function of negation as a logical operator.

The idea behind the syntactic account is that negation is a selective barrier to extraction, and that only referential expressions can escape this barrier. Referential expressions (e.g. *which project*) differ from non-referential expressions (e.g. *how*) in having *theta*-roles and therefore, according to Rizzi, in being assigned referential indices. Non-referential expressions leave traces without indices. Under the assumption that the properties of negation justify its syntactic placement in the A'-specifier position of the TP (tense phrase), negation can function as a potential antecedent governor for the trace of the extracted *wh*-phrase. Since the principle of *relativized minimality* rules out a syntactic configuration in which a potential antecedent governor (here: negation) interrupts the antecedent government relationship between an extracted constituent and a non-referential trace, sentences like (1a) featuring non-referential argument extraction over negation are ruled out. Negation does not interrupt the binding relationship between an extracted constituent and a referential trace, and hence sentences like (1b) are grammatical.

Turning to the semantic account, the acceptability of sentences with extraction over negation depends on the denotation domain of the extracted constituent. Extracted constituents whose denotation ranges over sets of individuals can take scope over negation because the Boolean operation required by negation, namely the computation of the complement set, is defined in this case. By denoting sets of individuals, referential arguments such as *which NP* expressions can be extracted over negation, rendering (1b) acceptable. The complement set cannot be computed in the case of expressions that denote partially ordered and non-individuated domains, resulting in ungrammaticality (1a).

In a nutshell, in the syntactic account of negative islands, the syntactic position of negation is crucial to the argument, while in the semantic account the nature of the logical function of negation is crucial for the explanation. Note that in either account, negation has an effect only in combination with both of the other two factors, extraction and (non)-referentiality. The evidence from our previous studies of negative islands that negation plays a role in and of itself, and in combination with either extraction or with non-referentiality, calls for an investigation of other dimensions of negation that might underlie these effects.

Such dimensions include the processing cost associated with negation and conditions on the use of negation. Over the past 50 years, the processing difficulty associated with negation has been demonstrated with a diverse range of experimental techniques. The cost of negation is reflected in higher error rates (e.g. Wason 1961), longer response times (e.g. Slobin 1966), greater cortical activation (Carpenter *et al.* 1999) and larger brain responses (Staab 2007) to simple negative sentences in comparison with affirmative sentences.

The requirements of negation on the discourse context are easily demonstrated. Imagine asking a new colleague on Monday morning what she did over the weekend, assuming that you hadn't talked to her about it before and don't know her well. If she replies with something like *I didn't go to the mountains* you might frown and ask her if she was supposed to go to the mountains (cf. Givòn 1978). Conversely, the same statement without negation – *I went to the mountains over the weekend* – would not be an awkward response, as it constitutes a discourse move that can easily be accepted.

The importance of discourse context for the integration of negation into the truth conditions of a sentence has been most convincingly demonstrated by means of event-related brain potential (ERP) experiments. Fischler et al (1983) recorded ERPs while participants read sentences such as *A robin isn't a bird/tree* without supporting context that would help situate the assertion. Participants had to judge the truth of the sentences they read. The most curious finding concerned the N400 component (Kutas & Hillyard 1980). The N400 is a negative voltage deflection in the averaged waveform thought to index aspects of semantic processing, and was therefore predicted to be sensitive to the truth of the stimulus sentence. This prediction was borne out with respect to positive sentences but not with respect to negative sentences. This finding was interpreted as evidence that negation isn't processed on line but is integrated into the truth conditions of the sentence later on, perhaps as late as 1500 ms after completion of the sentence (Kaup *et al.* 2006). Subsequent ERP research provided evidence that in pragmatically plausible contexts (*With proper equipment, scuba-diving isn't very dangerous and often good fun*), as opposed to pragmatically implausible contexts (*Bulletproof vests aren't very dangerous and used worldwide for security*), negation is indeed integrated into the truth conditions of a sentence on line, as reflected in the amplitude of the N400 component (Nieuwland & Kuperberg 2008; see also Staab 2007).

In summary, previous grammatical or semantic accounts of negative islands refer to the syntactic or semantic properties of negation that figure into a global constraint, in conjunction with other factors. However, we know from previous investigations that negation in and of itself, as well as in combination with extraction or with non-referentiality, has noticeable processing consequences that do not register as ungrammaticality. This calls for an explanation that is independent of a global grammatical constraint.

3. Acceptability Rating Study

We hypothesize that the prominence of the factor negation in creating negative islands is related to the processing cost of its contextual requirements. The idea is that, as soon as the parser encounters negation, it switches into a different mode of processing. Within this new mode of processing, the sentence is

evaluated against the available context on line to ensure correct interpretation of the sentence within that context. This process requires memory resources to retrieve the context.

By hypothesis, in negative islands this processing cost interacts with the well-known processing cost of extraction. While extraction is a syntactic notion indicating the displacement of a constituent to a non-canonical position, it also has a well-established processing correlate: it is thought to tax the limited resources of working memory (e.g. Just & Carpenter 1992; Waters & Caplan 1996; Kluender 1998; Lewis & Vasishth 2006). As shown in (4), *which movie* has to be held in verbal working memory until it can be integrated into the sentence as the object of the verb *watch*.

(4)   Which movie did the kids watch __ on the internet?

In syntactic and semantic accounts of negative islands, the syntactic operation of extraction across negation is restricted to certain types of constituents (namely, referential ones) because of the specific syntactic and semantic properties of negation that figure into a global constraint. However, if it were instead the processing cost of extraction that interacts with the (pragmatic) processing cost of negation, then we would expect (i) an interaction of negation and extraction even when an unequivocally referential argument is extracted, and (ii) an interaction of extraction with any intervening lexical element that comes with its own pragmatic requirements, such as a presupposition trigger. The first prediction is borne out in Gieselman *et al.* (2011, in preparation). In this paper we focus on testing prediction (ii).

We conducted an acceptability judgment study comparing the effects of negation to those of a presupposition trigger in the context of extraction. Our aim was to investigate whether an element that is syntactically and semantically different from sentential negation but pragmatically similar to it would interact with extraction in the same way that negation does in negative island contexts. To this end, we chose the presupposition trigger *also* to compare to negation.

With regard to pragmatic similarity, although we do not wish to claim that negation is itself a presupposition trigger, it nonetheless exhibits similar discourse conditions to those required for *also* (see Tian *et al.* 2010 for a similar point). If someone is asked out of the blue *What did you do over the weekend?* and responds either *I didn't go to the mountains* or *I also went to the mountains*, both answers seem infelicitous and would lead to additional follow-up questions (*Were you supposed to go to the mountains? / So what else did you do?* etc.). Secondly, the presupposition trigger *also* is known to be resistant to accommodation, in contrast to other presupposition triggers like definite determiners, or verbs such as *stop*, which do allow accommodation (for an overview on presupposition accommodation see Kadmon 2001 pp.151 – 204; Beaver & Zeevat 2007). Given the ERP results in Fischler *et al.* (1983) and in

Nieuwland & Kuperberg (2008) showing that negation cannot be integrated into the truth conditions of a sentence without providing plausible context, we assume that the discourse conditions of negation likewise cannot be easily accommodated. Finally, there is self-paced reading time evidence that not fulfilling the presuppositions of *also* incurs processing costs (Schwarz 2007). This same relationship has been demonstrated inversely for negation: its associated processing costs are mitigated when appropriate context is provided (Glenberg *et al.* 1999). In other words, both negation and *also* seem to be associated with processing costs related to discourse conditions.

With regard to the semantic distinctness, negation introduces a Boolean operator into the semantic representation while *also* behaves like a presupposition trigger without affecting the truth conditions of the sentence.

As to the syntactic distinctness of *also*, while Rizzi (1990; 1992) assumes that negation occupies the A'-specifier position of TP, to the best of our knowledge there is no serious claim in the literature that *also* occupies an equivalent specifier position in the phrase structure tree. Therefore *also* should not interrupt the antecedent government relationship between an extracted element and its trace in the same way that negation is claimed to.

In sum, we chose *also* as a relevant comparison for negation because it is (i) pragmatically similar in imposing discourse conditions that are difficult to accommodate out of the blue, (ii) similar from a processing perspective in that it is associated with a recognized cost when such discourse conditions are not met, and yet (iii) semantically and syntactically distinct. Thus if it turns out that *also* interferes with extraction in the same way that negation does, this can only be attributed to the pragmatic similarities that they share. If on the other hand when inserted into the same syntactic environment as negation in a negative island context, *also* does not interfere with extraction in like manner, this must be attributed to its distinct semantic and/or syntactic profile.

3.1 Methods

3.1.1 Participants
28 native speakers of English were recruited and given course credit for their participation.

3.1.2 Material
A total of 27 sets of nine parallel questions were constructed. Each set contained yes/no-questions (5a) containing negation (5b) or *also* (5c), subject *wh*-questions (5d) containing negation (5e) or *also* (5f), and object *wh*-questions (5g) likewise containing negation (5h) or *also* (5i).

(5) a. Did the kids watch the movie on the internet?
    b. Didn't the kids watch the movie on the internet?

c. Did the kids also watch the movie on the internet?
d. Which kids watched the movie on the internet?
e. Which kids didn't watch the movie on the internet?
f. Which kids also watched the movie on the internet?
g. Which movie did the kids watch on the internet?
h. Which movie didn't the kids watch on the internet?
i. Which movie did the kids also watch on the internet?

Yes/no-questions were included in the design to isolate the effects of negation and *also* on question formation; there is no extraction over negation/*also* in subject *wh*-questions while there is in object *wh*-questions. The stimulus questions all contained a subject consisting of a determiner and a noun, an object consisting of a determiner and a noun, a main verb and an adjunct consisting of a preposition, a determiner and a noun (5). Item sets differed in lexical realization, and thus every item set had a different verb, subject and object, but two of the 24 different prepositional phrases were used repeatedly. All questions in all item sets were crafted across conditions to be as pragmatically plausible and felicitous as possible, and they contained no grammatical violations.

The experimental sentences were supplemented by 54 filler sentences. All filler sentences were questions in order to conceal the purpose of the experiment. There were positive, negative and *also* yes/no-questions and *wh*-questions, and fillers were used to create a balanced design with respect to grammaticality (ranging over different levels of acceptability), intervener (negation, *also*, none) and question type (*wh* vs. *yes/no*).

The experimental stimuli were submitted to a Latin square design, resulting in nine lists such that every subject saw only one item per set and three different lexicalizations of the same condition. Every list contained 27 stimulus items and 54 filler sentences randomly interspersed between the stimuli. Each of the nine lists consisting of 81 sentences was also presented in reverse order such that the design included 18 lists total. Each participant was randomly assigned to one of the 18 lists.

3.1.3 Procedure
Participants were run in 15-minute sessions. The experiment was performed on a computer in the computer lab of the Linguistics Department at UCSD. After giving informed consent, participants were instructed on a website to use their intuitions as a native speaker of English to judge the naturalness of some English sentences presented to them on the computer screen. There was no time pressure in terms of submitting the rating. Both during the experiment as well as during training trials, participants saw one sentence at a time. Underneath the sentence was a series of buttons numbered from one to seven. Participants were instructed to choose one of the lower numbers for 'bad' sentences and one of the higher numbers for 'good' sentences, in accordance with their judgment.

3.1.4 Analysis

A repeated measures analysis of variance (ANOVA) with two within-group factors was conducted. One factor was QUESTION TYPE, with three levels: yes/no-question, subject *wh*-question and object *wh*-question. The other factor was INTERVENER, again with three levels: negation vs. *also* vs. none. The Tukey HSD method was used to compute subsequent multiple pair-wise comparisons.

3.2 Results

As mentioned above, if *also* does not interact with extraction, this must be attributable to its divergent semantic and/or syntactic properties. If on the other hand *also* interacts with extraction in the same way as negation, this must be due to processing costs associated with its pragmatic requirements not being met. This would in turn suggest that it is the pragmatic rather than the semantic or syntactic properties of negation that interfere with extraction in negative islands.

Mean acceptability ratings and standard deviations are reported in Table 1; the same data are presented in graphic form in Figure 1. Both indicate that while the ratings for all question types with no intervener don't differ much, the presence of both negation and *also* seems to lower acceptability ratings in general, but most notably in the case of object *wh*-questions.

	Yes/No	*Subject Wh*	*Object Wh*
No Intervener	6.3 (1.0)	6.0 (1.3)	6.1 (1.4)
Negation	6.2 (0.9)	5.7 (1.3)	4.8 (1.3)
Also	5.8 (1.1)	5.3 (1.4)	4.8 (1.5)

Table 1: *Mean acceptability ratings with (standard deviations)*

The repeated measures ANOVA revealed a main effect of intervener type $(F_1(2,54) = 24.424$, $p < 0.001$, $\eta^2_{partial} = 0.47$; $F_2(2,52) = 25.737$, $p < 0.001$, $\eta^2_{partial} = 0.5)$, a main effect of question type $(F_1(2,54) = 26.643$, $p < 0.001$, $\eta^2_{partial} = 0.5$; $F_2(2,52) = 27.677$, $p < 0.001$, $\eta^2_{partial} = 0.51)$ and an interaction between the two $(F_1(4,108) = 5.59$, $p < 0.001$, $\eta^2_{partial} = 0.17$; $F_2(4,104) = 9.938$, $p < 0.001$, $\eta^2_{partial} = 0.27)$.

Subsequent multiple pair-wise comparisons showed that the main effect of intervener type was mainly due to significantly higher ratings for object *wh*-questions with no intervener compared to negative object *wh*-questions $(p < 0.001)$ and object *wh*-questions containing *also* $(p < 0.001)$. The main effect of question type was mainly driven by questions with interveners (negation or *also*): *also* object *wh*-questions were rated significantly lower than *also* yes/no-questions $(p = 0.008)$, and negative object *wh*-questions were rated lower than both negative yes/no-questions $(p < 0.001)$ and negative subject *wh*-questions $(p = 0.049)$. The interaction was due to robust differences between negative

object *wh*-questions vs. all no-intervener and negative yes/no- and subject *wh*-questions, no-intervener object *wh*-questions, and *also* yes/no-questions (all p ≤ 0.049); and by robust differences between *also* object *wh*-questions vs. all yes/no-questions and no-intervener subject and object *wh*-questions (all p ≤ 0.008). Finally, *also* subject *wh*-questions were rated significantly lower than positive yes/no-questions (p = 0.008) and negative yes/no-questions (p < 0.001).
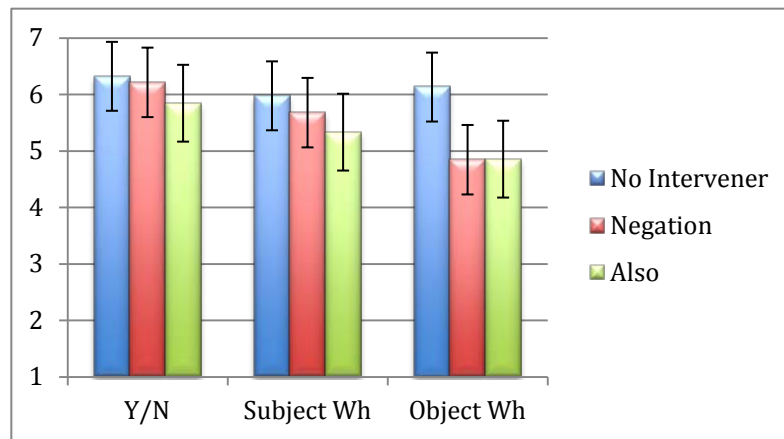
Figure 1: *Mean acceptability ratings are plotted on the y-axis; question type is plotted on the x-axis. In the following order, blue indicates the mean ratings of questions with no intervener, red indicates the mean ratings of questions with negation and green indicates the mean ratings of questions with also.*

3.3 Discussion

Our study compared the effects of the presupposition trigger *also* and negation in the context of extraction (yes/no- and subject *wh-questions* vs. object *wh*-questions) on acceptability ratings. We found a similar pattern of results for negation and *also*. Replicating an earlier study (Gieselman *et al.* 2011, in preparation), we found that negative object *wh*-questions receive lower acceptability ratings than object *wh*-questions without negation (i.e. with no intervener). Interestingly, *also* object *wh*-questions lead to a quantitatively equal drop in acceptability compared to object *wh*-questions with no intervener. The interaction of both *also* and negation with extraction was revealed in robust pair-wise differences between *also* yes/no-questions vs. *also* object *wh*-questions and between negative yes/no-questions vs. negative object *wh*-questions.

 To exclude the possibility that extraction over any adverb leads to drops in acceptability, we conducted a follow-up study. We wanted to know whether a different type of intervener, one that is not a presupposition trigger and that is

semantically relatively vacuous, such as *just* in its temporal reading, gives rise to the same type of intervention effects as negation and *also* did in the study reported above. *Just* should not impose conditions on the discourse in the same way that *also* and negation do.

  We found that while yes/no-questions with *just* (6d) were not significantly different (p = 0.99) from object *wh*-questions with *just* (6h), both yes/no-questions with *also* (6c) and yes/no-questions with negation (6b) received significantly higher ratings than object *wh*-questions with *also* (6g; p = 0.003) and negation (6f; p < 0.001), respectively.

(6) a.   Did the homeowner replace the cabinets during the remodeling?
      b.   Didn't the homeowner replace the cabinets during the remodeling?
      c.   Did the homeowner also replace the cabinets during the remodeling?
      d.   Did the homeowner just replace the cabinets during the remodeling?
      e.   Which cabinets did the homeowner replace during the remodeling?
      f.   Which cabinets didn't the homeowner replace during the remodeling?
      g.   Which cabinets did the homeowner also replace during the remodeling?
      h.   Which cabinets did the homeowner just replace during the remodeling?

We take these results to show that while both *also* and negation interact with extraction, *just* does not. This rules out the logical possibility that all adverbs interfere with extraction. With regard to intervention effects, the common denominator between negation and *also* must therefore be the requirements they place on the discourse context and not their syntactic or semantic properties.

4. General Discussion

In this paper, we investigated some of the factors at play in the linguistic phenomenon of negative islands, with special focus on the role of negation. We presented the results of an experiment comparing the effects of negation with those of the presupposition trigger *also* in the context of referential argument extraction on acceptability ratings. While negation and *also* are very different semantically and syntactically, they have certain pragmatic similarities. There is evidence that the pragmatic requirements of both negation (Glenberg *et al.* 1999) and *also* (Schwarz 2007) are related to their processing costs. Extraction is a syntactic notion but also has processing correlates (Frazier & D'Arcais 1989; Frazier & Clifton 1989; King & Kutas 1995; Kluender 1998; a.o.). If it is true as we hypothesized that the processing cost of negation is related to its discourse requirements, and that it is this pragmatically driven processing cost that interacts with extraction to cause acceptability drops in negative island contexts, then the same interaction should be seen in the case of extraction over *also*. This prediction was borne out, as the results showed equivalent drops in

acceptability for extraction over both *also* and negation in comparison to control *wh*-questions with no interveners. Crucially, these drops in acceptability were triggered by the extraction of referential arguments, and therefore occurred in the absence of any recognized violation of semantic or syntactic constraints.

These results demonstrate that negative island-like effects can be observed with non-negative elements such as the presupposition trigger *also*. We take this as an indication that it is perhaps the pragmatic processing requirements of negation rather than its syntactic or semantic properties that create the phenomenon known as negative islands.

These findings predict that elements that do not constrain the discourse context to the same degree should not interfere with extraction. This prediction was confirmed in a follow-up experiment comparing the effects of extraction over negation and *also* to the effects of extraction over *just* in its temporal meaning. A further prediction of this study is that other elements that impose conditions on the discourse that cannot easily be accommodated should intervene with extraction just as negation and *also* do. Additional research will be required to determine whether this is indeed the case.

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An Experimental Investigation of Semantic and Syntactic Effects on Idiom Recognition

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1. Introduction

The process of interpreting a syntactic representation is guided by the principle of compositionality: the notion that the meaning of a complex expression is equivalent to the meaning of its parts and the way in which those parts are combined (Frege, 1884). Compositionality is largely responsible for explaining how the rich, productive system of human language can exist given finite vocabulary and experience. However, there are limits to compositionality. Sentences such as *John kicked the bucket* or *Mary hit the hay* are ambiguous between a literal interpretation and an idiomatic interpretation. In the former case the meaning of the sentence can be compositionally determined in the normal way and is predictable from the component pieces (e.g. *John impacted the bucket with his foot*). In the latter case the meaning is neither predictable nor compositional, and the principle of compositionality breaks down (e.g. *John died*).

  Such non-compositional expressions are far from exceptional. They are pervasive in a given language (Jackendoff, 1995) and frequent in naturally-occurring language use (Pawley & Snyder, 1983). Thus, complete models of lexical representation should be capable of accounting for these expressions. Despite a long history of idiom research, however, there are still many questions about how these expressions are represented and accessed. Additionally, the relationship between an idiomatic expression and its literal counterpart is still poorly understood. In what follows we will examine attempts in the literature to integrate idiomatic expressions into models of the mental lexicon. We will then present the results of an experiment designed to examine the relationship between the literal and idiomatic interpretations of these strings, and the interplay between syntactic computation and idiom access.

1.1.   Previous research

Early proposals treated idioms as word-like units. In a simple lexical view, words are linguistic representations with arbitrary direct mappings to particular syntactic, semantic and conceptual information. Early research into idioms argued that idioms are word-like, in the sense that they occupy the same level of representation, being directly associated with semantic and conceptual information without a need for compositional interpretation (Bobrow & Bell, 1973; Swinney & Cutler, 1979; Katz & Postal, 1963). For example, Bobrow & Bell (1973) argued that idioms are stored in a separate system accessed via a special, non-compositional processing mode. Evidence for this comes from literalness priming effects: Participants are more likely to interpret an ambiguous string as idiomatic after recent exposure to several idiomatic strings, and as literal after exposure to literal strings (Bobrow & Bell, 1973).

Further evidence for the word-like nature of idioms was provided by Swinney & Cutler (1979)'s finding that idiomatic expressions are recognized as valid expressions faster than literal phrases (see also Gibbs & Gonzales, 1985; Gibbs 1980; Gibbs & Nayak, 1989). According to Swinney & Cutler, idioms are stored in the lexicon like words. During processing, accessing the idiom and computing the literal meaning of the expression proceeds in parallel, with the apparent speed advantage of idiomatic expressions emerging because idioms can be accessed directly in the mental lexicon without need for additional computational steps. They termed this model the *Lexical Representation Hypothesis* (LRH). In addition to offering an intuitively appealing explanation for the rapid recognition of idioms, the LRH also allows us to delegate the resolution of the pervasive literal/non-literal ambiguity to the same sort of systems which handle other kinds of lexical ambiguity.

While the LRH predicts no relationship between the idiomatic and literal versions of an ambiguous string, later research shed doubt upon this prediction. Gibbs & Nayak (1989) noted that idioms occupy a continuum of structural flexibility, and their research provided evidence for a correlation between this flexibility and the degree to which they can be semantically decomposed. In more recent work, Konopka & Bock (2009) found evidence for syntactic priming with phrasal verbs regardless of their level of idiomaticity, strongly arguing for a structural representation of idiomatic strings (see also Peterson et al, 2001).

More fine-grained information regarding the processing and representation of idioms comes from Cacciari & Tabossi (1988), who used cross-modal lexical decision to probe whether idiomatic and literal interpretations were activated during the processing of Italian idioms (e.g. *in seventh heaven*).They found that participants showed evidence of activation of the idiomatic interpretation but not the literal interpretation when probed on the final word of the idiom when the idiomatic nature of the phrase was predictable. When the idiom was not predictable, as measured by an idiom completion pretest, participants showed activation of the literal meaning at the final word, but did not exhibit signs of

idiomatic activation until 300ms later. These results argue against the idea, inherent in the architecture of the LRH, that the literal and idiomatic interpretations of a given ambiguous string are processed in parallel. (See also Cacciari et al, 2007; Titone & Connie 1994, 1999; Fanari et al 2006). This work lead to the Configuration Hypothesis (CH) in which idioms have a distributed representation in the lexicon (Cacciari & Glucksberg, 1991).

In line with this approach, recent work into idiom production also suggests a distributed representation and a primacy of the literal components. On the basis of speech error data, Cutting & Bock (1997) suggest that the production of idioms is sensitive not only to the idiomatic meaning of the phrase at hand, but also to its syntactic internal structure and literal meaning. The finding that, during idiom *production*, the literal meaning and associated syntactic structure are nevertheless activated is quite striking, given that the speaker presumably knows that she is producing an idiomatic expression -- hence one might expect that sensitivity to the structural properties and literal interpretation of an idiom would be unnecessary. Thus, Cutting & Bock's data is strong evidence in favor of a *hybrid representation of idioms.* In their model, idiomatic expressions are represented as phrasal frames in a lexical-conceptual layer of the lexicon. Like words, idioms are connected directly to their idiomatic conceptual meaning, like structures, access is mediated via the literal components of the expression. This model predicts that structural and literal information will be recruited both during idiom production and comprehension. The model also predicts tight integration between the idiomatic representation of an ambiguous string and the literal meaning of its component parts. Activation of an expression such as *kick the bucket*, for example should result in activation of literal *bucket* which in turn should result in activation of semantic and phonologically related lemmas (e.g. *pail* and *bucket*).

Sprenger, Levelt & Kempen (2006) examined these predictions explicitly and provided a refined model of idiom production. Their experiments showed that identity priming of a word in an idiom (e.g. showing people *bucket* for *kick the bucket*) facilitated cued recall of the idiom. Additionally, this priming effect was found to be *greater* for idioms than for related literal strings (e.g *clean the road*) as predicted by the architecture of Cutting & Bock's hybrid model. They also found that sentence completion of an incomplete idiomatic string was facilitated by priming words related phonologically and semantically to the target word, further suggesting that the content of the literal lemmas that comprise the idiomatic string are activated during production. They propose a slightly revised model in which idiomatic representations are instantiated as *super-lemmas*, which occupy a level of representation between structures and words. Like words, these *super-lemmas* are directly associated with a conceptual representation, but unlike words they contain a great deal of structural information and access to them is mediated via the literal lemmas which

comprise the idiom. As such they are able to enter into competition during language production with other literal and idiomatic phrases.

1.2 Aims

The hybrid model of idiom representation goes a long way in articulating the representation of idioms in the mental lexicon and the relationship between idioms and their literal components. Applying the hybrid model to idiom comprehension, however, is not trivial, and a number of questions remain open. First, it is somewhat unclear what the contents of this *super-lemma* representation are. One possibility is that it encodes detailed structural information. For example, an idiom such as *kick the bucket* may be specified at this level as a verb-phrase. This would differ from the representation of a typical VP in that access to the *super-lemma* is (i) directly mediated by access to the lemmas *kick* and *bucket* (ii) structurally specified rather than compositionally composed and (iii) directly associated with a conceptual meaning.

Given point (i) and what we already know about the structure of the lexicon, we might assume that idiomatic activation may proceed to some degree even if one or more of the comprising lemmas is not fully active. Thus parsing a string such as *kick the pail* may partially activate the idiomatic representation by virtue of partial activation of the trigger lemma *bucket* via spreading activation from the conceptually related *pail*. Point (ii) is interesting, as it provides us a potential way of explaining why idiomatic expressions vary with respect to their syntactic flexibility. The degree to which this structural representation is 'hard-coded' could correlate with the flexibility of the idiom. Thus a particularly frozen idiom, like *kick the bucket*, may be fully specified as an active VP, thus prohibiting its syntactic productivity and explaining why, for example, it cannot passivize. If this is the case, however, we would expect that consideration of idiomatic meaning would be inhibited in cases in which the component lemmas occupy a syntactic structure incompatible with this *super-lemma* representation. Furthermore we would predict that this effect will vary depending on the idiom in question. Idioms may differ along some continuum of flexibility, as mentioned earlier, or simply be individually specified for which structural features they permit.

In this paper we focus on these two points. To investigate point (i), we presented sentences such as *John kicked the bucket last Sunday* and *John kicked the pail last Sunday* to participants and used real-time eye-tracking in a text-based visual-world paradigm to investigate the time-course of consideration of the idiomatic and literal interpretations of these sentences over time. If our view is correct we predict competition between the idiomatic and literal interpretations upon hearing *kick the bucket*, and similar effects when hearing *kick the pail*.

To investigate point (ii) without making any assumptions about the underlying representation of the feature of 'flexibility,' it was essential to choose a syntactic structural feature which completely rules out an idiomatic interpretation regardless of the flexibility of our stimuli. To accomplish this, we presented participants with sentences in which the idiomatic string was broken up across a sentential boundary. If our view is correct, the syntactic structure should rule out the idiomatic interpretation, resulting in no consideration of the idiomatic interpretation in either …*kick. The bucket*… or …*kick. The pail*… cases.

2. Method

2.1 Participants

12 undergraduate students at the University of Southern California participated in this study. All participants were native speakers of American English.

2.2 Materials

2.2.1 Lexcial availability
12 idioms were selected out of a pool of 21 based on the results of an off-line norming study. All idioms (including those not selected for the main experiment) were of the form *verb x noun* (e.g. *kick the bucket, find her feet, smell a rat, pull his leg*) where *x* was either an article (*a* or *the*) or a possessive pronoun (*his* or *her*). The 12 selected idioms were chosen based upon their familiarity to the majority of participants in the norming study, and the ease of their use in stimuli for the main experiment. These items comprised our **Lexically Available** condition. 12 semantic-associates were then created by changing the final noun of each idiom to a semantically-related word (e.g. *kick the pail, find her toes, smell a mouse, pull his arm*). These items comprised our **Lexically Unavailable** condition.

2.2.2 Syntactic availability
Syntactic availability was manipulated by placing each idiom and semantic-associate into one of two sentential frames. In the **Syntactically Available** conditions, the relevant string was inserted into a simple sentence containing only a proper name and a time phrase so as to not contextually bias individuals to interpret the string one way or the other. In the **Syntactically Unavailable** conditions, the string was divided between two sentences with the *verb* occurring as the final word of the first sentence and *x noun* occurring as the beginning of the following sentence. An example is given in Table 1.

Syntax	Lexical	Sentence
Available	Available	John *kicked the bucket* last Thursday.
Available	Unavailable	John *kicked the pail* last Thursday.
Unavailable	Available	It was surprising to see someone as skilled as John completely miss when he *kicked. The bucket* full of orange slices was completely destroyed when he accidentally missed the ball.
Unavailable	Unavailable	It was surprising to see someone as skilled as John completely miss when he *kicked. The pail* full of orange slices was completely destroyed when he accidentally missed the ball.

Table 1. Example items for the idiom *kick the bucket* in each of our four conditions.

2.2.3 Stimuli

The test sentences (recorded by a native speaker of American English, no splicing to ensure naturalness) were presented over headphones. In addition to the 48 target audio sentences, 60 filler sentences were also recorded. To better mask the target stimuli, half of all fillers were short simple sentences and half were longer multi-sentence stories.

The visual stimuli consisted of a set of four words presented on the screen. For target items, these were an **Idiom Associate**, **Literal Associate** and two **Distractors**. **Idiom Associates** were selected based upon the results of an off-line norming study which asked people to list the first three words that came to mind when reading the given idiom. **Literal Associates** were semantic associates of one of the nouns (e.g. *Bucket*; 7 items) or the verb (5 items). To help mask the targets, half the filler displays also contained a word semantically related to one of the words in the sentence (see Meyer, 2005; Heuttig & McQueen, 2007, McQueen & Viebahn, 2007). In addition, three-fourths of fillers contained a word that matched a word in the auditory sentence.
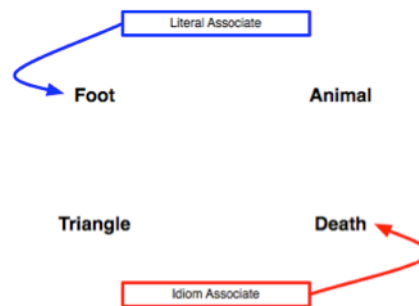
Figure 1. A sample display with Literal and Idiom associates marked.

Visual stimuli were presented on the screen with one word in each corner as shown in the sample display in Figure 1. Position of the associates and distractors was balanced both within the target items and overall (pooling targets and fillers).

2.3 Procedure

Participants' eye movements were recorded using an Eyelink II eye-tracker (SR Research). For each trial participants first saw the four visual stimuli appear on the screen and were given 5 seconds to preview the words. After 5 seconds the audio stimuli was presented. Participants were instructed to read each word silently to themselves during the preview phase and to maintain their attention on the screen during the audio phase. Stimuli were presented to participants using a modified latin-square design. Each participant saw two versions of each target, but never saw any target in the same condition more than once. Presentation order was pseudo-randomized: The first version of a particular target item occurred in the first half of the list, and the second occurred in the second half. Half of the participants saw lists with reverse order to control for possible learning effects.

3. Results

We were primarily interested in qualitative differences in looking behavior in our different conditions, and on the timing of changes in looking behavior over the course of a trial. Thus for each condition we examined whether looks to either the Idiomatic Target or Literal Target deviated significantly from the distractors and from each other. To prepare our data we computed average fixation proportions (by subject and by item) over a time interval extending from 200ms after the onset of the critical noun (e.g. *Bucket* or *Pail*) to 1000ms post onset. As we were also interested in changes in looking behavior over this time window, the full time window was partitioned into eight 100ms windows, and further analyses were performed on each of those windows. Analyses were performed using a series of ANOVA over the full time window and each individual partition.

  In the interest of clarity, results are presented graphically as *literal advantage scores*. These scores are computed by subtracting the proportion of looks to the idiomatic target from the proportion of looks to the literal target. Thus, a positive value represents more looks to the literal target (literal advantage), a negative value represents more looks to the idiomatic target and a value close to 0 represents equal looks to both the literal and idiomatic targets. (Statistical analyses were conducted on the proportions of looks, rather than on the difference scores of proportions of looks.)

3.1 Syntactically unavailable trials

Figure 2 shows the literal advantage scores for each time window in the *Syntactically Unavailable condition*. Generally we can see that participants seem

to be largely focused upon the literal interpretation. Our statistical analysis confirms these trends. First examining the full time window from 200ms to 1000ms, looks differ significantly in the Lexically Unavailable condition by both subjects and items [F1(2,11) = 3.94, p < .05; F2(2,11) = 8.85, p <.01] and marginally for the Lexically Available condition [F1(2,11) = 2.75, p = .08; F2(2,11) = 3.11, p = .06]. Pairwise analyses reveal that these differences are driven by the looks to the Literal target which is significantly different from the Distractors and Idiomatic Target in the Lexically Unavailable Condition [all p's < .05] and marginally different in the Lexically Available Condition [all p's < .1]

Examining individual time windows, the results largely confirm what we can observe visually. For the Lexically Available targets, looks to the Literal target are significantly greater than looks to the Idiom target [p's < .05] – i.e., bars are significantly greater than 0 -- until the 600ms-700ms interval, when the difference scores indicate some competition between the idiomatic and literal interpretations [p's > .1] – bars get 'shorter', closer to 0. In the Lexically Unavailable condition, looks to the Literal target begin to deviate significantly from looks to the Idiomatic target in the 400ms-500ms interval [p < .05] and continue to differ significantly or marginally for the entire window [significant by items, marginal by subjects].
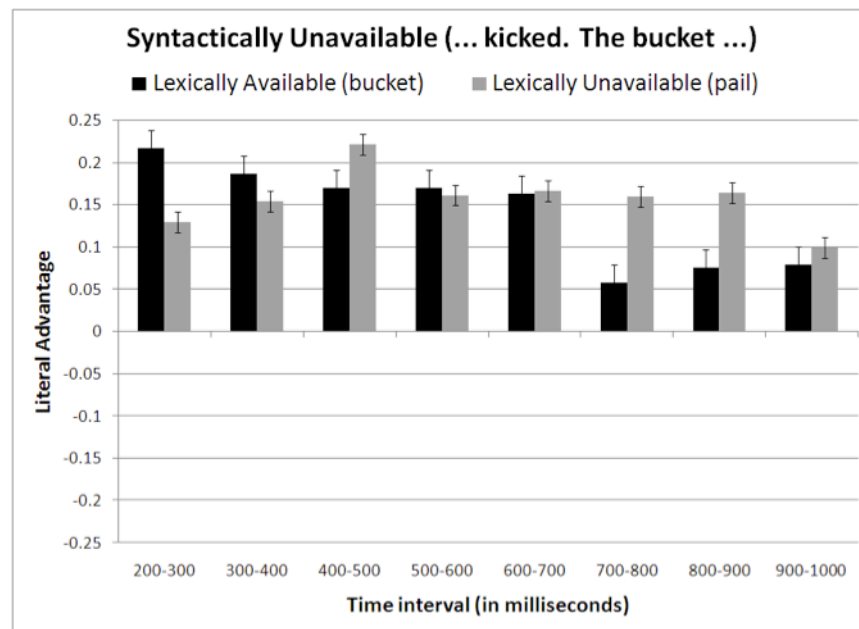
Figure 2. Literal advantage scores for the syntactically unavailable conditions (e.g. … *kicked. The bucket* …). Bars represent the difference between looks to the literal target and looks to the

idiomatic target for each 100ms time window, with 0ms corresponding to the onset of the critical noun (e.g. *bucket* or *pail* for lexically available and lexically unavailable conditions respectively).

Generally, these results confirm our hypothesis regarding the syntactic manipulation. Recall that we predicted that placing an idiomatic expression into a completely incompatible syntactic frame would cause the lexical access system to completely rule out the idiomatic possibility. This does appear to be what is happening in the Lexically Unavailable condition. In the Lexically Available condition we also see this general effect, however we also some late consideration of the idiomatic interpretation. We suggest that this may represent a sort of post-processing reconsideration effect, however further experimentation is require to confirm or deny this possibility.

3.2 Syntactically available trials

Figure 3 shows the literal advantage scores for each time window in the *Syntactically Available condition.* At first glance we can see that these results are qualitatively very different from the results obtained in the syntactically unavailable conditions. For the Lexically Available condition, it appears that we have long-lasting competition between the Idiomatic and Literal targets, while for the Lexically Unavailable condition we see an early preference for the Idiomatic Target shifting over time to a preference for the Literal Target.

80
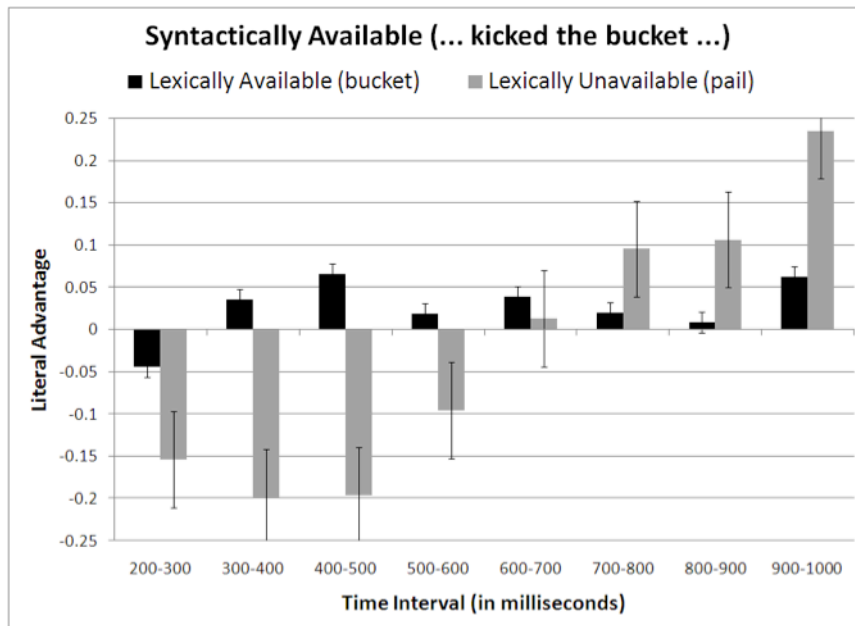
Figure 3. Literal advantage scores for the syntactically available conditions (e.g. … *kicked the bucket* …). Bars represent the difference between looks to the literal target and looks to the idiomatic target for each 100ms time window, with 0ms cooresponding to the onset of the critical noun (e.g. *bucket* or *pail* for lexically available and lexically unavailable conditions respectively).

Statistical analyses reveal no significant difference in looks over the full time window for the Lexically Available condition [F1(2,11) = .79 p = .46; F2(2,11)=.56, p = .57] and significant differences by item only in the Lexically Unavailable condition [F1(2,11) = .41, p = .66; F2(2,11) = 3.7, p < .05]. This is somewhat expected as changes in behavior over the large window will affect the proportion calculation, potentially washing out effects.

Examining individual time windows, we can see that there is no significant difference between looks to the Literal and Idiomatic targets in the Lexically Available condition [p's > .6] (black bars are close to 0), confirming the visual suggestion that these two interpretations are in competition for the duration of the trial. Further analyses reveal that looks to either the Literal or Idiomatic target deviate significantly from the distractors starting in the 600ms-700ms time window [p < .05].

Turning our attention to the Lexically Unavailable condition, we see significantly more looks to the Idiomatic Target in the time windows ranging from 400ms to 600ms [p's < .05] (bars are strongly negative), followed by competition, and then more looks to the Literal Target than the Idiomatic Target in the final 900ms-1000ms window [p < .05] (bars become positive).

The Lexically Available results suggest that individuals do indeed consider both the idiomatic and literal meaning of potentially idiomatic strings (e.g. *kick the bucket*) during on-line processing, as exhibited by long-lasting competition between the two interpretations in our results. We also hypothesized the same sort of competition would occur in semantically-related non-idiomatic strings (e.g. *kick the pail*), and our results also partially support this conclusion but suggest a more complicated behavior when parsing these strings. Particularly we see early attention on the *incorrect* idiomatic interpretation, and full consideration of the *correct* literal interpretation only much later.

4. Conclusions & Discussion

Hybrid models of idiom representation suggest that idioms are (i) represented as structural chunks and (ii) accessed via their component lemmas. With respect to the former point, we hypothesized that syntactic contexts which are incongruent with this pre-specified structure would quickly rule out the idiomatic possibility and prevent consideration of the idiomatic interpretation. Indeed, our results demonstrate that syntactic structure, at least large global properties such as the presence/absence of a sentential boundary, are used rapidly during one-line processing of a potentially ambiguous idiom string.

Interestingly, in the Syntactically Unavailable conditions, we also found some late hints of participants considering the idiomatic interpretation when the idiom was lexically available (e.g. *..kick. The bucket...*). This was unexpected, but could perhaps be due to a post-processing recognition of the idiomatic string. As an example of post-processing recognition, consider figurative phrases like *His bucket was thoroughly kicked.* These phrases represent playful use of language in which the idiomatic interpretation is clearly intended, though the structural requirements on idiom itself have been intentionally violated. Under this view, recognition of the idiomatic interpretation in such phrases would be delayed due to structural violations, yet the phrase is clearly (eventually) interpreted idiomatically. For our data, we believe something similar may be at work.

Overall, our findings regarding the effects of a syntactic boundary have potentially interesting implications for our understanding of sentence processing. We mentioned earlier that one of the characteristics of idiomatic expressions is their profile of rapid access as compared to literal controls. These results suggest that this rapidity is, in part, due to lexical storage of specified structural information. If this is the correct explanation, this means that idiomatic expressions, perhaps out of necessity, are stored lexically as structural units. However, the property of rapid access is not limited to idioms. Recent work has demonstrated similar results obtain with clichés (e.g. *handle with care*, Tabossi et al, 2009) and frequent expressions (e.g. *all over the place*, Arnon & Snider, 2010). One possible way to account for this is to ascribe the same sort of 'structural chunk' representation to these expressions as we have for idioms. Under this view the lexicon may also contain chunks of pre-compiled structure not only for non-compositional expressions, but also for compositional ones.

Again, for idioms this may be out of necessity, as compositional computation would result in an incorrect meaning. Extended to clichés and frequent expressions, however, this view would mean that even some compositional structures may be directly stored rather than computed in the normal course of sentence comprehension. In the case of frequent expressions, this could be beneficial to the parser, as it allows frequently repeated structures to be accessed and retrieved rapidly. Of course, further investigation is required to establish that the sort of representation our data suggests for idioms applies to certain compositional structures, however the implications for sentence processing and lexical access are interesting.

In addition to the presence vs. absence of a syntactic boundary, we also manipulated the lexical nature of the critical string (*kick the bucket* vs. *kick the pail*). The results of the lexical manipulation suggest that when syntactic requirements are met, there is competition between the idiomatic and literal interpretation regardless of whether the given string is actually ambiguous (e.g. *kick the bucket*) or just semantically related (e.g. *kick the pail*). In the Lexically Available condition we saw early-onset, long-lasting competition between the two interpretations. In the Lexically Unavailable condition we saw similar

competition until relatively late, when the correct literal interpretation won out over the incorrect idiomatic interpretation. We also saw that in the Lexically Unavailable condition, participants showed an early preference for the incorrect idiomatic interpretation. Further investigation is required to determine the source of this behavior. It may be related to a sort of 'Double Take Effect' as found by Gibbs (1980). The idea is that the unconventionality of the expression *kick the pail* coupled with its close semantic association with *kick the bucket* may temporarily boost consideration of the latter expression.

Broadly, our results support the hypothesis that idioms are represented as structural units which are accessed via the literal lemmas which compose them.

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Scandinavian Object Shift
from the Intonational Perspective[*]

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1. Introduction

In most of the Scandinavian languages a weak, unstressed object pronoun moves across a sentential adverb like the negation (1a), unlike a full NP object (1b) (*Object Shift* OS, Holmberg 1986)[1]:

(1)   a.   Jag kysste henne inte [VP kysste henne].
           I   kissed her   not
           'I didn't kiss her.'

       b.   Jag kysste inte [VP kysste Marit].
            I   kissed not   Marit
            'I didn't kiss Marit.'

OS is obligatory in simple tense forms in most of the Scandinavian languages but optional in some of the Scandinavian varieties (2a). An object pronoun cannot move when main verb movement does not take place, see (2b). In embedded clauses a main verb does not move (2c), in which an object pronoun does not move either. The fact that OS can occur only when main verb movement takes place is called *Holmberg's Generalization* (Holmberg 1986).

(2)   a.   Jag såg den inte [VP såg den].   Jag såg inte [VP såg den].
           I   saw it   not   I saw not   it
           'I didn't see it.'

       b.   Jag har inte [VP sett den].   *Jag har den inte [VP sett den].
            I have not   seen it   I have it   not   seen
           'I haven't seen it.'

       c.   … att jag inte [VP såg den]   *… att jag den inte [VP såg den]
               that I   not   saw it   that I   it   not   saw
           '… that I didn't see it.'

Despite much literature on OS (Diesing 1992, 1997; Holmberg and Platzack 1995; Holmberg 1999; Chomsky 2001; Sells 2001; Vikner 2001; Erteschik-Shir 2005a,b; Josefsson 2003; Vogel 2004; Fox and Pesetsky 2005; Broekhuis 2008; among others), no decisive account of Holmberg's Generalization has been provided yet.

In this paper I aim to shed light on the issues on Scandinavian OS from the perspective of the intonational properties of the Scandinavian languages. Based on the experimental data of the constructions relevant to OS in Swedish, I propose a new hypothesis on OS and provide an account of Holmberg's Generalization on the basis of the hypothesis. This paper is organized as follows. In section 2 I introduce the experiment conducted to observe the intonational properties of the constructions relevant to OS. I show that F0 of the sentential elements that follow a focused-accented main verb is lower than F0 of the main verb in the OS contruction. In section 3 I propose a new hypothesis on OS: an object pronoun moves to cause downstep. On the basis of the hypothesis, I present an account of Holmberg's Generalization as follows: When main verb movement takes place, an object pronoun moves and causes downstep to prevent a focal H contour from arising after a focus-accented main verb. In the environments in which downstep cannot occur, e.g. in complex tense forms and embedded clauses in which pitch must rise towards a focus-accented main verb in situ, OS does not occur either. In section 4 I conclude this paper, arguing that OS is a purely phonological movement, caused by the interaction between syntax, information structure, and intonation.

In the remains of this section I introduce the Swedish intonational system established by Bruce (1977, 2007). Most of the Swedish dialects maintain a distinction between two word accents, accent 1 and accent 2, which are associated with the tonal pattern of High-Low HL. For accent 1 accent is associated with L (i.e. HL*). For accent 2 accent is associated with H (i.e. H*L). The negation *inte*, a typical diagnosis of the presence or absence of OS, is an accent 2 word. In Swedish the focus of a sentence is realized by a H tone following a HL contour: the focal H contour. The focal H contour overlaps the pitch contour of an accent 1 word, which produces a single-peaked pitch contour. In the same way the focal H contour overlaps the pitch gesture of an accent 2 word in the dialects of SOUTH (e.g. Malmö), CENTRAL (e.g. Dalarna), NORTH, and Finland Swedish (e.g. Helsinki), which we call the single-peaked dialects. In the dialects of EAST (e.g. Stockholm) and WEST (e.g. Göteborg), on the other hand, the focal H contour is added after the pitch contour of an accent 2 word, which produces a double-peaked pitch picture as illustrated in (3).

(3)   Accent 2 in EAST and WEST:

pitch contour of   focal H
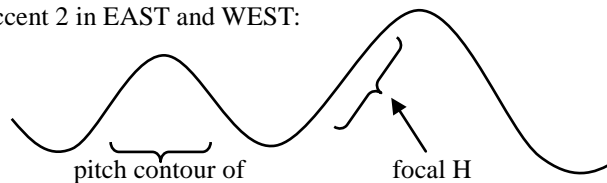
a focused word   contour

2. The Intonational Properties of the Constructions Relevant to Object Shift

I carried out an experiment to observe the intonational properties of the constructions relevant to OS in Swedish. The constructions investigated are simple tense forms (2a), complex tense forms (2b), and embedded clauses (2c). *Verb Topicalization* (Holmberg 1999), a contrastive verb-focus construction in which a past participle moves to sentence-initial position and OS also occurs, e.g. *kysst har jag honom inte* (kissed have I him not 'I didn't KISS him'), was added due to the theoretical significance related to this construction (Holmberg 1999, Chomsky 2001). Test sentences contain either a monosyllabic pronoun (e.g. *den* 'it') or a disyllabic pronoun (e.g. *honom* 'him'). On the basis of the literature on information structure (Lambrecht 1994, Vilkuna 1995, Kiss 1998), appropriate contexts were built with a question and the answer, the latter of which corresponds to each relevant construction: e.g. polarity-focus: *köpte du boken?* (bought you the-book 'did you buy the book?') – *nej, jag köpte den inte* (no I bought it not 'no, I didn't buy it'). Data were collected from six SOUTH speakers (three female and three male), two EAST male speakers, three WEST male speakers, and one NORTH female speaker. The age of the informants ranges from the 20es to the 40es. They were asked to read each question-answer pair in an appropriately rapid speech, in such a way as they speak in real-life conversation. Five recordings were done for each sentence pair by using PRAAT. The total number of collected data amounts to more than 400. Below, I present the data of a double-peaked dialect and that of a single-peaked dialect in that order for each construction. Since SOUTH and NORTH are both single-peaked, I present only the data of SOUTH as the representative of the single-peaked dialects investigated.

First, the typical pitch properties of simple tense forms observed in the dialects investigated are illustrated in (4-5). (4a-b) is the data of monosyllabic object pronouns and (5a-b) is that of disyllabic object pronouns. Focus accent is located on the first syllable of a main verb, *köp-* of *köpte* (4a-b) and *kyss-* of *kysste* (5a-b). Pitch falls on the first syllable of the main verb and maintains the lowered pitch level on the shifted object pronoun, *den* (4a-b), *henne* (5a), and *honom* (b). Pitch slightly rises again on the first syllable of the negation *in-* of *inte*, which is pronounced in liaison with the preceding nasal *-n* of the moved object pronoun, and falls sentence-finally.

Second, in complex tense forms (6a-b) pitch continuously rises from a subject *jag*, through an Aux *har*, to the first syllable of the negation *in-* of *inte*. The final H peak comes on the main syllable of the past participle main verb *sett*, on which focus accent is located too. It is remarkable that this result is without exception for all speakers of the dialects investigated.

(4) Jag köpte den inte. (I bought it not 'I didn't buy it')

   a.

EAST (Male)
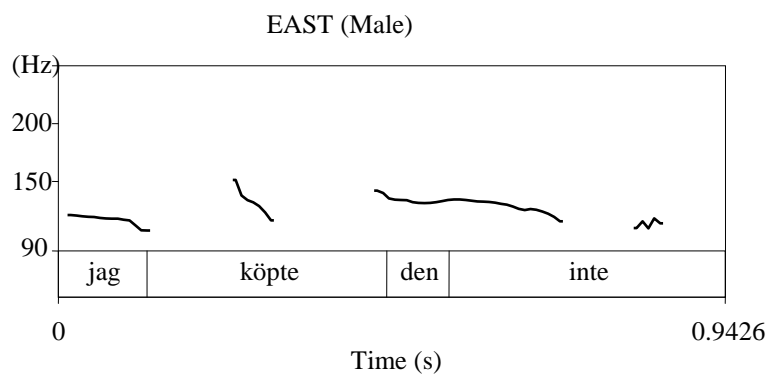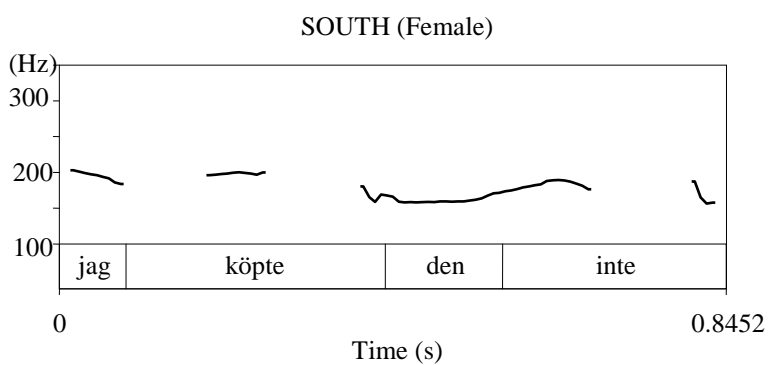
(5) a. Jag kysste henne inte. (I kissed her not 'I didn't kiss her')

WEST (Male)
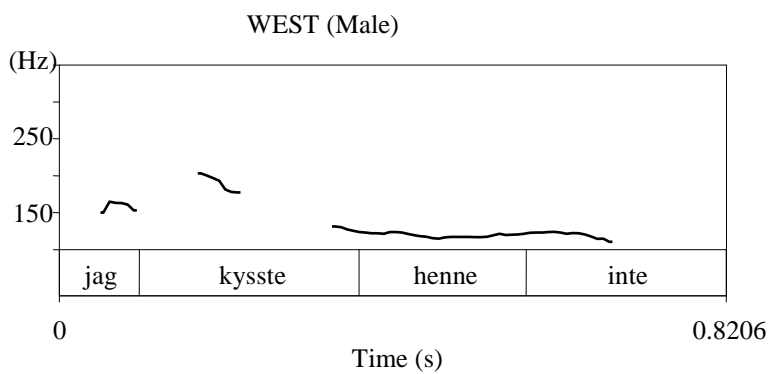
b. Jag kysste honom inte. (I kissed him not 'I didn't kiss him')

SOUTH (Female)
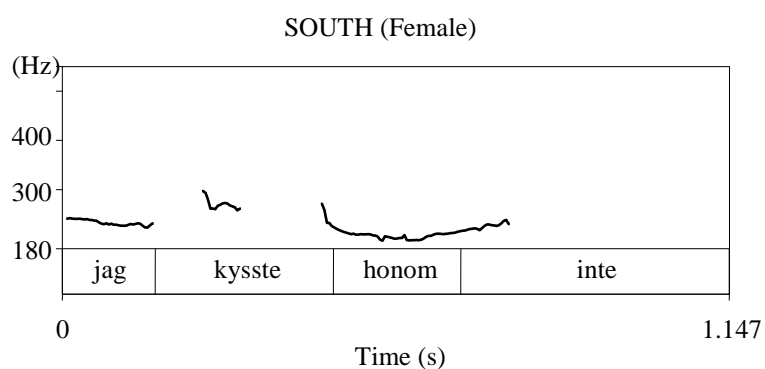
(6) Jag har inte sett den. (I have not seen it 'I haven't seen it')

a.

EAST (Male)

b.

SOUTH (Female)
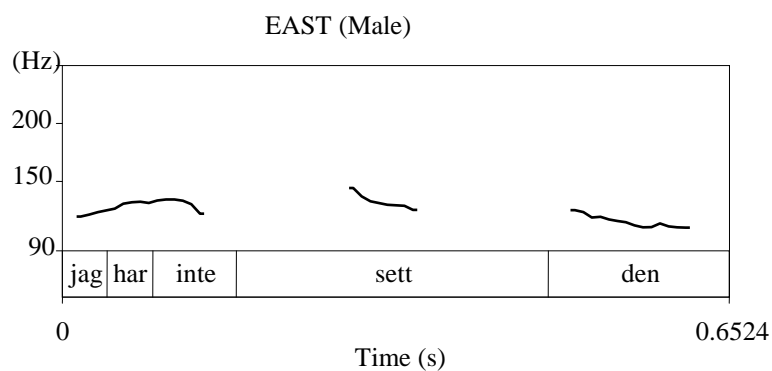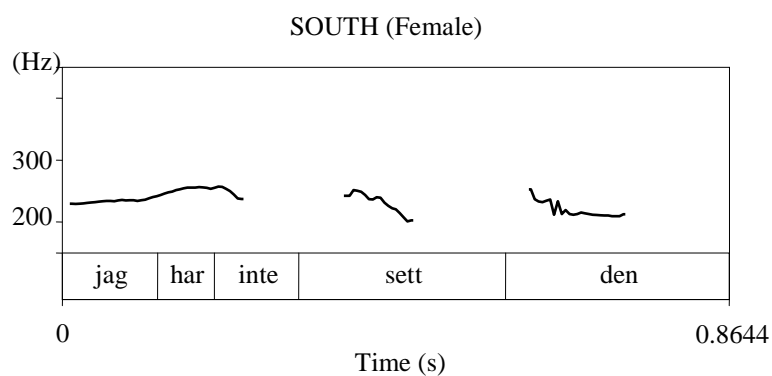
Third, in embedded clauses (7a-b) pitch rises from a complementizer *att*, through the subject *jag*, to the first syllable of the negation *in-* of *inte*. The final H peak comes on the first syllable of the main verb in the embedded clause *kyss-* of *kysste*, on which focus accent is located too. In the same way as in complex tense forms, it is remarkable that this result is without exception for all speakers of the dialects investigated.

(7)   Jag sa att jag inte kysste henne. (I said that I not kissed her 'I said that I didn't kiss her')

a.

WEST

b.

SOUTH (Male)
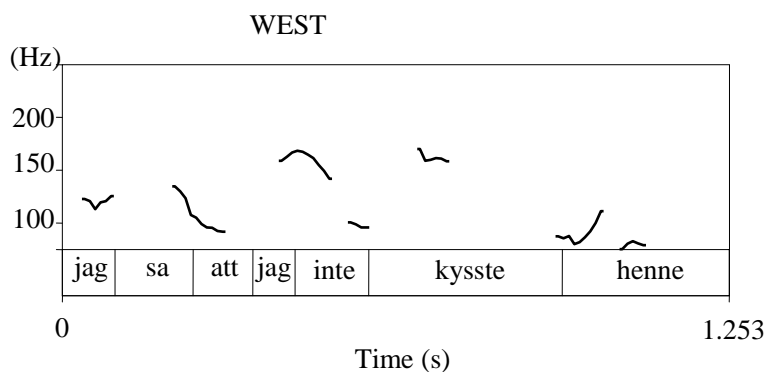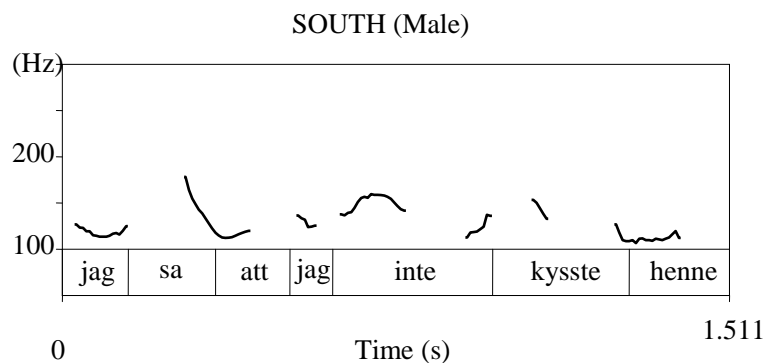
Finally, for Verb Topicalization (8a-b) all the dialects investigated show a single-peaked contour in which the pitch peak and focus accent come on the main syllable of the sentence-initial past participle *kysst*. After pitch falls from it, pitch maintains a low level until the end of a sentence.

(8) Kysst har jag henne inte. (kissed have I her not 'I didn't KISS her')

a.

EAST (Male)

b.

SOUTH (Male)
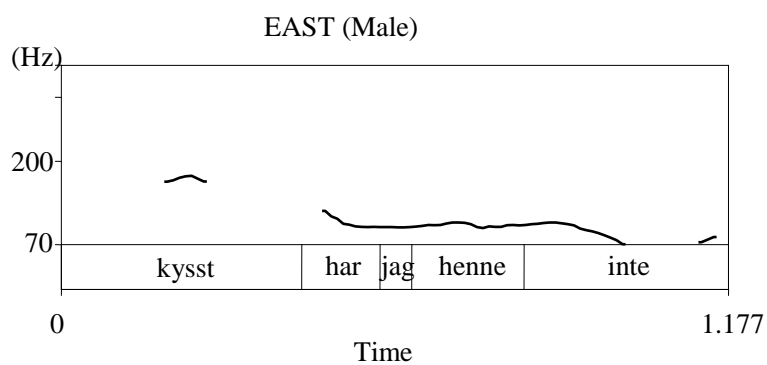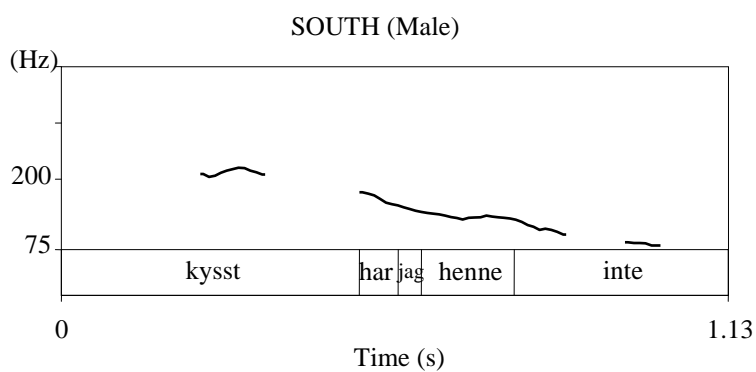
3. Object Shift as the Cause of Downstep

The pitch picture of the OS construction observed in all the dialects investigated is illustrated in (9).

(9)   Jag köpte den inte. (I bought it not 'I didn't buy it')   (=4a-b)
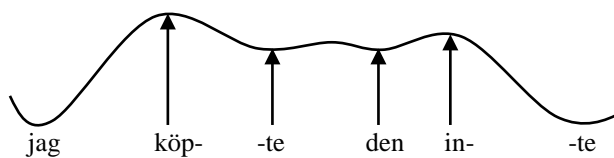
Compare the pitch properties of the OS construction above with those of the double-peaked pitch picture (3). What is remarkable is that F0 of the first syllable of the negation *in-* of *inte*, the next syllable that can be stressed after a focus-accented main verb, is lower than F0 of the first syllable of the main verb *köp-* of *köpte* in the OS construction. The picture like (9) is expectable for SOUTH and NORTH, the single-peaked dialects, but cannot be expected for EAST and WEST, the double-peaked dialects. That is, the OS constuction is exceptional in that F0 of the sentential elements that follow a focus-accented main verb does not rise not only in single-peaked SOUTH and NORTH but also in double-peaked EAST and WEST.

   A H tone gets lower than the preceding H if a L tone intervenes between them, a phenomenon called *downstep* (cf. Gussenhoven 2004). After a downstep has occurred, the following H tone does not get higher than the preceding H; it reaches at most the same level as the preceding one. In the OS construction pitch typically lowers on the shifted object pronoun located (somewhere) between the main verb and the negation as illustrated in (4-5,8). As we saw just above, F0 of the sentential elements that follow a focus-accented main verb is lower than F0 of the main verb. Then, I propose a new hypothesis on OS:

(10) Scandinavian Object Shift:
      An object pronoun moves to cause downstep.
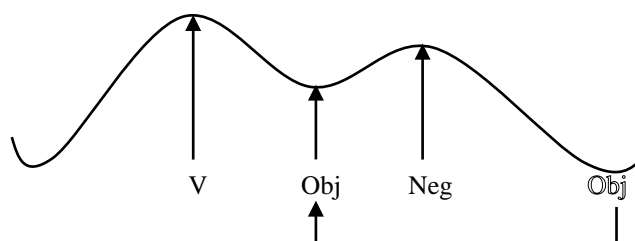
   The question is why downstep must be caused by movement of object pronouns. According to Bruce (2005, 2007), downstep occurs in double-peaked EAST and WEST, but this is only after the focal H contour occurs. If an object pronoun did not move in simple tense forms, a focal H contour could come on the first syllable *in-* of the negation *inte*, the accent 2 word that would directly follow a main verb. This would make it sound as if the negation itself were focused. However, the focus and main focus accent of a sentence is located on the main verb in the unmarked case. Hence, an object pronoun moves and causes downstep to eliminate a focal effect on the negation on one hand and to maintain the focus of a sentence on the main verb on the other. This argument is extended to Verb Topicalization, in which pitch does not rise again after pitch falls on the sentence-initial contrastively focused past participle. Since the past participle is the sole possible location of focus in such a sentence, an additional focus of the sentence that could be realized by a focal H contour

must not occur: a sentence can have only one focus (Lambrecht 1994). Hence, an object pronoun moves and causes downstep to prevent a pitch rise for a possible focal H contour that could produce a focal effect on the negation. All these arguments amount to claiming that an object pronoun moves and causes downstep to prevent a focal H contour from arising after a focus-accented main verb.[2]

One of the predictions is that OS does not occur in the environments in which downstep cannot occur. This is exactly the cases of complex tense forms and embedded clauses. The focus of a sentence is carried by a past participle main verb in complex tense forms. The focus of an embedded clause is carried by a finite main verb in it. Downstep occurs in post-focal position, but does not occur in pre-focal position (Bruce 2005). Thus, downstep cannot occur on the sentential/clausal elements preceding the main verb, since pitch must rise towards the pitch peak on the focused main verb in complex tense forms and embedded clauses. The results of the experiment show, without exception, that pitch of the sentential elements which an object pronoun cannot follow rises: F0 of the first syllable of the negation *in-* of *inte* is higher than F0 of an Aux *har* in complex tense forms (6), and higher than F0 of a subject *jag* in embedded clauses (7). Then, the account of Holmberg's Generalization is provided as follows: When main verb movement takes place, an object pronoun moves and causes downstep to prevent a focal H contour from arising after a focus-accented main verb. In the environments in which downstep cannot occur, e.g. in complex tense forms and embedded clauses in which pitch must rise towards a focus-accented main verb in situ, OS does not occur either.[3]

The argument above can be extended to other relevant facts on OS. An object pronoun cannot move across an indirect full NP object (11a). An object pronoun normally cannot move across a subject in *yes-no* questions either (11b) (Holmberg 1986, 1999).

(11) a. Jag gav inte Elsa *den*.   *Jag gav *den* inte Elsa.
         I gave not Elsa it   I gave it not Elsa
         'I didn't give it to Elsa.'

     b. Köpte Johan *den* inte?   *Köpte *den* Johan inte?
        bought Johan it not   bought it Johan not
        'Didn't Johan buy it?'

In natural contexts the indirect full NP *Elsa* (11a) and the subject *Johan* (11b) will be the most appropriate candidates for the carrier of the focus in those sentences. Pitch must rise towards such focused elements, which prevents an object pronoun from crossing them.[4]

The proposed hypothesis is highly expected to apply to the other Mainland Scandinavian languages, Norwegian and Danish. The basic pitch accent of Norwegian is L*H, and the focus of a sentence is realized by an extra H, i.e. by broadening the range of the L*H contour of a focused word (Gussenhoven 2004). The intonational properties of East (e.g. Oslo) and Central (e.g. Trøndelag) Norwegian are quite similar to those of the

double-peaked dialects of Swedish, EAST and WEST. They together make a 'central Scandinavian axes' (Bruce 2007:144). The intonational properties of West (e.g. Bergen) and North (e.g. Finnmark) Norwegian, on the other hand, are quite similar to those of the single-peaked dialects of Swedish, e.g. SOUTH and NORTH. They are spoken in the peripheral areas of the Scandinavian countries. According to Gussenhoven (2004), the pitch accent of Standard Danish (e.g. Copenhagen) is H*L. Danish does not obligatorily have a high tone to realize the focus of a sentence, but the way of focal accentuation in Danish is quite similar to that in the single-peaked dialects of Swedish (Bruce 2007).[5]

4. Conclusion: Object Shift as a Purely Phonological Movement

In this paper I have discussed OS from the point of view of the intonational properties of the Scandinavian languages, mainly of Swedish. By presenting experimental data, I showed that F0 of the sentential elements that follow a focus-accented main verb is lower than F0 of the main verb in the OS construction. I proposed a new hypothesis on OS: an object pronoun moves to cause downstep. On the basis of this hypothesis as well as the experimental results that pitch rises on an Aux in complex tense forms and on a subject in embedded clauses, neither of which an object pronoun can follow, I provided an account of Holmberg's Generalization as follows: When main verb movement takes place, an object pronoun moves and causes downstep to prevent a focal H contour from arising after a focus-accented main verb. In the environments in which downstep cannot occur, e.g. in complex tense forms and embedded clauses in which pitch must rise towards a focus-accented main verb in situ, OS does not occur either.

This work suggests that OS is a linguistic phenomenon produced by the interaction between syntax, information structure, and intonation. Holmberg (1986) points out the correlation between the syntactic position of a main verb and that of an object pronoun. What must be added to it is the information structure of the sentence and the way this is expressed in the Scandinavian languages, i.e. by intonation. None of these three components can be left out in a principled account of OS. Seen from another point of view, OS is a tool to compensate for a somewhat rigid property of intonation that expresses information structure, i.e. the property that the focus of a sentence is realized by the focal H contour. Hence, OS is a movement that is phonologically motivated to a significant extent, and should be interpreted not as a syntactic movement but as a purely phonological movement (cf. Holmberg 1999, Chomsky 2001).

Notes

[1] In this work the terminology *Object Shift* is exclusively used to refer to weak pronoun shift and/or cliticization. Examples are all from Swedish.

[2] In single-peaked dialects such as SOUTH and NORTH deaccentuation can occur as the way of downgrading (Bruce 2005, 2007). But this can occur only when the effect of backgrounding is particularly required. In the simple tense forms in which an object pronoun does not move, deaccentuation of the negation would be difficult to occur without any reason for backgrounding the negation, which might make the negation sound to be focused. Thus, movement of object pronouns is required to downgrade the negation in these dialects too.

[3] A possible argument against the proposed hypothesis would be the shift of an indirect object pronoun in double object construction:

i) Jag lämnade honom inte mina pengar.
    I left   him not my money
   'I didn't leave him my money.'

The focus of a sentence could be carried by either the negation or a direct full NP object on which pitch peak could come, but still OS can occur. According to Anders Holmberg (p.c.), the shift of the indirect object pronoun is optional in any contexts. The point of the claim here is that downstep is caused by movement of object pronouns at least in the cases in which OS is obligatory.

[4] OS does not apply beyond verb particles in Swedish (ia), but applies in the other Scandinavian languages (ib).

i) a. Jag skrev (*det) upp ([OK]det). (Swe.)   b. Jeg skrev ([OK]det) opp (*det).   (Nor.)
    I wrote it up   it   I wrote   it   up   it
   'I wrote it down.'   'I wrote it down.'
   (Holmberg 1999:2,(3b-c)

According to Bruce (1999), verb particles, which usually have accent 1, are obligatorily accented in Swedish, whereas the combination of a verb and a particle allows various intonational patterns in Norwegian. I leave the study of the intonational properties of Scandinavian verb particle construction for future.

[5] See Hosono (2010a) for the argument that Icelandic OS is caused by different intonational factors than those in Swedish OS, Hosono (2010d) for the claim that the absence of OS in Övdalian (the Älvdalen dialect of Swedish) is derived from the intonational properties peculiar to this Scandinavian variety, and Hosono (2010b) for the discussion of the intonational properties of unshifted weak object pronouns.

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AAB and ABB Reduplication in Taiwan Southern Min*

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1. Introduction

This paper adopts the optimality theory (McCarthy and Prince 1993/2004) to investigate the reduplication in Taiwan Southern Min. This paper examines the trisyllabic reduplication AAB and ABB, which has a disyllable base AB. If A is semantically emphasized, A receives a stress. If B is semantically emphasized, B receives a stress. The first question is how the interaction between stress and semantic emphasis may affect reduplication. Second, what constraints may account for the reduplication of AAB? And what constraint may account for the reduplication of ABB? This paper is organized as follows. Section two is the literature review of the study on reduplication, optimality theory, and stress. Section three is an analysis of how the stress and semantic emphasis affect the reduplication of AAB and ABB, and how the constraints adjacency-BR and alignment may interact in this aspect. Section four is the conclusion.

2. Literature Review

2.1 Correspondence theory

Output-Output correspondence is to examine the identity between the output base and the reduplicant. The model proposed by McCarthy and Prince (1995) is illustrated below.

(1)   (McCarthy and Prince 1995)

Input：   /Affix+stem/   (AfRED+Stem)

(I-R Faithfulness)   (I-B Faithfulness)

Output：   R ——(B-R Identity)—— B
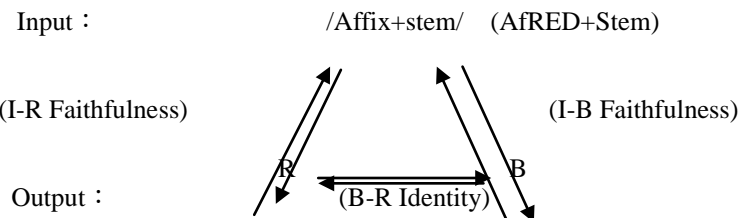
Correspondence theroy consists of three identifications. The first is

input-reduplicant faithfulness to examine the identification between stem (input) and the reduplicant (output). The second is input-reduplicant to check the identification between input (stem) and output base. The third is the B-R faithfulness to check the identification between output (base) and output (redupilcant). This paper examines the identification between output base and reduplicant.

2.2 Generalized alignment constriant

McCarthy and Prince (1993) proposed the alignment constraint which can capture the syntax and phonology sharing the same edge discussed in Selkirk (1986) and the morphology and the phonology share the same edge discussed in Inkelas (1989). Besides, the alignment constraint summarized the whole grammatical categories such as prosodic or syntactic categories adapting the sharing edge.

(2) Generalized Alignment (McCarthy & Prince 1993)
Align (Cat1, Edge1, Cat2, Edge2) = def
$\forall$ Cat1 $\exists$ Cat2 such that Edge1 of Cat1 and Edge2 of Cat2 coincide.
Where Cat1, Cat2 $\in$ ProsCat $\cup$ GramCat
Edge1, Edge2 {Right, Left}
GramCat：{Word, Stem, Root, Affix…}
ProsCat：{Prwd, foot, syllable, Mora…}

2.3 Adjacency constraint

Lunden (2004) proposed adjacency constraint emphasizing the adjacent relation between the reduplicant and the corresponding base. Besides, Lunden (2004) proposed the notion of locality generalization which means the reduplicant should be as close to the corresponding base as possible. In the previous studies about the reduplication, the direction of alignment and anchoring should be the same so that the reduplicant is adjacent to the base and can be predicted correctly. When it is a prefix, the constraint ranking would be Align(RED, Prwd)-right >> Align(RED, Prwd)-left, and Anchor-BR-left >> Anchor-BR-right. However, Lundun (2004) proposed adjacency constraint to solve the different direction of the alignment and anchoring so that the reduplicant can be predicted correctly. When the adjacency is ranked higher than alignment or anchoring, the output would be consistent with the notion of locality generalization and the reduplicant is adjacent to the corresponding base. But when the adjacency is ranked lower than the alignment or anchoring, the output would violate locality generalization. This paper examined the reduplication in Taiwan Southern Min among the interaction between alignment, anchoring, and adjacency. Lunden (2004) considered the adjacency a family constraint given in (4).

(3) Locality Generalization：
Reduplicants tend to be adjacent to their correspondent base.

(4) Adjacency-BR constraint family (Lunden 2004)
a.　　Adjacency-BR-BY-SEG：Every segment in the reduplicant is next

to its correspondent base.

b.   Adjacency-BR-BY-σ：Every syllable in the reduplicant is next to its correspondent base.

c.   Adjacency-BR-BY-Foot：Every foot in the reduplicant is next to its correspondent base.

2.4   **Chiang** (1992)

Chiang (1992) examined the reduplication of Chinese dialects along the prosodic morphology which has the constraint template to the reduplication. Besides, Chiang (1992) proposed that the reduplication of Chinese dialect is suffixation, which right spread from the base to the reduplicant template. In addition, Chiang (1992) adopted the notion of cyclicity to explain the single syllable reduplicating twice and become trisyllable. For example, A → AA in the first cycle, and AA→AAA reduplicated the second A in the second cycle. Chiang (1992) proposed suffixation reduplication in Chinese dialects along three points. First, the reduplication could change the syntactic category. Second, the tone of the reduplicant could lose base tone and became neutral tone. Third, the reduplication could be substituted by the diminutive.

2.5   **Duanmu (1990)**

According to Duanmu's (1990) "Nonhead Stress Rule", in a syntactic head-nonhead or a nonhead-head relation, the nonhead has greater stress than the head. The relation between head and non-head is defined as fellows：

(5)

In X^{n+1} Y is the non-head and X^n is the head.

Y⟋\X^n (Y = any projection)   (Duanmu 1990)

Following this definition, the head is any projection of X and non-head covers modifier, complement, etc. Besides, In Xiamen, the main stress is assigned to the last (non-weak) syllable in every XP that is not an adjunct. (Chen 1987).

3.   Trisyllabic Reduplication

In trisyllabic reduplication, AB is the base for forming ABB and AAB. Consider the verb-resultative forms below:

(6) *hian33 **khui55***   'open'
     uncover open

(7) ***hian55** khui0*   'open'
     uncover open

From the syntactic information, in (6), the resultative *khiu55* 'open' is the head, and verb *hian33* 'uncover' is the nonhead. According to Duanmu's (1990) "Nonhead stress rule", in the syntactic relation, the nonhead has greater stress than the head. In (6), the verb *khiu55* 'open' is stressed, and the resultative *hian33* 'uncover' is unstressed. However, in (7), the semantically focus on the verb *hian55* 'uncover', the resultative *khui55* 'open' loses its base tone and bear neutral tone to be *khui0* 'open'.

The semantic distinction between (6) *hian33 Khui55* 'open' (*Khui55* is full tone) and (7) *hian55 khui0* 'open' (*khui0* is neutral tone) has been made above. In the (6) *hian33 Khui55* 'open' (*Khui55* 'open' is full tone), the stress is on the nonhead modifier. In contrast, in (7) *hian55 khui0* 'open' (*khui0 'open'* is neutral tone) the stress is on the verb *hian55* 'uncover'.

The intrinsically difference between (6) *hian33 Khui55* 'open' (*Khui55* 'open' is full tone) and (7) *hian55 khui0* 'open' (*khui0* is neutral tone) is due to the semantically focus. Therefore, the bases of these two are different.

(8) *ian55 **to51*** 'overturn'
    overturn down
(9) ***ian51** to0* 'overturn'
    overturn down
(10) *tsiah5 **liau51*** 'eat all'
    eat   finish
(11) ***tsiah3** liau0* 'eat all'
    eat   finish
(12) *long31 **phainn51*** 'bump into broken'
    bump broken

(13) ***long51** phainn0* 'bump into broken'
    bump broken
(14) *siu33 **ho51*** 'store something well'
    store well
(15) ***siu55** ho0* 'store something well'
    store well

Similarly, when B of AB undergoes reduplication such as (8), (10), (12), (14) (B is full tone), B is the stressed and is reduplicated to form ABB. In contrast, when in (9), (11), (13), (15), A is stressed syllable, B is neutral tone and A is reduplicated to form AAB

To examine the application of the reduplication of AAB and ABB which are from the distinct base AB in the input for the semantic purpose, this paper proposes the relevant constraints below.

    a.   RED (σ́) ：assign one violation mark for every input stressed syllable do not reduplicate in the output.
    b.   Adjacency-BR-by-syllable ：assign one violation mark for every syllable in the reduplicant do not next to its correspondent base. (Lundun 2004)
    c.   Align(RED, Prwd)-Right ：assign one violation mark every reduplicant do not coincide the right edge with the prosodic word.

3.1 ABB Reduplication

ABB reduplication is from the disyllable base AB when B is the full tone stressed syllable to focus the meaning on the modifier B; this follow Duanmu's (1990) "nonhead stress rule". This shows that the stressed syllable is reduplicated. The constraint RED (σ́) is proposed to regulate which syllable in the disyllable should be reduplicated. The constraint adjacency-BR-by-syllable are motivated by the idea that each syllable of the reduplicant wants to be as close as possible to its correspondent syllable in the base. The constraint ranking is given below.

(16)

/RED+hian33khui55 /	Adjacency-BR-by-syllable	RED (σ́)
☞ a. hian33khui33 <u>khui55</u>		
? b. hian33<u>khui33</u> khui55		
c.<u>khui33</u>hian33khui55	* !	
d.hian33<u>hian33</u>khui55		* !
e.<u>hian33</u>hian33khui55		* !
f. hian33khui33<u>hian55</u>	* !	*

In this tableau, candidate c. violates the constraint adjacency-BR-by-syllable since the reduplicant *khui55* 'open' is not next to the correspondent base. Candiate c. is ruled out. Candidate d., e., and f. violate the constraint RED (σ́) since the stressed syllable in the base is the modifier *khui55* 'open' not the verb *hian33* 'uncover'. Besides, candidate f. also violate the constraint adjacency-BR-by-syllable. Candidate c., d., e., f., are ruled out. However, candidate b. do not violate adjaceny-BR-by-syllable nor RED (σ́). This paper proposes Align(RED, Prwd)-Right to make the reduplicant coincides the right edge with the trisyllabic prosodic word in the output. This supports Chiang's (1992) prediction of the reduplication in Chinese dialects. The reduplication is a sort of suffixation. This make the reduplicant right spreads from the correspondent base. To rule out candidate b., the constraint Align(RED, Prwd)-Right is added.

(17)

/RED+*hian33 khui55*/	Adjacency-BR-by-syllable	RED (σ́)	Align(RED, Prwd)R
☞a.hian33khui33<u>khui55</u>			
b.hian33<u>khui33</u>khui55			* !
c.<u>khui33</u>hian33khui55	* !		**
d.hian33<u>hian33</u>khui55		* !	*
e.<u>hian33</u>hian33khui55		* !	**
f. ian33khui33<u>hian55</u>	* !	*	

In this tableau, candidate b. is ruled out since the reduplicant do not share the same edge with the prosodic word in the output. Candidate c. and d. are ruled out since both of them violate Adjacency-BR-by-syllable. Candidate d. and e. are ruled out since both of them violate RED ($\acute{\sigma}$). The optimal candidate is candidate a. In ABB reduplication, the constraint ranking is Adjacency-BR-by-syllable, RED ($\acute{\sigma}$) >> Align(RED, Prwd)R.

3.2 AAB Redplication

AAB reduplication is from the disyllable base AB when the focus is on the action; this make A stressed syllable and syllable B loss its tone value to surface with neutral tone. In AAB, A which is a stressed syllable in the base AB is reduplicated. The constraint RED ($\acute{\sigma}$) regulate which syllable is reduplicated in AB which is stressed on A. The constraint Adjacency-BR-by-syllable have effect on the reduplicant should be as close as possible to its correspondent base. The constraint ranking is given below.

(18)

/RED+*hian55khui0*/ (focus on verb *hian55*)	Adjacency-BR-by-syllable	RED ($\acute{\sigma}$)
☞ a. *hian33 hian55 khui0*		
?　b. *hian33 hian55 khui0*		
c. *hian55 khui0 hian55*	* !	
d. *khui0 hian55 khui0*	* !	*
e. *hian55 khui0 khui0*		* !
f. *hian55 khui0 khui0*		* !

In this tableau, candidate c. and d. are ruled out since both of them violate the constraint Adjacency-BR-by-syllable. Candidate e. and f. are ruled out since both of them violate RED ($\acute{\sigma}$) which make the stressed syllable A not syllable B to be reduplicated. However, candidate b. do not violate the constraint adjacency-BR-by-syllable nor RED ($\acute{\sigma}$). The constraint Align(RED, Prwd)-Right is needed to regulate the reduplicant should coincide the right edge of the trisyllabic AAB. The constraint ranking is shown below.

(19)

/RED+*hian55 khui0*/	Adjacency-BR-by-syllable	RED ($\acute{\sigma}$)	Align(RED, Prwd)R
☞ a. *hian33 hian55 khui0*			*
b. *hian33 hian55 khui0*			** !

c. *hian55 khui0 hian55*	* !		
d. *khui0 hian55 khui0*	* !	*	**
e. *hian55 khui0 khui0*		* !	*
f. *hian55 khui0 khui0*		* !	

In this tableau, candidate b. is ruled out since it violates Align(RED, Prwd)R twice. Candidate c. and d. are ruled out since both of them violates Adjacency-BR-by-syllable. Candidate e. and f. are ruled out since both of them violates RED (ớ). The optimal candidate is candidate a. In AAB reduplication, the constraint ranking is Adjacency-BR-by-syllable, RED (ớ) >> Align(RED, Prwd)R.

4. Conclusion

This paper has examined the AAB and ABB reduplication in Taiwan Southern Min. The result shows that stress and semantic emphasis play a crucial role in the reduplications. In the structure of verb-resultative AB, A is the head, and B is the resultative morpheme, that is, the nonhead. According to the non-head stress rule (Duanmu 1990), in the disyllable AB, B is stressed syllable, as in (6). However, if A is semantically focused, B will be neutral toned, and A is stressed as in (7).When AB undergoes reduplication, the stressed syllable is reduplicated. This paper proposes the constraint ranking "Adjacency-BR-by-syllable, RED (ớ) >> Align(RED, Prwd)R" to account for the ABB and AAB reduplication. In cases like (6), B is stressed and reduplicated to form ABB. In cases like (7), A is semantically focused and reduplicated to form AAB. The derivations of ABB and ABB explain the close relation between stress, semantic focus and morphology.

Notes

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On Multiple Reflexives in Japanese[*]
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1.   Introduction

It is well known that the Japanese reflexive *zibun* 'self' is a long distance anaphor with a subject orientation (see, among others, Kuroda 1965; Kuno 1973; Akatsuka 1976; Inoue 1976). In (1), for example, the reflexive *zibun* 'self' is ambiguous in that it can take as its antecedent either the embedded subject *Mary* or the matrix subject *John*:

(1) **John**-ga   [**Mary**-ga   **zibun**-no kuruma-de Tookyoo-ni itta   to]
     John-NOM **Mary**-NOM **self**-GEN car-in   Tokyo-to   went C
     omotteiru (koto)
     think   (fact)
     'John thinks that Mary went to Tokyo in self's car.'

Howard and Niekawa-Howard (1976) claim, however, that there is a further constraint on the interpretation of reflexives:

(2) **John**-ga   [**Mary**-ga   [**zibun**-no imooto]-ni [**zibun**-no hon]-o   watasita
     John-NOM **Mary**-NOM   **self**-GEN sister-DAT   **self**-GEN book-ACC gave
     to] itta (koto)
     C said (fact)

In (2), there appear two reflexives in the embedded clause. Without any further constraint, these two reflexives should both be ambiguous so that (2) should be four-way ambiguous. Howard and Niekawa-Howard observe that (2) is only two-way ambiguous as shown in (3a-d):

(3) a.   ATB reading: **John** said that Mary gave **his** book to **his** sister.
     b.   ATB reading: John said that **Mary** gave **her** book to **her** sister.
     c.   Mixed reading: * **John** said that **Mary** gave **his** book to **her** sister.
     d.   Mixed reading: * **John** said that **Mary** gave **her** book to **his** sister.

In order to capture this fact, they propose the Reflexive Coreference Constraint (RCC) (4) (Howard and Hiekawa-Howard 1976:229):

(4) The Reflexive Coreference Constraint (RCC)
     Two instances of the reflexive pronoun *zibun* commanded by the same pair of possible antecedents must be coreferential. If they are not, the sentence is

marked as ungrammatical.

According to the RCC, the two reflexives in (2) are commanded by the same pair of possible antecedents, *i.e. John* and *Mary*, so that (2) can only have the 'across-the-board readings' (ATB readings) (3a, b), where the two reflexives have the same antecedent, but not the 'mixed readings' (3c, d), where the two reflexives have different antecedents. Although Howard and Niekawa-Howard mark the mixed readings (3c, d) as ungrammatical, the judgments are not so crystal clear to every speaker. It is important to note, however, that almost all speakers find that the 'mixed readings' are worse than the 'ATB readings.'[1]

The RCC effect is also observed in Chinese and Korean as exemplified by (5) and (7) (see, among others, Fiengo and Kim 1980; Richard 1996; Kim and Kitagawa 2002):

(5) **Xiao Ming** xiang [**Da Hua** zai **ziji** de frangjian zuo **ziji** de gongke]
  Xiao Ming think **Da Hua** at **self** DE room do **self** DE homework
(6) a. ATB reading: **Xiao Ming**$_i$ said that Da Hua$_j$ was doing **his**$_i$ homework in **his**$_i$ room.
  b. ATB reading: Xiao Ming$_i$ said that **Da Hua**$_j$ was doing **his**$_j$ homework in **his**$_j$ room.
  c. Mixed reading:***Xiao Ming**$_i$ said that **Da Hua**$_j$ was doing **his**$_i$ homework in **his**$_j$ room.
  d. Mixed reading:***Xiao Ming**$_i$ said that **Da Hua**$_j$ was doing **his**$_j$ homework in **his**$_i$ room.

                (Richards 1996: 25)

(7) **Chelswu**-ka [**Sunhi**-ka **caki** pang-ese **caki** il-ul   hakoissta ko]
  Chelswu-NOM **Sunhi**-NOM **self** room-in **self** work-ACC was-doing C
  syangkakhanta
  think
(8) a. ATB reading: **Chelswu**$_i$ thinks that Sunhi$_j$ is doing **his**$_i$ work in **his**$_i$ room.
  b. ATB reading: Chelswu$_i$ thinks that **Sunhi**$_j$ is doing **his**$_j$ work in **his**$_j$ room.
  c. Mixed reading:***Chelswu**$_i$ thinks that **Sunhi**$_j$ is doing **his**$_i$ work in **his**$_j$ room.
  d. Mixed reading:***Chelswu**$_i$ thinks that **Sunhi**$_j$ is doing **his**$_j$ work in **his**$_i$ room.

                (Richards 1996: 25)

This paper argues that the RCC effect straightforwardly follows from the properties of AGREE, presenting further evidence for an AGREE analysis of anaphoric binding proposed by, among others, Reuland (2005) and Chomsky (2008). The organization of this paper is as follows. Section 2 exlicates previous analyses of the RCC effect. Section 3 proposes an AGREE analysis of the RCC effect. It is shown that the RCC effect follows from the properties of AGREE. Section 4 argues that the AGREE analysis should be preferred over previous analyses in that the former accounts for not only the RCC effect but also 'blocking effects' induced by the multiple nominative construction and subject honorification, which remains unexplained under any previous analyses. Section 5 makes concluding remarks.

2. Previous Analyses

2.1 Kim and Kitagawa's (2002) relativized opacity analysis

Kim and Kitagawa (2002) propose the notion of "relativized opacity" (9) to account for intervention effects in Korean *wh*-constructions:

(9) Relativized Opacity
    a.   Opacity
        One actual instance of head-licensing makes the licensing domain opaque.
    b.   Domain
        The maximal projection of the licensing head is the domain of licensing.
    c.   Relativization
        This opacity prohibits the same type of licensing from outside the domain.

They apply this notion of "relativized opacity" to the RCC effect. They claim that a verb is a "licensing head" for reflexive binding. On the assumption that a verb has a selectional relation with its external argument in its Spec, the verb pairs its external argument with *zibun* 'self'; the external argument is interpreted as the antecedent of *zibun* 'self'. When a verb pairs its external argument with two instances of *zibun* 'self' as represented in (10), we can get the ATB readings (3a, b), depending on whether V is the matrix verb or the embedded verb:

(10)
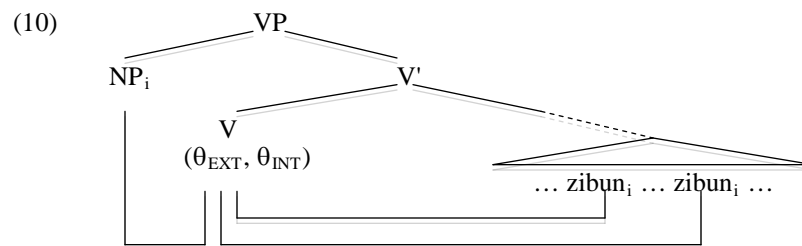
When the embedded verb licenses only one instance of *zibun* 'self', on the other hand, the maximal projection of the licensing head, *i.e.* the embedded VP, becomes an opaque domain for reflexive binding, as illustrated in (11):

(11)
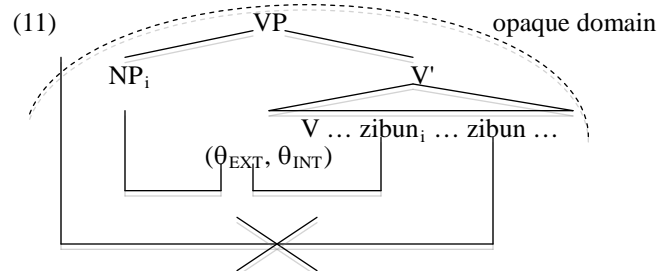
Reflexive binding of the other instance of *zibun* 'self' is prohibited from outside the embedded VP. This excludes the mixed readings (3c, d). Hence, the RCC effect follows.

As pointed out by Fujii (2004), however, Kim and Kitagawa's analysis is not desirable, since their analysis does not explain why reflexive binding makes VP domain opaque. In other words, their analysis stipulates the notion of relativized opacity (9). Rather, the notion of relativized opacity should be derived from general properties of grammar.

2.2 Feature movement analyses (Richards 1996; Fujii 2004)

Assuming Chomsky's (1995) 'feature movement', Richards (1996) and Fujii (2004) propose a feature movement analysis of the RCC effect. They claim that the RCC effect follows from the Minimal Link Condition. Since they share the basic insight, I will only explicate Fujii's analysis. Fujii's analysis consists of the following three main claims. First, *zibun* 'self' bears 'F feature', which undergoes 'feature movement' to enter into a checking relation with T that has a matching feature F. *Zibun* 'self' is then interpreted as coreferential with the Spec of T, *i.e.* the subject of the clause. Second, T may or may not have 'F feature'. Third, the 'F feature' on *zibun* 'self' moves to the closest T that has 'F feature'. Under his feature-movement analysis, the ATB readings (3a, b) are assigned representations (12) and (13) respectively:

(12) ATB Reading (3a)
[John   T$_{[F]}$ … [Mary T … zibun$_{[F]}$ … zibun$_{[F]}$ …]]

(13) ATB Reading (3b)
[John T … [Mary   T$_{[F]}$ … zibun$_{[F]}$ … zibun$_{[F]}$ …]]

In (12), the F-features of *zibun* 'self' undergo feature-movement to the matrix T with F-feature; the two reflexives take the matrix subject as their antecedent. In (13), they undergo feature-movement to the embedded T with F-feature so that the two reflexives take the embedded subject as their antecedent.

The mixed readings (3c, d), however, are excluded by the Minimal Link Condition as represented in (14):

(14) Mixed Readings (3c, d)
[John T$_{[F]}$ … [Mary T$_{[F]}$ … zibun$_{[F]}$ … zibun$_{[F]}$ …]]
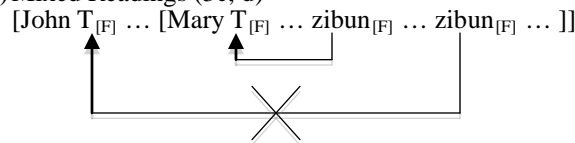
When one instance of *zibun* 'self' undergoes feature-movement to the embedded T with F-feature, the other instance of *zibun* 'self' cannot undergo feature-movement to the matrix T, since it skips the closest T with F-feature and

violates the Minimal Link Condition. Hence, the RCC effect follows. The feature movement analysis is more desirable than the relativized opacity analysis, since the former explains why the embedded clause becomes an opaque domain when reflexive binding takes place, *i.e.*, the opaque domain is due to the Minimal Link Condition.

In the rest of this paper, I will propose an AGREE analysis of the RCC. It is shown that our AGREE analysis should be preferred over the feature movement analysis in that our analysis accounts for not only the RCC effect but also 'blocking effects' induced by the multiple nominative construction and subject honorification.

3. A Proposal

3.1 An AGREE analysis of *zibun*

Chomsky (2000) develops a system of AGREE, where 'feature movement' is replaced by 'feature valuation' through agreement. Since then, AGREE analyses of anaphoric binding have been proposed by, among others, Reuland (2005) and Chomsky (2008). The AGREE analyses claim that a phase head (PH) undergoes Multiple AGREE with a reflexive (R) and its antecedent (XP) so that they share their ϕ-features, which is interpreted as a binding relation, as represented in (15):

(15) $[\text{PH}_{[\phi]} \ldots \text{XP}_{[\phi]} \ldots \text{R}_{[\phi]}]$ Multiple AGREE
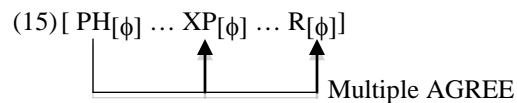
I extend the previous AGREE analyses to an analysis of the Japanese reflexive *zibun* 'self'. This paper adopts Pesetsky & Torrego's (2007) system of features (16):

(16) Pesetsky and Torrego's (2007) System of Features
   a. Both interpretable and uninterpretable features may come as valued and unvalued.
   b. AGREE involves valuation and feature sharing, *i.e.* matching features coalesce into a common feature, which is valued if either of the coalescing features is valued.
   c. Valuation of one feature by another feature creates a link that is accessible to subsequent operations (see also Frampton and Gutmann 2000; Boeckx 2008).

Based on Pesetsky & Torrego's feature system, let us explicate the basic properties of *zibun* 'self'. First, as pointed out by, among others, Akatsuka (1976), Kuno (1973), and Katada (1991), the antecedent of *zibun* 'self' can be any person, number, and gender as long as it is [+human] as shown in (17):

(17) a. Person/gender free
       Watasi/Anata/John/Mary-ga [zibun-no sensei]-o   kiratteiru (koto)

I/you/John/Mary-NOM   self-GEN teacher-ACC hate   (fact)
'I/you/John/Mary hate(s) self's teacher.'
  b.   Number free
         [John to Mary]-ga   [zibun-o sensei]-o   kiratteiru (koto)
          John and Mary-NOM self-GEN teacher-ACC hate   (fact)
         'John and Mary hate self's teacher.'[2]

Based on this property, I claim that *zibun* 'self' has interpretable unvalued φ-features. *Zibun* 'self' therefore must be provided with its φ-feature values from its antecedent, which has interpretable valued φ-features. Second, I claim with, among others, Katada (1991) and Huang & Liu (2001) that *zibun* 'self' is an operator, since the unvalued φ-features of *zibun* 'self' imply that *zibun* 'self' has a "semantic range," which is a property shared with other operators like *wh*-words. More specifically, I assume that *zibun* 'self' has an interpretable valued operator feature, a λ(-operator) feature with the reflexive value [Ref] (cf. Huang & Liu 2001). Third, as mentioned in section 1, *zibun* 'self' has a subject-orientation. I claim that in addition to φ-features, the C-T pair (but not the *v*-V pair) may be assigned the property [+multiple] in the sense of Hiraiwa (2001) as well as an uninterpretable unvalued λ-feature. The C-T pair with [+ multiple] undergoes Multiple AGREE with a reflexive and a subject; this yields their binding relation.
     Let us consider (18) as an example:

(18) **John₁**-ga [**Mary₂**-ga   [**zibun₁/₂**-no hahaoya]-o   semeta to] itta (koto)
      John-NOM **Mary**-NOM   **self**-GEN   mother-ACC blamed C   said (fact)
      '**John** said that **Mary** blamed **his/her** mother.'

During its derivation, we construct the embedded CP phase. Suppose that the embedded C is assigned [+ multiple] and λ-feature, which are inherited by T. Given that an unvalued feature functions as a probe, T, which has unvalued φ-features, functions as a probe. T has two matching goals, *i.e. Mary* and *zibun* 'self'. Since T also has [+multiple], it undergoes Multiple AGREE with these two matching goals as represented in (19a). Under the feature sharing approach, T, *Mary*, and *zibun* 'self' are linked with one another; they share the values of φ-features, *i.e.* the values of *Mary*'s φ-features [3, S, F] (3rd person, singular, feminine) as represented in (19b). As a result, *Mary* and *zibun* 'self' are interpreted as having a binding relation; *zibun* 'self' is interpreted as taking the embedded subject *Mary* as its antecedent. Note in passing that T and *zibun* 'self' also share the value of λ-feature, *i.e.* [Ref] of *zibun* 'self':

(19) a.   [[[*v*P **Mary[3SF]** [*v'* [**zibun[unvalued φ, Ref]**-no hahaoya]-o semeta] *v*]
              Mary   self-GEN   mother-ACC blamed

         T[unvalued φ, unvalued λ] [+multiple] to]
                                    C
                           Multiple AGREE
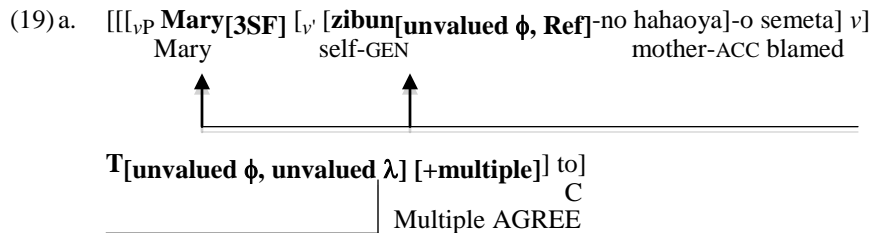
b.   [[[$_{v}$P **Mary[3SF]** [$_{v'}$ [**zibun[3SF, Ref]**-no hahaoya]-o semeta] v]
        Mary   self-GEN   mother-ACC blamed

    T[3SF, Ref]] to]
            C

When the embedded C is not assigned [+multiple], on the other hand, there is no way of licensing *zibun* 'self' within the embedded clause. The matrix C may be assigned [+multiple] and λ-feature, which are inherited by the matrix T. As represented in (20a), the matrix T undergoes Multiple AGREE with the matrix subject *John* and *zibun* 'self' within the embedded clause, given that AGREE does not obey the Phase Impenetrability Condition and thus can take place at a distance, as argue by Bošković (2007). This creates a long-distance binding relation between *John* and *zibun* 'self', as represented in (20b); *zibun* 'self' is interpreted as taking the matrix subject *John* as its antecedent:

(20) a.   [[[$_{v}$P **John[3SM]** [$_{v'}$ [Mary-ga [**zibun[unvalued ϕ, Ref]**-no hahaoya]-o
        John   Mary-NOM self-GEN   mother-ACC

    semeta to] omotteiru] v] **T[unvalued ϕ, unvalued λ] [+multiple]**] C]
    blaimed C think
                                     Multiple AGREE

b.   [[[$_{v}$P **John[3SM]** [$_{v'}$ [Mary-ga   [**zibun[3SM, Ref]**-no hahaoya]-o
        John   Mary-NOM   self-GEN   mother-ACC
    semeta to] omotteiru] v] **T[3SM, Ref]**] C]
    blamed C   think

Note that elements with valued ϕ-features intervening between the matrix T and *zibun* 'self' do not function as interveners for this long-distance AGREE, since, as argued by Chomsky (2001), the intervention effect is nullified unless intervention blocks matching of all features. The embedded subject *Mary*, for example, does not function as an intervener, since although the matrix T, being a probe, matches with the embedded subject *Mary* in ϕ-features, the λ-feature of the matrix T does not match with *Mary*; T is free to seek a goal further.

3.2 An analysis of the RCC effect

With the discussion of the previous subsection in mind, let us return to the RCC effect (2). During its derivation, we construct the embedded CP phase. Suppose that the embedded C has [+multiple] and λ-feature, which are inherited by T. One of the properties of Multiple AGREE is that when a phase head has [+multiple], it undergoes Multiple AGREE to *all* matched goals at the *same* derivational point (Hiraiwa 2001; cf. Chomsky's (2001) Maximization Principle). As represented in (21a), since the probe T with [+multiple] has three matching goals, *i.e. Mary* and the two instances of *zibun* 'self', T is required to undergo Multiple AGREE with all of the three goals. *Mary* and the two instances of

zibun 'self' must share the values of *Mary*'s φ-features, *i.e.* [3, S, F] (3rd person, singular, feminine) as represented in (21b). The two instances of *zibun* 'self' are interpreted as taking the embedded subject *Mary* as their antecedent; the ATB reading (3b) follows:

(21) ATB reading (3b)

    a.   [[[$_{v}$P **Mary[3SF]** [$_{v'}$ [**zibun[unvalued φ, Ref]**-no imooto]-ni
            Mary   self-GEN   sister-DAT

        [**zibun[unvalued φ, Ref]**-no hon]-o   watasita] *v*]
         self-GEN   book-ACC gave

        T[unvalued φ, unvalued λ] [+multiple]] to]
                             C
                   Multiple AGREE

    b.   [[[$_{v}$P **Mary[3SF]** [$_{v'}$ [**zibun[3SF, Ref]**-no imooto]-ni
            Mary   self-GEN   sister-DAT

        [**zibun[3SF, Ref]**-no hon]-o   watasita] *v*] **T[3SF, Ref]**] to]
         self-GEN   book-ACC gave   C

In the ATB reading (3a), the embedded C is not assigned [+multiple]. Instead, the matrix C is assigned [+multiple] and λ-feature. The matrix T, which inherits these features from C, undergoes Multiple AGREE with the matrix subject *John* and the two instances of *zibun* 'self' within the embedded clause as represented in (22a). *John* and the two instances of *zibun* 'self' must share the values of *John*'s φ-features as represented in (22b); the ATB reading (3a) follows:

(22) ATB reading (3a)

    a.   [[[$_{v}$P **John[3SM]** [$_{v'}$ [Mary-ga   [**zibun[unvalued φ, Ref]**-no
            John   Mary-NOM   self-GEN

        imooto]-ni [**zibun[unvalued φ, Ref]**-no hon]-o   watasita to] itta] *v*]
        sister-DAT   self-GEN   book-ACC gave   C   said

        T[unvalued φ, unvalued λ] [+multiple]] C]
                     Multiple AGREE

    b.   [[[$_{v}$P **John[3SM]** [$_{v'}$ [Mary-ga   [**zibun[3SM, Ref]**-no imooto]-ni
            John   Mary-NOM   self-GEN   sister-DAT

        [**zibun[3SM, Ref]**-no hon]-o   watasita to] itta] *v*] **T[3SM, Ref]**] C]
         self-GEN   book-ACC gave   C   said

The AGREE analysis can correctly rule out the mixed readings (3c, d) as represented in (23):

(23) Mixed readings (3c, d)

[[[*v*P **Mary[3SF]** [*v′* [**zibun[unvalued ϕ, Ref]**-no imooto]-ni
     Mary   self-GEN   sister-DAT

[**zibun[unvalued ϕ, Ref]**-no hon]-o   watasita] *v*]
  self-GEN   book-ACC gave

T[unvalued ϕ, unvalued λ] [+multiple]] to]
                                  C
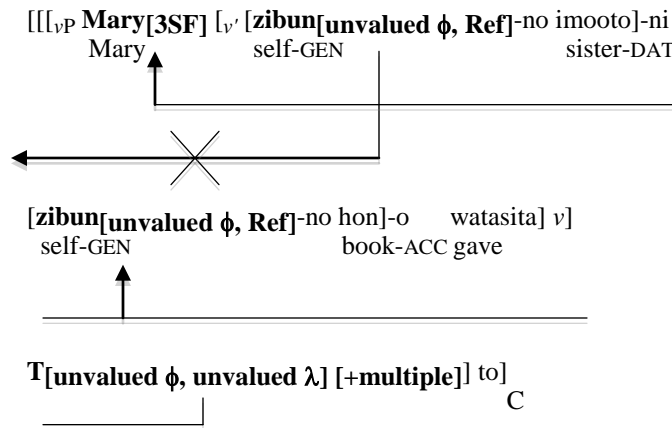
In (3c, d), one instance of *zibun* 'self' takes the embedded subject *Mary* as its antecedent. The embedded T has [+multiple] so that T is required to undergo Multiple AGREE with all matching goals, including the other instance of *zibun* 'self'. Hence, there is no way that the other instance of *zibun* 'self' undergoes AGREE with the matrix T; it cannot take the matrix subject as its antecedent. The deviancy of the mixed readings (3c, d) follows.

4. Consequences

In the previous section, I have proposed an AGREE analysis of the RCC effect. In this section, I will show that our AGREE analysis of the RCC effect receives further support from 'blocking effects'.

4.1 The multiple nominative construction

First, the multiple nominative construction induces the 'blocking effect', as the contrast between (24a) and (24b) shows:

(24) a. **John₁**-ga tyoosa iinkai-ni   [[**Mary₂-no titioya]₃-ga**
John-NOM investigation committee-DAT [**Mary-GEN father]-NOM**
[**zibun₁/*₂/₃**-ga hatumeisita kusuri-ga   genin-de] nyuuinsita to]
[**self**-NOM   discovered medicine-NOM cause-by hospitalized C
hookokusita
reported
Lit. '**John₁** reported to the investigation committee that [**Mary₂**'s
father]₃ was hospitalized due to medicine discovered by **self₁/*₂/₃**.'

   b. **John₁**-ga tyoosa iinkai-ni   [**Mary₂-ga titioya₃-ga**
John-NOM investigation committee-DAT [**Mary-NOM father-NOM**
[**zibun*?₁/₂/₃**-ga hatumeisita kusuri-ga   genin-de] nyuuinsita to]
[**self**-NOM   discovered medicine-NOM cause-by hospitalized C
hookokusita
reported
Lit. '**John₁** reported to the investigation committee that **Mary₂**'s
father₃ was hospitalized due to medicine discovered by **self*?₁/₂/₃**.'

In (24a), *zibun* 'self' within the embedded clause can take either the embedded subject or the matrix subject as its antecedent. However, in the multiple nominative construction (24b), where the embedded clause has two nominative subject phrases, *zibun* 'self' cannot take the matrix subject as its antecedent.

Based on the traditional insight that that T can license more than one nominative phrase in multiple specifiers or adjoined positions within one projection (see, among others, Saito 1982; Fukui 1986; Takezawa 1987; Heycock 1993; Koizumi 1994; Ura 2000), Hiraiwa (2001) argues that in the multiple nominative construction, T undergoes Multiple AGREE with more than one nominative phrase. In other words, the embedded T in (24b) has [+multiple]. It then follows that *zibun* 'self' within the embedded clause is required to undergo AGREE with the embedded T. It cannot undergo AGREE with the matrix T; *zibun* 'self' within the embedded clause cannot take the matrix subject as its antecedent. Hence, the 'blocking effect' in the multiple nominative construction follows.

4.2 Subject honorification

Second, Aikawa (1993) observes that subject honorification induces the 'blocking effect' as shown in (25):

(25) a. **Masao₁**-ga minna-ni   [**Tanaka-sensee₂**-ga [**zibun₁/₂**-no
Masao-NOM everyone-DAT   **Prof. Tanaka**-NOM **self**-GEN
kodomo]-o sikatta   to] hanasita (koto)
child-ACC scolded C   told   (fact)
'**Masao₁** told everyone that **Professor Tanaka₂** scolded **self₁/₂**'s child.'

b. **Masao₁**-ga minna-ni [**Tanaka-sensee₂**-ga [**zibun**$_{*?1/2}$-no
   Masao-NOM everyone-DAT **Prof. Tanaka**-NOM **self**-GEN
   kodomo]-o **o-sikarini-natta** to] hanasita (koto)
   child-ACC **scolded**[Subject Honorification] C told (fact)
   '**Masao₁** told everyone that **Professor Tanaka₂** scolded **self**$_{*?1/2}$'s
   child.'

In (25a), *zibun* 'self' within the embedded clause can take either the embedded subject or the matrix subject as its antecedent. However, in (25b), where subject honorification takes place in the embedded clause, *zibun* 'self' cannot take the matrix subject as its antecedent.

It has been claimed by, among others, Shibatani (1977), Toribio (1990), Ura (2000), and Hasegawa (2006) that subject honorification should be treated as an abstract subject-verb agreement. They claim that subject-verb agreement in subject honorification is mediated by some other category. I claim with Ura that subject-verb agreement is mediated by T. It then follows that if we adopt the system of AGREE to accommodate subject honorification, T undergoes multiple AGREE with subject and verb. The embedded T in (25b) has [+multiple] so that *zibun* 'self' within the embedded clause is required to undergo AGREE with the embedded T. Hence, the 'blocking effect' with subject honorification follows.

5.   Conclusion

This paper has argued that the RCC effect straightforwardly follows from the properties of AGREE, presenting further evidence for AGREE analysis of anaphoric binding. It was shown that our AGREE analysis of the RCC effect should be preferred over previous analyses in that our analysis accounts for not only the RCC effect but also the 'blocking effects' induced by the multiple nominative construction and subject honorification, which remains unexplained under any previous analyses.

Notes:

[1] Fuji (2004) observes that there are examples where the RCC effect is overruled (Fujii 2004: 105, see also Richard 1996):

(i)   **Taroo₁**-wa [**Hanako₂**-ga [**zibun₂**-no heya]-kara **zibun₁**-o mihatteiru to] omotteiru
      Taro-TOP Hanako-NOM elf-GEN room-from self-ACC is-watching C think
      'Taro thinks Hanako is watching self from self's room.'

In (i), *zibun* 'self' can only take as its antecedent the matrix subject *Taroo* 'Taro', but not the embedded (local) subject *Hanako* 'Hanako'. As pointed out by Fujii, however, that *zibun* 'self' in (i) may not belong to a class of anaphoric expressions which we are dealing with. It has been claimed by, among others, Akatsuka (1976), Oshima (1979), and Aikawa (1993), that *zibun* 'self' in the direct

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object position can take the local subject as its antecedent only when the predicate refers to an abstract activity as shown in (ii). When the predicate refers to a physical activity, on the other hand, it cannot take the local subject as its antecedent as shown in (iii):

(ii)   **John₁**-ga **zibun₁**-o nikundeiru/semeta (koto)
         John-NOM self-ACC hate/blamed   (fact)
         'John hates/blamed himself.'
(iii) ***John₁**-ga **zibun₁**-o nagutta/ketta (koto)
         John-NOM self-ACC hit/kicked   (fact)
         'John hit/kicked himself.'

This suggests that when *zibun* 'self' appears in the direct object position of the predicate referring to a physical activity, it does not function as an anaphor but rather functions like a pronominal element. In (i), the embedded predicate *mihatteiru* 'is watching' refers to a physical activity so that *zibun* 'self' in the direct object position, being a pronominal-like element, cannot refer to the local subject *Hanako*. Hence, (i) does not constitute counterevidence against the RCC effect.

[2] (17b) only has the distributive meaning, *i.e.* John hates his teacher and Mary hates her teacher.

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L2 *Wh*-Movement: *That*-trace Effect and Subject/Object Preferences*

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1. Introduction

Previous studies in second language (L2) acquisition have questioned the effects of age on L2 speakers' sensitivity to and representations of the target language (e.g., Johnson and Newport 1989; Bialystok and Miller 1999; Dekeyser et al. 2010). As a result, many studies have found a negative correlation between age of acquisition and ultimate attainment of a target language, but the nature of age effects is still controversial. A pattern of age effects can vary by, for example, a linguistic domain (e.g., syntax vs. phonology), a type of phenomena (e.g., *wh*-movement vs. sluicing), or subjects' L1 backgrounds (e.g., Flege et al. 1999; McDonald 2000; Long 2005; Birdsong 2006).

In addition, most of the work has assumed that grammaticality is strictly categorical (grammatical vs. ungrammatical). Consequently, most L2 literature has paid little attention to the fact that acceptability judgments are not black and white, but rather gradient, as in the examples in (1) (Sorace et al. 2005; Fanselow 2006; Wasow 2007). Although both sentences are grammatical, the acceptability of each sentence is different. A subject relative clause as in (1a) is reported to be preferred over an object relative clause as in (1b) (e.g., Kluender and Kutas 1993b; Kluender and Cowles 1997).

(1)   a.   The reporter who ___ harshly attacked the senator admitted the error.   ≥
          b.   The reporter who the senator harshly attacked ___ admitted the error.
                                 (≥ means 'seems better than')

The careful study of gradience in acceptability has the potential to allow us to discover more specific and subtle differences between L2 speakers and native speakers in the course of learning a language. If, for example, L2 and native speakers differ significantly in terms of the gradience in their judgments, this is something that our theory of L2 acquisition needs to explain and, further, this may provide a better understanding of age effects in L2 acquisition.

This study examines the extent to which L2 speakers with different ages of arrival display native-like gradience in their acceptability judgments of different *wh*-movement constructions. Specific focus is placed on subject/object preference and the *that*-trace effect in embedded *wh*-questions. The paper is organized as follows. In section 2, I briefly review L1/L2 literature on subject/object preferences in *wh*-questions and on the *that*-trace effect. In section 3, I outline the design of the experiment and report the results. A discussion of the results follows in section 4. Section 5 concludes this paper.

2. Acquisition of Long-distance Subject/Object *Wh*-questions

2.1. Subject/object preference

If the categorical assumption is true, no difference in acceptability is expected between subject and object *wh*-dependencies. However, many studies have demonstrated a subject/object asymmetry in *wh*-dependencies. An example is relative clauses, which show a subject preference as in (1) above (e.g., Warren and Gibson 2002; Kwon et al. 2010; second language acquisition: Gass 1979, Wolfe-Quintero 1992, Hamilton 1994).

One of the likely reasons for the subject preference in relative clauses is processing factors. In processing filler-gap dependencies, a *wh*-filler must be stored in working memory until it is assigned to a gap (e.g., Kluender 1998). When the (linear or structural) filler-gap distance gets longer, the processing burden of carrying the filler in working memory to a gap is increased and the filler's level of activation in working memory decreases after it is first processed (e.g., King and Just 1991; Just and Carpenter 1992; O'Grady 1997; Gibson 2000). In this regard, increased (linear or structural) distance between the filler and its gap in object *wh*-dependencies demands more memory resources than in subject *wh*-dependencies in English, and it results in lower acceptability in object relative clauses than in subject relative clauses.

However, with regard to *wh*-questions as in (2), various patterns of subject/object asymmetries are reported in experimental findings.

(2)   a. Who did they say [John criticized ____ for voting that way]?
         b. Who did they say [__ criticized John for voting that way] ?

First, studies of acceptability judgments show no preference for either type of *wh*-question. Cowart (1997) found no acceptability difference between embedded subject and object *wh*-questions in the absence of complementizer *that*. Fukuda et al. (2010) also found no difference despite using 3 different acceptability judgment tasks (i.e. yes/no, 5-point scale, and Magnitude

Estimation). Both subject/object *wh*-questions in the absence of *that* were accepted similarly by native speakers of English.

Furthermore, many L2 studies report that L2 speakers of English preferred object *wh*-questions over subject *wh*-questions (e.g., Schachter and Yip 1990; White and Juffs 1998; Tsimpli et al. 2007; Dussias and Piñar 2010). A self-paced reading study by Juffs (2005) discovered that subject *wh*-questions (e.g., *Who did Anne say likes her friend?*) were read slower than object *wh*-questions (e.g., *Who did Anne say her friend likes?*) for L2 participants. L2 participants took the longest reading time in the embedded verb both in subject and object *wh*-questions. However, the reading time for the embedded verb in object *wh*-questions was much shorter than in subject *wh*-questions, which indicates more processing difficulties in subject *wh*-questions in L2 groups. Juffs argues that the difficulty with subject *wh*-extractions may be due to reanalysis problems, adapting the Generalized Theta Attachment idea of Pritchett (1992). Under this proposal, an extracted subject *wh*-word is likely to be interpreted initially as the object of the matrix verb, so it must be later reanalyzed as the subject of the embedded verb. This requires changes in the theta role assigner (e.g., *say* to *likes*), theta role (e.g., *internal* to *external*), and case assigned (e.g., *accusative* to *nominative*) in subject *wh*-questions. However, in object *wh*-questions, only a change in theta role assigner is needed. Thus, the reanalysis in subject *wh*-questions of theta role and case triggers more effort to parse subject *wh*-questions than object *wh*-questions for L2 participants as well as for native controls, but L2 participants are reported to experience more parsing difficulties than native controls.

On the other hand, Lee (2010) claims that L2 speakers display a subject preference in *wh*-questions. Lee tested L1 Korean speakers' comprehension of long-distance *wh*-questions in English with a picture-based listening comprehension task. The results showed that the participants at different stages of learning performed better on subject *wh*-questions than on object *wh*-questions, which is argued as evidence of the subject preference. Lee assumed that this is due to the distance-based accounts of processing *wh*-dependencies as found in relative clauses.

The contradictory results on the subject/object preference in *wh*-questions show a need for further research. However, the traditional way of testing L2 acquisition (i.e. grammatical vs. ungrammatical) seems inappropriate to investigate L2 speakers' native-like attainment on this topic. As previous findings indicate, regardless of their grammaticality, one type of *wh*-questions may sound better than the other due to non-grammatical factors (e.g., processing difficulties). Thus, it is more reasonable to ask whether L2 speakers show the same degree of acceptability as native speakers, rather than testing whether L2 speakers can judge the phenomenon as grammatical/correct or ungrammatical/incorrect. This will allow us to obtain a better picture of L2 acquisition by revealing more specific and subtle differences between L2

speakers and native speakers. In addition, because of the well-known effects of age on L2 acquisition, it makes sense to examine the subject/object preference with different groups based on age of acquisition.

2.2. *That*-trace effect

When the complementizer *that* is present, the subject preference is not expected in *wh*-questions due to the *that*-trace effect. According to the *that*-trace effect, a subject cannot be extracted from an embedded clause when *that* is present, as shown in (3a) (e.g., Rizzi, 1990; Pesetsky & Torrego, 2001; Roussou, 2007).

(3) a. ***that*-trace effect**:   * Who did John think **that** ___ saw Mary?
     b. object extraction with *that*:   Who did John think **that** Mary saw ___?
(4) a. subject extraction without *that*:   Who did John think ___ saw Mary
     b. object extraction without *that*:   Who did John think Mary saw ___?

 The Empty Category Principle (ECP) is the standard explanation for the *that*-trace effect, prohibiting subject *wh*-extractions when *that* is overt, as in (3a), since the *wh*-trace is not properly governed. When *that* is absent, as shown in (4a), subject *wh*-extractions are allowed because a *wh*-trace is properly governed by the trace in Comp. Similarly, object *wh*-extractions are acceptable because the verb in the complement clause always properly governs the *wh*-trace, as in (3b and 4b).

 Interestingly, the *that*-trace effect has been found to be problematic for L2 speakers. In White and Genesee (1996), highly proficient L2 subjects with various L1 backgrounds had grammaticality judgments similar to native speakers in many phenomena; on the *that*-trace violation, however, the L2 results were significantly different from native controls. Difficulty with the *that*-trace effect is also observed in Bley-Vroman et al. (1989). In a 3-point scale (*possible - not sure - impossible*) grammaticality judgment test on *wh*-movement in English, the single area in which Korean L2 subjects scored *'poorly'* was the *that*-trace effect.[1]

 These results raise a question: did the L2 speakers really lack the *that*-trace effect, or is the reported grammaticality an artifact of the test itself? L2 subjects' low accuracy score on the *that*-trace effect in grammatical judgment tasks in previous studies means that L2 participants marked the *that*-trace sentences as grammatical the majority of the time (Bley-Vroman et al. (1989) mentioned the 'unsure' option was almost never chosen). These results may be a true reflection of L2 subjects' lack of *that*-trace effect. However, the test may not have been sensitive enough to capture the L2 speakers' true knowledge. With a more fine-grained response method, the results could be different, so the possibility of a *that*-trace effect in L2 speakers needs to be reinvestigated with more sensitive measures.

To this end, this experiment uses a 9-point scale acceptability judgment test with four types of long-distance *wh*-questions (i.e. subject/object *wh*-questions in the presence/absence of *that*). If the L2 speakers have the *that*-trace effect, the *that*-trace condition should be the least favored one in comparison with other three conditions (i.e. subject/object *wh*-questions without *that*, object *wh*-questions with *that*). On the other hand, if they do not have the *that*-trace effect, acceptability of the *that*-trace condition would not be the lowest.

Here again, the lack of a *that*-trace effect in L2 groups may be related to age effects. Subjects in previous studies were late learners of English, but it is possible that early learners will behave differently. Although White and Genesee (1996) investigated the role of age of exposure and found no significant age effect on the *that*-trace effect, this might be due to a small number of subjects in each group. Thus, this study tests the *that*-trace effect with two different age groups, "Early" (6≤AoA≤10) and "Late" (12≤AoA≤15).

3. Experiment

3.1. Subjects

A total of 144 undergraduate students with no linguistics background at the University of California, San Diego (UCSD) participated in this experiment: 72 L2 speakers of English (18-29 years old at the time of testing with M: 22) and 72 native controls (18-36 years old at the time of testing with M: 21). L1 native Korean speakers were chosen to minimize L1 transfer since Korean is different from English in many aspects such as word order (SOV), *wh* in-situ, case markers etc.

All L2 participants were born in Korea and spoke only English and their native language, Korean, but no other languages. 72 L2 subjects were grouped into two by their different Age of Arrival (AoA) in the U.S, *Early Arrivals* (6≤AoA≤10) and *Late Arrivals* (12≤AoA≤15), yielding 2 Korean groups of 36 participants. (One subject in the Early group was eliminated from the results due to incomplete data and this yielded 35 subjects in the Early group.) A minimum of 7 years of residence in the U.S. was required. Table 1 summarizes the language experience and background of L2 participants.

	Age of Arrival (year)		Resident Length (years)		Education in U.S. (years)		% English use now		%L1 (Korean) use now	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)
Early	8.5	(1.62)	11.6	(2.06)	11.5	(1.80)	62.46	(21.47)	36.07	(20.88)
Late	12.9	(1.08)	8.8	(1.99)	8.4	(1.70)	41.77	(16.36)	57.12	(16.44)

Table 1. Background and experience information of each L2 group.

3.2. Method

A 9-point scale acceptability judgment task was given with pencil-and-paper. Prior to the experiment, participants had a practice session with 3 sentences which received varying judgment ratings by native speakers. Subjects were instructed not to analyze the sentence, but to give their first reaction by rating how good or bad the sentence sounded to them. They rated the sentences on a scale from 1 (very bad) to 9 (very good) by circling the appropriate number on a scale as shown in figure 1.

Who did Leslie realize killed you?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

very bad……………...very good

Figure 1. A sample of experiment stimuli

Upon completion of the experimental session, participants filled out a Language Background and Experience Questionnaire, which included age, sex, age of arrival, education background etc. The questionnaire was based on that of Marian et al. (2007).

3.3. Materials

There were four conditions: extraction site (subject/object) × presence of *that* (+that/-that). 20 sentences were created per test condition using 20 different lexical items. Sentences were distributed among 36 lists consisting of 5 tokens for each of the 4 test conditions, for a total of 20 experimental sentences in each list. Sentences were also pseudo-randomized. Each list had 81 fillers (e.g., subject-verb agreement, *whether*-islands, Complex NP Constructions, particle movement). The ratio of test sentences and fillers is 1:4. (6) shows a sample experimental item for the four conditions.

(6)   a. subject extraction with *that* :   Who did Bill think that saw you?
        b. object extraction with *that* :   Who did Bill think that you saw?
        c. subject extraction without *that* :   Who did Bill think saw you?
        d. object extraction without *that* :   Who did Bill think you saw?

3.4. Results

The raw ratings as shown in Table 2 and Figure 2 were first submitted to a repeated-measures ANOVA with a between-subjects factor, Language (English, Korean), and with within-subjects factors, extraction site (subject, object) × presence of *that* (+that/-that). Alpha was set at the 0.05 level. This analysis yielded a main effect of extraction site ($F1$ $(1, 141) = 78.183$, $p < .0001$, $F2$ $(1, 58) = 27.622$, $p < .0001$) that interacted with presence of *that* ($F1$ $(1, 140) =$

9.504, p = .002, F2 (1, 58) = 7.094, p = .01). A significant main effect of Language suggests that L2 groups were significantly different from native controls (F1 (1, 141) = 23.294, p < .0001, F2 (1, 58) = 21.131, p < .0001). In addition, significant interactions of presence of *that* and Language (F1 (1, 141) = 27.011, p < .0001, F2 (1, 58) = 18.819, p < .0001), and three-way interactions of Language, presence of *that*, and extraction site (F1 (1, 141) = 26.728, p < .0001, F2 (1, 58) = 14.567, p < .0001) were found.

Test conditions	Native control		Korean Early		Korean Late	
	M	(SD)	M	(SD)	M	(SD)
Subject extraction (+that)	4.20	(1.4)	3.91	(1.32)	4.42	(1.50)
Object extraction (+that)	5.61	(1.61)	4.52	(1.53)	4.93	(1.45)
Subject extraction (-that)	5.31	(1.63)	3.69	(1.32)	3.36	(1.28)
Object extraction (-that)	5.43	(1.32)	4.44	(1.25)	4.36	(1.45)

Table 2. Means (M) and Standard Deviations (SD) of acceptability of *wh*-extractions [2]

In order to test effects of Age of Arrival, another repeated-measures ANOVA was run with a between-subjects factor, Age of Arrival (Early, Late, native), and with within-subjects factors, extraction site (subject, object) × presence of *that* (+that/-that). A statistically significant effect of extraction site (F1 (1, 140) = 67.672, p < .0001, F2 (1, 57) = 24.479, p < .0001) was observed. Noticeably, a significant main effect of Age of Arrival suggests that all three groups performed differently compared to each other (F1 (2, 140) = 11.693, p < .0001, F2 (2, 57) = 10.536, p < .0001). The interaction of Age of Arrival and presence of *that* (F1 (2, 140) = 17.540, p < .0001, F2 (2, 57) = 13.574, p < .0001), and three-way interaction of Age of Arrival, presence of *that*, and extraction site (F1 (2, 140) = 13.643, p < .0001, F2 (2, 57) = 7.533, p = .001) were observed.

An additional repeated-measures ANOVA was run using only the two L2 groups' data in order to investigate the effects of age of arrival. The results showed main effects of extraction site (F1 (1, 69) = 32.678, p < .0001, F2 (1, 38) = 16.520, p < .0001) and of presence of *that* (F1 (1, 69) = 15.924, p < .0001, F2 (1, 38) = 11.782, p = .001). The effect of Age of Arrival was not significant, but its interaction with presence of *that* was found (F1 (1, 69) = 7.455, p = .008, F2 (1, 38) = 6.427, p = .015). This implies that two groups are different from each other only regarding the effect of *that*.
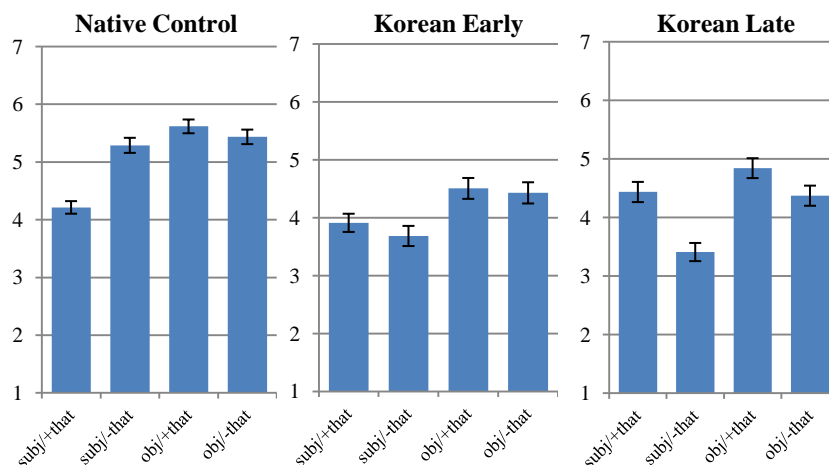
Figure 2. Acceptability of subject/object *wh*-questions with/without *that*

Each group was also separately tested by repeated-measures ANOVA with the factors extraction site (subject/object) × presence of *that* (+that/-that). First, in native controls, the ANOVA yielded significant effects of extraction site (F1 (1, 71) = 44.198, p < .0001, F2 (1, 19) = 14.149, p = .001) and of presence of *that* (F1 (1, 71) = 11.341, p = .001, F2 (1, 19) = 8.585, p = .009). Importantly, a significant interaction of extraction site and presence of *that* was found (F1 (1, 71) = 32.71, p < .0001, F2 (1, 19) = 28.359, p < .0001) which displays the *that*-trace effect in native controls. A series of paired sample *t*-test confirmed the *that*-trace effect: *subj/+that* (SY) was significantly different from other three conditions, (1) *obj/+that* (t (339) = -7.940, p < .0001); (2) *obj/-that* (t (339) = -6.423, p < .0001); (3) *subj/-that* (t (339) = 6.076, p < .0001). No significant subject/object asymmetry in the absence of *that* was found.

No interaction of factors was discovered in any L2 group. In the Early group, only a main effect of extraction site was found (F1 (1, 34) = 14.674, p = .001, F2 (1, 19) = 5.586, p = .029). Specifically, the object preference was revealed by paired sample *t*-tests both in the absence of *that* (t (167) = 2.499, p = .013) and in the presence of *that* (t (167) = -2.957, p = .004). In the Late group, a subject/object asymmetry was also shown by a main effect of extraction site (F1 (1, 35) = 18.104, p < .0001, F2 (1, 19) = 15.719, p = .001). However, the *t*-test discovered the object preference only in the absence of *that* (t (177) = - 4.213, p < .0001). A significant main effect of existence of *that* (F1 (1, 35) = 18.977, p < .0001, F2 (1, 19) = 28.590, p < .0001) was also found. A paired *t*-test confirmed the preference for *sub/+that* over *subj/-that* (t (177) = -4.749, p < .0001), and for *obj/+that* over *obj/-that* (t (177) = -2.037, p = .043). Thus, we

see no *that*-trace effect in either group of L2 speakers; in fact, late learners show an object preference only when *that* is absent.

4. Discussion

4.1. Subject/object preference in long-distance *wh*-questions

The object preference in long-distance *wh*-questions was found in both L2 groups. Since there is no grammatical theory that directly accounts for this asymmetry, I will assume that this is the result of a reanalysis difficulty as described above. In this view, the additional reanalysis in subject *wh*-questions compared to object *wh*-questions is the main reason for the object preference in *wh*-questions in L2 groups. An initial misanalysis of the *wh*-filler as the object of the main clause might be more difficult to recover from in subject *wh*-questions than in object *wh*-questions. In contrast, the absence of subject/object asymmetry in native controls implies that native speakers did not suffer from misanalysis, or if they did, the level of such difficulties was not severe enough to lower its acceptability.

These conclusions are compatible with previous findings (e.g., Juffs 2005, Tsimpli et al. 2007, Dussias and Pinar 2010) as discussed in section 2.1. The degraded acceptability of subject *wh*-questions for L2 speakers in the present study could then be a reflection of processing difficulty. The most crucial aspect of our results is that L2 speakers showed the different subject/object asymmetry from that of native controls in long-distance *wh*-questions without the complementizer *that*. This implies that L2 speakers had greater difficulty processing and recovering from an initial misanalysis in *wh*-questions compared to native speakers of English.

4.2. The *that*-trace effect

Native controls showed the expected *that*-trace effect, but the *that*-trace effect was not found in any L2 group. In fact, the "ungrammatical" *Subj/+that* condition was rated higher than the other "grammatical" conditions. The absence of the *that*-trace effect in L2 speakers has also been reported in previous L2 literature (Bley-Vroman et al., 1989; White and Genesee, 1996; White and Juffs, 1998). What makes the present study different is that the task was able to capture gradience in subject responses and the native speaker controls showed a very robust *that*-trace effect.

Why then is the *that*-trace effect so difficult for L2 speakers to acquire? A conclusive answer remains out of reach, but this study adds additional data to the investigation. The lack of evidence of the *that*-trace effect in even the Early group suggests that the *that*-trace effect is strongly constrained by age. It seems

very difficult for L2 speakers to acquire the *that* trace effect when acquisition begins at an age as young as 5. Whether or not the *that*-trace effect is attainable before age 5 is still uninvestigated, but the strict age constraint seen here adds important information to previous findings. Further research is needed to investigate L2 speakers with very early ages of acquisition, to determine the point at which the *that*-trace effect becomes unattainable.

4.3. Age effects on *that*

Interestingly, the L2 groups rated *wh*-questions containing *that* higher than those without *that*. I suggest that this is a reflection of different degrees of processing costs. The complementizer *that* informs speakers of a clause boundary and this prevents them from misparsing and promotes faster recovery from misanalysis. Effects of *that* in reducing comprehension and productions difficulty in object relative clauses have been reported (e.g., Race and MacDonald, 2003). Similarly, the presence of *that* in *wh*-questions may reduce processing difficulties and thus boost acceptability for L2 groups.

  However, the difference in acceptability between the presence/absence of *that* was significant only for the Late group. This may be explained by the relative ease of processing English that the Early group's familiarity with the language gives them over the Late group. Since the Early group was more efficient and automatic in processing *wh*-questions, the presence of *that* may not make much difference in terms of their processing costs and acceptability. This is evidence of another age effect in acquisition of *wh*-questions. Although no L2 group patterned exactly like native controls in the *that*-trace effect and subject/object preference, it is interesting that the Early group appeared to show a processing advantage in *wh*-questions compared to the Late group.

5. Conclusion

This study has revealed that even within grammatically "correct" and "incorrect" sentences L2 speakers show different degrees of variance in the acceptability of *wh*-questions. Specifically, I have found that the *that*-trace effect does not exist for L2 speakers who were exposed to English after 5 years of age, which suggests a strong age constraint in the acquisition of this effect. The preference for object *wh*-questions in L2 groups is likely a result of increased processing costs in subject *wh*-questions over object *wh*-questions. Further evidence of this comes from the increased acceptability with the complementizer *that*, which can also be explained as an effect of relieving processing burdens. However, the effects of *that* were significant only in the Late group. This implies that the Late group might experience more processing difficulties than the Early group. Neither L2 group in this study was exactly like native controls, but age still

seems to play a role in acquisition of long-distance *wh*-questions with lower degrees of processing difficulties in the Early group. More research on age effects especially in processing of *wh*-questions may provide better insight into age effects in L2 acquisition.

Notes

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[1.] However, native speakers' acceptability of *that*-trace effect in both papers was also irregular and different from the result of the other phenomena, and it was suspected that this might represent a dialect variation (Chomsky, 1986b; Sobin, 1987; Rizzi, 1990).

[2.] Since the mean ratings of experimental conditions in this study are distributed mostly in the middle of the scale, whether subjects used the full range of scale was questioned by looking at mean acceptability of the 5 most and least grammatical fillers. The results showed that participants did use the full range of the scale.

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Sluicing as Simple as Possible
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1. Introduction

Sluicing is a kind of elliptical structure in which the sentential part of a constituent question is missing and only a *wh*-phrase is overtly pronounced. Since Ross (1969), sluicing has commonly been analyzed as involving *wh*-movement followed by TP deletion (Merchant 2001), as illustrated in (1).

(1) Tommy ate something, but I don't know [*what*TP[~~Tommy ate t~~]]

If *wh*-movement is a prerequisite for sluicing, however, then Korean data presents complications. A *wh*-in situ language, Korean has a sluicing-like construction, shown in (2), that is parallel to the English counterpart (1).

(2) Korean
Tomi-ka mwuess-ul mek-essnun-tey, na-nun mwuess-i-n-ci molukeyss-ta.
T.-Nom something-Acc eat-Pst-though I-Top what-be-Pres-C not.know-Dec
'Tommy ate something, but I don't know what.'

In this paper, I discuss three competing analyses proposed in the literature and show that they all encounter difficulties in dealing with the wider range of properties of sluicing in Korean. Alternatively, I propose that sluicing in Korean is better analyzed as structure involving a base-generated silent *pro*-form.

This paper is organized as follows. In Section 2, I introduce basic data of sluicing constructions in Korean. In Section 3, I review three approaches and argue against (non)movement analyses of sluicing in Korean. In Section 4, I provide five sets of supporting evidence in favor of a new proposal, a *pro*-form approach. Section 5 addressees the remaining issues. Finally, Section 6 concludes the paper.

2. Basic Data

In this section, I examine general properties of sluicing constructions in Korean.

First, regarding case marking, the structural case markers such as the nominative markers *-i/ka* and the accusative markers *-l(ul)* should be dropped, as in (3) and (4), whereas the dative marker ey(key) can be optionally retained as in (5).

(3) Nominative case *-i/ka*[1]

nwukwun-ka	Tim-ul	salangha-yess-chiman,
someone-Nom	Tim-Acc	love-Pst-but
na-nun	nwukwu(-*ka)-i-n-ci	molu-n-ta.
I-Top	who(-Nom)-be-Pres-C	not.know-Pres-Dec

'Someone loved Tim, but I don't know who.'

(4) Accusative case *-l(ul)*[2]

Thim-i	nwukwu-lul	salangha-yess-chiman,
Tim-Nom	someone-Acc	love-Pst-but
na-nun	nwukwu(*lul)-i-n-ci	molu-n-ta.
I-Top	who(*-Acc)-be-Pres-C	not.know-Pres-Dec

'Tim respected someone, but I don't know who.'

(5) Dative marker *-ey(key)*[3]

Haitun-i	nwukwu-eykey	kok-ul	cwu-ess-chiman
Hayden-Nom	someone-Dat	music-Acc	give-Pst-but
na-nun	nwukwu(-eykey)-i-n-ci	molu-n-ta.	
I-Top	who(-Dat)-be-Pres-C	not.know-Pres-Dec	

'Hayden gave his music to someone, but I don't know who.'

For example, in (3) and (4) it is ungrammatical if the nominative and the accusative case markers remain. In contrast, in (5) the dative marker can be optionally retained without changing the interpretation or grammaticality.

Second, sluicing constructions in Korean must contain a copular verb, and the sluiced phrase is obligatorily followed by a certain type of complementizer, as shown in (6).

(6)

a. Everybody thought that Tim loved someone, but...

b. na-nun	nwukwu*(i)n*(ci)	molunta.
I-Top	whobePresC	not.knowPresDec

...I do not know who'

In (6b), the presence of the copular verb *i* is obligatory, and the complementizer *-ci*[4] must be used in the sluiced phrase.

3. Previous Analyses

On the basis of the data presented in Section 2, I now turn to the analysis of sluicing constructions in Korean. I first review two types of movement approach and show that these analyses encounter difficulty in dealing with the wider range of properties of sluicing constructions in Korean. I next show the non-movement approach, the cleft analysis.

First, according to the *wh*-movement analysis sluicing constructions in Korean are formed by an operation of *wh*-movement followed by IP/TP deletion (Takahashi 1993, Merchant 2001, 2004, among others). This approach, however, is immediately rejected since there is no obligatory *wh*-movement and the copular verb *i* is absent in forming *wh*-questions in Korean. Consider the data in (7) and (8).

(7) Embedded question
na-nun   thomi-ka   mwues-ul   mek-ess-nunci   molukeyss-ta
I-Top   Tommy-Nom   what-Acc   eat-Pst-C   not.know-Dec
'I don't know what Tommy ate.'

(8) Repeated from (2)
Tomi-ka mwuess-ul   mek-essnun-tey, na-nun mwuess-i-n-ci molukeyss-ta.
T.Nom   something-Acc   eat-Pst-though I-Top   what-be-Pres-C not.know-Dec
'Tommy ate something, but I don't know what.'

The *wh*-question in (7) shows that Korean does not have overt *wh*-movement as in English and that the copular verb *i* must be missing. In contrast, in (8) the copular verb *i* is necessary in sluicing.

Under the second movement approach, the focus movement analysis, *wh*-phrases in sluicing constructions undergo focus movement prior to TP-ellipsis, and the copular verb *i* is obligatorily inserted either to support a stranded tense (Kim 1997) or to satisfy case requirement as a last resort (Wang and Wu 2006). This account is illustrated in the following data.

(9) Repeated from (2)
Tomi-ka mwuess-ul   mek-essnun-tey, na-nun mwuess-i-n-ci molukeyss-ta.
T.Nom   something-Acc eat-Pst-though   I-Top   what-be-Pres-C not.know-Dec
'Tommy ate something, but I don't know what.'

(10) Focus movement
a. Case marker and TP deleted
na-nun   CP[FocP[mwuess~~ul~~ TP[~~Tomika t₁   mekessnun~~]]-ci] molukeyss-ta.
I-Top   what-Acc Tommy-Nom   ate-C   not.know-Dec

b. Copula inserted

na-nun   CP[FocP[mwuess-i-n   TP[~~Tomi-ka t_L mekessnun~~]]-ci] molukeyss-ta.
I-Top   what-be-Pres   Tommy-Nom ate-C   not.know-Dec

Following Kim's (1997) suggestion, the structure in (10) shows how the focus movement approach analyzes sluicing constructions in Korean. In (10a), *mwuess* 'what' first moves to the FocP, dropping its accusative case marker *-ul*, and then the TP is deleted. Next, shown in (10b), the copular verb *i* is inserted to support tense.

  Under the focus movement approach, however, two questions arise. First, it is not clear why only the copular verb *i* should be inserted. Commonly the dummy verb *hata* 'do' in Korean is inserted to support a stranded tense (Aoyagi 1998, Sakai 1998). Second, a special process of copula insertion would be stipulative. In Chinese, for example, adjunct *wh*-phrases do not need the copula (e.g. *shi* 'be' in Chinese) since they do not need case (Wang and Wu 2006). However, *wh*-adjuncts in sluicing constructions in Korean require copula support even though they are not assigned case.

  Next, under the cleft analysis sluicing constructions are a type of elliptical cleft construction (Nishiyama et al. 1996), as illustrated in (11) and (12).

(11) Korean
nwukwunka-ka   ku   chayk-ul   ilk-essc-iman
someone-Nom   that   book-Acc   read-Pst-but
na-nun   [~~ku chayk-ul   ilun-kes-i~~]   nwukwu-i-n-ci   nolukeyss-ta
I-Top   that book-Acc   read-Comp-Nom who-be-Pres-C   not.know-Dec
'Someone read the book, but I don't know who it is.'

(12) Japanese
Dareka-ga   sono   hon-o   yon-da ga,
Someone-Nom   that   book-Acc   read-Pst but
watashi-wa   [~~dare da/de   aru ka~~] wakaranai.
I-Top   who be   Pres Q   not.know
'Someone read the book, but I don't know who it is.'

(Merchant 1998, Example (17))

The structures in (11) and (12) show how the cleft approach analyzes sluicing constructions in Korean and Japanese. In (11), under the cleft approach (Nishiyama et al. 1996) the source of the sluiced phrase is a cleft construction in which the cleft clause 'read the book' is null. A similar analysis is shown in the corresponding Japanese sluicing example (Nishiyama et al. 1996) in (12).

  The cleft analysis is advantageous compared to the movement analysis discussed above, since it can account for the obligatory presence of the copular verb; in both clefts and sluicing, the copular verb is required.

As I show in the next section, however, a closer look at additional data tells us that sluicing constructions in Korean do not resemble cleft constructions, because a number of different syntactic properties are found between the two constructions.

Thus, in the following section I provide a new analysis of sluicing constructions in Korean. I show that a number of differences between cleft and sluicing lend support to this new claim, thereby rejecting the cleft analysis.

4. Proposal

In this section, I extend Adams' (2004) argument for sluicing constructions in Chinese and propose that sluicing constructions in Korean are base-generated as a simple clause consisting of a null subject *pro* followed by the copula *i*, similar to Adams' analysis of sluicing constructions in Chinese. Consider the data in (13).

(13) Chinese
a. John bought a special gift$_1$ (for his girl friend)
danshi wo bu zhidao [*pro*$_1$ shi shennme]
but 1Sg not know copula what
'…but I don't know what that was.'

b. (John is very gentle most of the time) [John smacked someone]$_2$,
danshi wo bu zhidao [*pro*$_2$ shi weishenme.]
but 1Sg not know copula why/for what
'...but I don't know why that was.' (Adams 2004, Page 11, Example (25))

According to Adams (2004), in the sluiced phrase (13a) *pro* refers to the NP 'gift' in the preceding clause; in (13b), *pro* refers to the TP 'John smacked someone'. Adams (2004) claims that *pro* is an unpronounced pronoun and is anaphoric to either the indefinite NP or the TP in the preceding clause depending on the properties of its antecedent. Adams (2004) also notes that pro must have an overt linguistic antecedent, which is supported by Heim's (1982) file-card account, as illustrated in (14).

(14) English
a. John has a spouse; she is from Delaware.
b. ??John is married; she is from Delaware.

According to Adams (2004), whenever an indefinite NP such as *she* is mentioned (as in (14)) it creates a file card to represent that NP and keep track of relevant information in the conversation. Usually, a pronoun needs a file card to

which it can refer back. Thus, (14a) is acceptable because a file card is created for *a spouse*. In contrast, in (14b) there is no file card for the pronoun *she*.

Returning to the Korean data, if similar suggestions are made, some other patterns of sluicing constructions in Korean follow naturally. I argue that sluicing constructions in Korean are base-generated as a simple clause [*pro wh-copula*] as illustrated in (15), similar to sluicing constructions in Chinese (Adams 2004).

(15) Korean
Mia-ka	nwukwunka-lul	coaha-yess-ta-ko	sayngkakha-ss-nuntey,
Mia-Nom	someone-Acc	like-Pst-Dec-Comp	think-Pst-though
na-nun	CP[kukey/*pro*	nwukwu-*(i)-n-*(ci)]	molukeyss-ta.
I-Top	that/*pro*	who-be-Pres-C	not.know-Dec

'I thought that Mia liked someone, but I don't know whom.'

Similar to sluicing constructions in Chinese (Adams 2004), in (15) *pro* can be pronounced as the demonstrative pronoun *kukey* 'that'; the existence of *pro* is attributed to the *pro*-drop parameter. The copular verb obligatorily follows the *wh*-phrase *nwukwu* 'who'. Thus, the sluiced phrase resembles a simple clause consisting of a null subject *pro* or its overt form *kukey* 'that' and a *wh*-word followed by the copular verb *i*.

In what follows, I provide five pieces of evidence in support of the base-generated as a simple clause approach; the first three show that the current claim has advantages over the cleft analysis.

First, true adverbs such as *ettehkey* 'how' usually serve as the remnant in the sluicing construction as in (16). In contrast, cleft constructions disallow true adverbs as in (17).

(16) Sluicing
cyull-ka	tul	chitul-lul	cap-ass-ta-ko	tul-ess-nuntey,
Julie-Nom	field	mouse-Acc	catch-Pst-Dec-C	hear-Pst-though
na-nun	CP[*pro*	ettehkey-i-n-ci]	molukeyss-ta.	
I-Top		how-be-Pres-C	not.know-Dec	

'I heard that Julie caught the field mouse, but I don't know how.'

(17) Cleft
*[cyullka t$_i$	tul	chitulul	capun	kes]-un	ettekey$_i$-i-ni?
Julie-Nom	field	mouse-Acc	catch	thing-Top	how-be-Q

'How is it that Julie caught the field mouse?'

In (16), *ettehkey* 'how' represents a true adverb; it is associated with the position modifying Julie's catching of the field mouse; *pro* is anaphoric to the TP in the first conjunct. However, while *ettehkey* 'how' in (17) is also associated with a

missing adverb which modifies Julie's catching of the mouse, the sentence in (17) is ungrammatical. This is because true adverbs are not allowed to be extracted in cleft constructions in Korean. Therefore, the data show that treating sluicing constructions uniformly as cleft constructions is not appropriate.

Second, multiple sluicing is allowed as in (18), whereas multiple clefting is not, as in (19).

(18) Sluicing

emma-ka	ettensalam-eykey	mwues-ul	cwu-ess-nuntey,
mother-Nom	someone-Dat	something-Acc	give-Pst-but
na-nun [*pro*	nwukwu-eykey	mwues-i-n-ci]	molun-ta.
I-Top	who-Dat	what-be-Pres-C	not.know-Dec

'The mother gave something to someone, but I don't know what to whom.'

(19) Cleft

*[Tomika $t_1 t_2$	cwu-n	kes-un] nwukwu-eykey$_1$	mwues$_1$-i-ni?
T-Nom	give-And	thing-Top who-Dat	what-be-Q

'Who is it that the mother gave what to?'

For example, in (18) multiple sluicing is grammatical: *nwukwu* 'who' refers back to *ettensalam* 'someone' and *mwues* 'what' refers back to *mwues* 'something'. However, in (19) multiple clefting is ungrammatical; clefting simultaneously the objects *nwukwueykey* 'to whom' and *mwues* 'what' is not allowed.

Third, sluicing in Korean systematically shows no island effects as in (20) and (21). This naturally follows from the proposed analysis; there is no movement of the sluiced *wh*-phrase since sluicing constructions are base-generated as a simple clause [*pro wh*-copula].

(20) Sluicing　　　　　　　　　　　　　　　　Complex NP island

Lee-nun Swu-ka	nwukwunka-lul	salangha-yess-ta-nun	somwun-ul
Lee-Top Sue-Nom	someone-Acc	love-Pst-Dec-Adn	rumor-Acc
pettul-yess-nuntey,	na-nun [*pro*	nwukwu-i-n-ci]	molukeyss-ta.
spread-Pst-though,	I-Top	who-be-Pres-C	know.not-Dec

'Lee spread the rumor that Sue loved someone, but I don't know whom.'

(21) Sluicing　　　　　　　　　　　　　　　　Relative clause island

LG-ka	etten ene-lul	kwusaha-nun	haksayng-ul	chat-koiss-nuntay,
LG-Nom some	language-Acc speak-Adn	student-Acc	find-Prog-though,	
na-nun	mwusun	ene-i-n-ci	molu-n-ta.	
I-Top	which	language-be-Pres-C	not.know-Pres-Dec	

'LG is looking for a student who speaks some language, but I don't know which language.'

For example, the sentence in (20) is grammatical with a complex NP island; *nwukwu* 'who' serves as the object in the complex NP. Similarly in (21), *mwusun ene* 'which language' is in a relative clause, but the sentence is grammatical.

  In contrast, cleft constructions in Korean are uniformly sensitive to syntactic islands, as illustrated in (22) and (23).

(22) Cleft   Complex NP island
*[Tim-I [t_1 ssu-n   salam-ul] piphanha-n kes-un]   i nonmwun$_1$-i-ta.
  Tim-Nom write-Adn person-Acc criticize-Adn thing-Top this article-be-Dec
  'It is this article that John criticized the person who wrote**.**'

(23) Cleft   Relative clause island
*[LG-ka [t_1 kwusaha-nun haksayng-ul chatkoissnun-kes-un] plangsue$_1$-i-ta.
   LG-Nom speak-Adn   student-Acc find.Prog-C-Top   French-be-Dec
'It is the French language that LG is looking for a student who speaks.'

For example, in (22) the object *i nonmuwn* 'that article' is coreferential with the empty element inside a complex NP, an NP whose head *salam* 'the person' takes a sentential complement. The ungrammaticality indicates that clefting out of a complex NP is blocked. This is expected, as complex NPs are islands for movement.

  Therefore, this shows that the formation of cleft constructions in Korean involves some sort of movement, but the formation of sluicing constructions does not involve a similar type of movement. This leads us to suggest that the source of sluicing and cleft constructions is different; specifically, sluicing is a simple clause [*pro wh*-copula].

  One might argue that the absence of island effects in sluicing in Korean can be explained by Merchant's (2001) account, in which islands in sluicing are PF-islands; when a phonological deletion occurs, the islands are elided and the violation is required. However, although sluicing can repair what would otherwise be island violations (Ross 1969, Merchant 2001, among others), not all kinds of island violations can be ameliorated in *wh*-in situ languages. For example, sluicing constructions in Turkish with the particle *ki* (Ince 2007) and the Japanese case-marked sluicing (Fukaya and Hoji 1999) constitute counterexamples to PF-islands in the Merchant (2001) sense. Consider the data in (24) and (25).

(24) Turkish *ki* sluicing
Hasan Kafkas   dillerin-den   biri-ni bil-en bir adam-la   konuş-tu.
H.-Nom Caucasian languages-Abl one-Acc know-C one man-comm talk-Pst-3s
*Hangisi-ni   ki/*Hangi   Kafkas   dili-ni   ki?
 which-acc   ki/ which   Caucasian   language-Acc   ki

'Hasan talked to a man who knows a Caucasian language. Which one/Caucasian language (I wonder)?'

(Ince 2007, Page 8, Example (25))

(25) Japanese case-marked sluicing
John-wa otooto-ni   nanika-o   okuttekita hito-o syootaisita rasiiga,
John-Top brother-Dat   something-Acc sent   person-Acc invited seem.but
*boku-wa   nani-o   ka   siranai.
 I-Top   what-Acc Q   know.not.
'It seems that John invited a person who had sent something to his brother, but I don't know what.'

(Fukaya and Hoji 1999, Page 2, Example (3))

The example in (24) shows that Turkish *ki* sluicing exhibits the island effect: in the sluiced phrases the *wh*-phrase cannot co-occur with *ki*. The same is shown in the case-marked sluicing of Japanese. In (25), *nanio* 'what' is accusative-marked, and such case-marked sluicing in Japanese displays the island sensitivity, although case-marked sluicing is possible in Japanese.

Therefore, PF-islands (Merchant 2001) present additional complications in accounting for why island constraints are in effect in Turkish sluicing with the particle *ki* and Japanese case-marked sluicing. I thus reject the argument of PF islands and do not extend it to the data in Korean; the arguments in the Merchant (2001) sense require additional complications to account for the data in Korean. The current proposal, however, has a simple explanation for why island violations are absent in Korean sluicing: there is no movement of the sluiced *wh*-phrase.

Fourth, it is consistently possible to replace a *wh*-phrase with a simple NP in Korean sluicing constructions. Let us first consider the English data in (26).

(26) English
a. Mari met someone,
b. Ken does not know who, but...
c. #...I know Bill.

As shown in (26), sluicing in English is syntactically associated with the form of a *wh*-question (Ross 1969, Merchant 2001). Filling the position for a *wh*-word with the simple NP *Bill* as in (26c) results in a semantically anomalous reading.

In contrast, the simple NP does not have to be deleted in the corresponding examples in Korean; the *wh*-phrase can be replaced by the simple NP *pil* 'Bill'.

(27) Korean
a. mali-ka   nwukwunka-lul   mannass-ta,
   Mari-Nom   someone-Acc   met-Dec

'Mari met someone.'

b. Ken-un   [kukey/*pro*   nwukwu-i-n-ci]   moluchi-man,
   Ken-Top   that/*pro*   who-be-Pres-C   not.know-but
   'Ken does not know who, but...'

c. na-nun   [kukey/*pro*   pil-i-lako]   an-ta.
   I-Top   that/*pro*   Bill-be-Comp   know-Dec
   '…I know Bill.'

   The grammaticality of (27) supports the claim that sluicing in Korean is base-generated as a simple clause [*pro wh*-copula] and that the syntactic structure of sluicing is not associated with *wh*-questions. The same also holds for sluicing in Japanese.

(28) Japanese
a. Mari-wa   dareka-ni   at-ta.
   Mari-Top   someone-Dat   meet-Pst
   'Mari met someone.'

b. Ken-wa   dare-(ni)-(da)-ka sir-ai-ga,
   Ken-Top   who-Dat-is-Q   know-Negbut
   'Ken does not know who, but...'

c. Watasi-wa   Yoko-(ni)-is-to   sitte-iru.
   I-Top   Yoko-Dat-is-Comp   know-Prog
   '...I know Yoko.'

   Fifth, it is consistently possible to replace pro with the overt pronoun *kukey* 'that' and retain the identical meaning in all of the sluicing examples illustrated in this section.
   Therefore, I claim that sluicing constructions in Korean are base-generated as a simple clause.

5. Remaining Issue

Before concluding this paper, I mention one remaining issue with respect to strict and sloppy readings associated with sluicing constructions. More specifically, it has been noted that the presence of strict and sloppy readings is a typical property of sluicing in English.

(29) English[5]

John wondered which novel he should buy, and Bill wondered which dictionary.
a. Strict reading: Bill wondered which dictionary he (John) should buy.
b. Sloppy reading: Bill wondered which dictionary he (Bill) should buy.

(30) English
'Tom knows why he was scolded, but John does not know why.'
a. Strict reading: John also knows why he (Tom) was scolded.
b. Sloppy reading: John also knows why he (John) was scolded.

  In Korean, however, there is asymmetry between *wh*-argument sluicing and *wh*-adjunct sluicing with respect to the presence of strict and sloppy readings. First, sluicing of *wh*-arguments in Korean exhibits only a strict reading; the sloppy reading is missing, as shown in (31).

(31) Korean
cyan-un   ku-ka   etten soselchayk-ul   sayahanun-ci kwungkumhayss-ko,
John-Top he-Nom which novel.book-Acc   should.buy-C wondered-and
pil-un   kukey/*pro*   etten sacen-in-ci   kwungkumhayss-ta.
Bill-Top that/*pro*   which dictionary-be-C   wondered-Dec
'John wondered which novel he should buy, and Bill wondered which dictionary.'
a. Strict reading: Bill wondered which dictionary he (John) should buy.
b. *Sloppy reading: Bill wondered which dictionary he (Bill) should buy.

  In contrast, the sluicing of *wh*-adjuncts exhibits both strict and sloppy readings.

(32) Korean
Tom-un   ku-ka   wai   honnatessnun-ci alchi-man,
Tom-Top   he-Nom   why   scolded-C   know-but,
cyan-un   kukey/*pro*   wai-in-ci   molun-ta.
John-Top   that/*pro*   why-be-C   not.know-Dec
'Tom knows why he was scolded, but John does not know why.'
a. Strict reading: John also knows why he (Tom) was scolded.
b. Sloppy reading: John also knows why he (John) was scolded.

If the current analysis is on the right track, future research should reveal an explanation for this asymmetry with respect to strict and sloppy readings in Korean sluicing.

6. Conclusion and Further Implication

In this paper, I have proposed that sluicing in Korean is base-generated with a

silent *pro*-form, which tells us that sluicing in Korean is a kind of pseudo-sluicing since it does not in fact involve any process of movement or deletion.

  To conclude, if the current account is correct, it raises expectations as to the existence of cross-linguistic patterns of sluicing constructions, since sluicing in Korean patterns together with that of Chinese (Adams 2004). More broadly, if sluicing constructions are universally attested across languages, the question raised is why sluicing in Korean is base-generated, while sluicing in English cannot be analyzed in the same way (e.g. Merchant 2001). It might be because Korean is a subject *pro*-drop language, and so this *pro*-dropping also takes place in sluicing constructions in Korean; in contrast, English is a non-*pro*-drop language, and so sluicing constructions in English cannot be captured with the same analysis as in Korean.

Acknowledgements

Notes

[1] The allomorphs of the nominative markers are phonologically conditioned: if the NP ends with a consonant, i is used, and if the NP ends with a vowel, ka is used. [2] The allomorphs of the accusative markers are phonologically conditioned: if the NP ends with a consonant, ul is used, and if the NP ends with a vowel, lul is used. [3] The allomorphs of the dative markers depend on the animacy of the complement NP: if the NP encodes an inanimate entity, ey is used, and if the NP encodes an animate entity, eykey is used. [4] Cho (1995) describes a different type of complementizer in Korean; it is noted that ci is used to mark the meaning of suspicion. [5] Examples are adapted from Adams (2004).

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Phasehood in Applicatives[*]
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1. Introduction

In this paper, I discuss two proposals regarding the applicative and phasehood. In McGinnis (2001), the high Applicative projection has been proposed to be a phase in order to explain possible DO extraction in the Kinyarwanda Benefactive applicative construction. However, in Lee-Schoenfeld (2008), the high Applicative projection cannot be a phase. Otherwise, the NP Case cannot be licensed by the *v* head in the German unaccusative AcI construction. I argue that the above conflict is only apparent. Although both constructions involve the high ApplP, they show major structural differences. While the Kinyarwanda Benefactive applicative construction involves a Thematic Applicative, the German unaccusative AcI construction involves a Raising Applicative (cf. Georgala 2010 and Georgala, Waltraud and Whitman 2008). With the definition that phasehood is only compatible with the Thematic Applicative, we can then explain the seemingly contradictory conclusions drawn by McGinnis (2001) and Lee-Schoenfeld (2008). The current study also discusses the formation of phasehood and may shed light on the core of Phase Theory (Chomsky 2000, 2001a and 2001b).

2. The Applicatives

The applicative projection [ApplP] introduces an additional argument into verbal argument structures (cf. Marantz 1993, McGinnis 2001, McGinnis and Gerdts 2004 and Pylkkänen 2008, among others). In addition, these applied NPs can be interpreted as a beneficiary, malificiary, instrument, location and so forth (via theta-role assignment by McGinnis 2001). In example (1), the main verb is a transitive verb, but here it takes three arguments. Note that the NP *old woman* is not a verbal argument. Semantically, however, this NP seems to relate to the whole VP. Under the ApplP analysis, the NP *old woman* is said to be located at Spec, ApplP, and it is interpreted as a beneficiary (see translation).

(1) Venda

    Nd-o-tandulela   tshimu   ya   mukegulu.
    1SG-PAST-survey   old.woman   the   field
    'I surveyed the field for the old woman.'

                                      (Pylkkänen 2008: 19)

  The applicatives can be divided into high and low applicatives according to their different properties. The one in example (1) is a high applicative, as illustrated in (2). The high ApplP is located right above VP, and it denotes a thematic relation between an applied argument and the event described by the verb (i.e. an event and an individual). This then explains why we can interpret the NP *old woman* as a beneficiary who benefits from the event of surveying the field.

(2)

the High ApplP
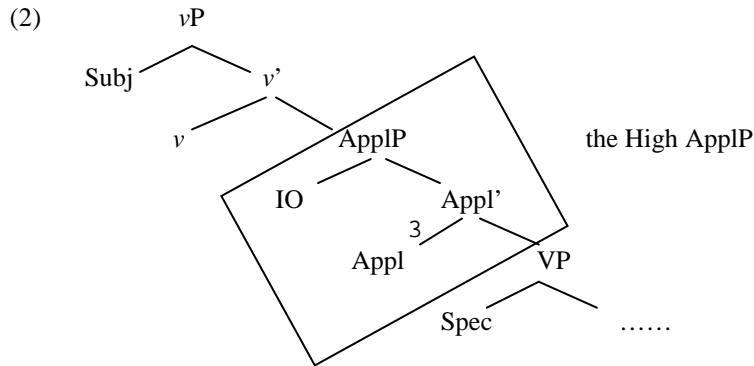
  On the other hand, the applicative illustrated in (3) is a low Applicative. The low applicative head combines with the direct object (the VP domain), and it denotes a transfer-of-possession relation between two individuals. That is, it asserts that the direct object is transferred to the possession of the indirect object from the Subject.

(3)
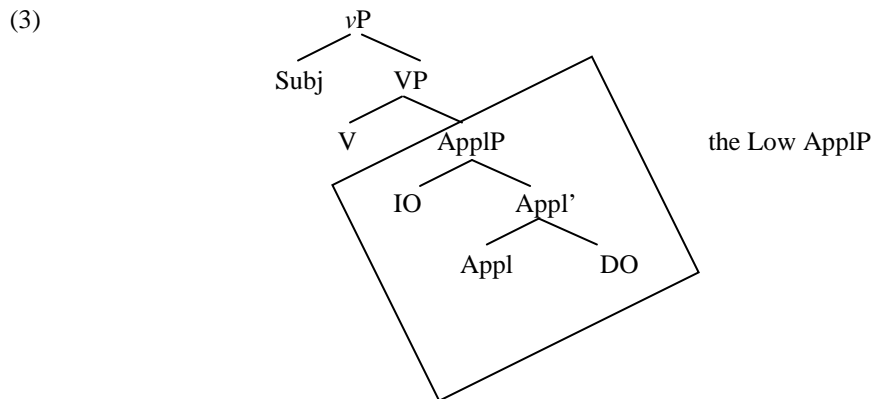
the Low ApplP

A typical example employing the low ApplP can be seen in (4).

(4) Jack baked Rose a cake.

Originally the direct object in the VP domain is the NP *a cake*. In this example, *Rose* is the applied NP, introduced by the low ApplP, and is interpreted as a recipient.

3. McGinnis (2001)

In recent years, the properties and syntactic interactions of applicatives have been widely discussed. For example, in McGinnis (2001), she discusses the A-movement (passivization) asymmetry in Kinyarwanda applicatives. Her main focus is on Kinyarwanda Benefactive and Locative applicatives (Kimenyi 1980). As observed in Kimenyi (1980), the Kinyarwanda Benefactive applicative allows both IO and DO passivization, as shown in (5) and (6).[1]

(5) Umukoôbwa$_i$ a-ra-andik-ir-w-a   t$_i$ íbárúwa
     n'ûmuhuûngu.
      girl   SP-PR-write-APPL-PAS-ASP   letter   by boy
      'The girl is having the letter written for her by the boy.'
                                                          (Kimenyi 1980: 3c)

(6) Íbárúwa$_i$ i-ra-andik-ir-w-a   umukoôbwa t$_i$ n'ûmuhuûngu.
     letter   SP-PR-write-APPL-PAS-ASP girl   by boy
     'The letter is written for the girl by the boy.'
                                                          (Kimenyi 1980: 3b)

On the other hand, the Locative applicative allows only the IO passivization, but not DO passivization, as shown in (7) and (8).

(7) Ishuûri$_i$ ry-oohere-j-w-é-ho   t$_i$ igitabo   n'úúmwáalímu.
     school   SP-send-ASP-PAS-ASP-LOC   book   by teacher
     'The school was sent the book by the teacher.'
                                                          (Kimenyi 1980: 19c)

(8) *Igitabo$_i$ cy-oohere-j-w-é-ho   ishuûri   t$_i$ n'úúmwáalímu.
      book   SP-send-ASP-PAS-ASP-LOC   school   by teacher
     'The book was sent to school by the teacher.'
                                                          (Kimenyi 1980: 24)

McGinnis's (2001) proposal to explain the above A-movement asymmetry is to combine the applicative with phasehood. First, she proposes that the benefactive applicative and locative applicative involve different applicative projections. While the former involves a high ApplP, the latter involves a low ApplP. Moreover, McGinnis gives the following definition in (9) for phasehood.

(9) The sister of VP heads a phase if an argument is generated in its specifier.
                                        (McGinnis, 2001:7)

This definition includes not only the *v*P as a phase (Chomsky 2000, 2001a, and 2001b), but also the high ApplP as a phase. Note that the *v* and the ApplH can head phases since they have an argument generated in their specifier (Subject and the applied NP respectively) and they are sisters of VP. Recall that the high ApplP is located right above VP. Hence in (10a), the phase is the high ApplP. But in the structure (10b) which involves the low ApplP, the phase is still *v*P. In both structures the spell-out domain is still VP.
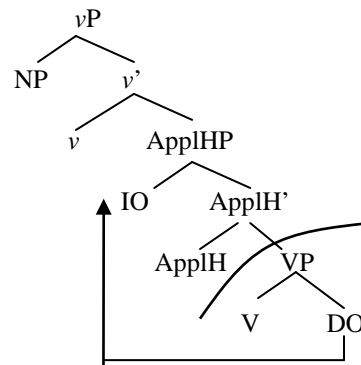
(10)   a. High ApplP   b. Low ApplP
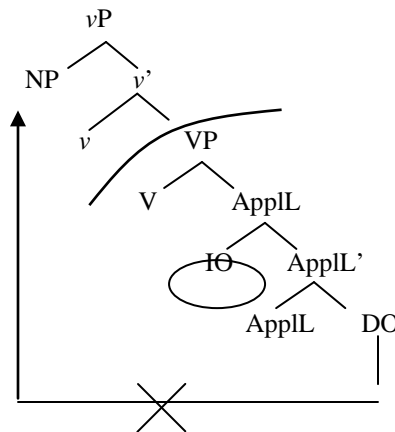
Since the benefactive applicative in Kinyarwanda involves a high ApplP, which is a phase with an EPP feature, the IO and the DO may undergo movement via the edge of the ApplHP. On the other hand, since the Locative applicative in Kinyarwanda is proposed to involve a low ApplP, which is not a phase and has no EPP feature, the movement of the DO is blocked by the IO since the IO is closer to the EPP feature on *v*P. With the above explanation, the A-movement asymmetry in the Kinyarwanda Benefactive and Locative applicative is nicely captured by combining the applicative and phase theories.

4. Lee-Schoenfeld (2008)

Another proposal concerning both the applicative and phasehood is that of Lee-Schoenfeld (2008). She proposes a phase-based account for the binding phenomena in German. The major proposal is that movement and anaphoric relations are governed by phase. In other words, the binding domains correspond to phases. First of all, in the following German Possessor Dative Construction [PDC] example (11), the anaphor "self" can be bound by both Subjects "Martin" and "Thorsten". This is not surprising if "self" is a long distance anaphor. However, the pronoun can only be bound by the higher Subject, but not by the Subject at Spec, DP.

(11) Martin$_i$ hört   nicht   gern   [$_{DP}$ Thorstens$_j$ Geschichten
     Martin   hears   not   with-pleasure   Thorsten's stories
     über sich$_{i/j}$/ihn$_{i/*j}$].
     about self/him
     'Martin doesn't like to hear Thorsten's stories about himself/him.'
                                                    (Lee-Schoenfeld 2008: 288)

   According to Binding Principle B, the pronoun must be free in its binding domain. Based on the binding facts in (11), it seems that the binding domain of the pronoun is the whole DP, which has to be a phase under Lee-Schoenfeld's proposal. She then proposes that a DP needs to be complex (i.e., have a specifier that is filled with at least a covert possessor/Subject) in order to become a phase. In Example (11), the DP does have an overt Subject. Hence, it becomes a phase, and the pronoun cannot be bound by the closest Subject.
   On the other hand, in example (12), there is no overt Subject in the DP. The binding domain then has to be the whole sentence. The pronoun therefore cannot be co-indexed with the main Subject.

(12) Martin$_i$ hat   [$_{DP}$ Angst vor sich$_i$ (selbst) / ihm$_{*i}$].
     Martin   has   fear   of   self (emphatic) / him
     'Martin is afraid of himself.'
                                                    (Lee-Schoenfeld 2008: 289)

   Although it might seem that the above contrast between (11) and (12) could be explained by the Specified Subject Condition (Chomsky 1973), it is in fact not a sufficient explanation. Consider the following binding facts in Preposition Phrases. In both examples (13) and (14), there are no Subjects in the PPs. But the binding facts show that the PP is not the binding domain in (13), while the one in (14) has to be a binding domain.

(13) Welches   kleine   Boot   lies   er$_i$ einfach [$_{PP}$ neben
     which   little   boat   let   he   simply   next-to
     sich$_i$/ihm$_i$] untergehen?
     self/him   under-go
     'Which little boat did he simply let sink next to him?'

(14) Die Frau$_i$ interessiert   sich   nur   [$_{PP}$ für sich$_i$ (selbst) /sie$_{*i}$].
     the woman interests   self   only   for self (emphatic)/her
     'The woman is only interested in herself.'

<div align="right">(Lee-Schoenfeld 2008: 292)</div>

Lee-Schoenfeld proposes that only theta-independent PPs are phases/binding domains. The PP in (13) is like an Adjunct; hence, it is theta-independent and is a phase/binding domain. The pronoun can be bound by the NP outside the PP. In example (14), the PP is related to the verb "interest"; therefore, it is theta-dependent. The theta-dependent PP is not a phase/binding domain, and the bound pronoun in (14) is therefore not acceptable.

In addition to the well-known vP and CP phases, Lee-Schoenfeld has shown that PP and DP can be phases under certain circumstances. To capture the whole story of phasehood in all phases, Lee-Schoenfeld proposes the following rules in (15) to define phases:

(15) Candidates and conditions for phasehood:
    a. A phrase of type α, with α, being v, D, P, or C, that is saturated and topmost is a phase.
    b. A phrase of type α is saturated if it has the maximum number of arguments that lexical items of type α can in principle take.
    c. A phrase of type α is topmost if it is not itself the complement of a phrase of type α.

Rule (15a) establishes possible phase candidates and conditions for phasehood, and Rules (15b and c) clarify these conditions. As one can imagine, the requirement to saturate a phrase is to make sure that the Specifier position of this phrase is occupied by a certain phrase. Among these rules, rule (15c) is designed to exclude the possibility of the high ApplP being a phase. In the following German unaccusative AcI construction (16) (Lee-Schoenfeld 2008: 295), we can see that there is a high ApplP (= vP(aff)) right above VP (= vP(def)).

(16) Der kleine Junge [$_{vP\ (agent)}$ lässt [$_{vP\ (aff)}$ [$_{NP}$ seinem Freund]$_i$
     the   little   boy   lets   his   friend.dat
     [$_{vP(def)}$ den Stein   auf   t$_i$ den Kopf   fallen]]].
          the rock.acc on   the head   fall
     'The little boy lets the rock fall on his friend's head.'

Although Spec, ApplP is saturated by the NP "his friend", it is not the topmost phrase of *v*P. Hence the phase here is *v*P (agent), the topmost *v*P. The *v* head in *v*P (agent) then licenses the Accusative case on the NP "the rock", within a single phase. If the *v*P (affe) is a phase, the Agree relationship between the *v* head and the NP "the rock" cannot be established. In order to exclude this potential problem in (16), we therefore need (15c) to rule out the possibility of high ApplP being a phase.

5. The Reconciliation and the Consequences

When we compare the above two discussions, which both concern applicatives and phasehood, it seems that we have a contradiction. According to McGinnis (2001), the high ApplP has to be a phase in the Kinyarwanda Benefactive applicative. However, Lee-Schoenfeld (2008) shows that the ApplP cannot be a phase in the German unaccusative AcI construction.

I propose that these conflicting conclusions about the high ApplP's status as a phase can be reconciled if we combine the definitions of phase in the above two proposals and distinguish the structures of the Kinyarwanda Benefactive applicative from the German unaccusative AcI construction. This reconciled version of phasehood, shown in (17), combines the saturation proposal from Lee-Schoenfeld (2008) and the base-generation proposal from McGinnis (2001).

(17) The Reconciled version:
  a.   A phrase of type α, with α being *v*, D, P, or C, or <u>ApplH</u>, that is saturated, is a phase.
  b.   A phrase of type α is saturated if it has the maximum number of <u>base-generated</u> arguments that lexical items of type α can in principle take.

This reconciled version deletes Lee-Schoenfeld's third rule (15c) and narrows the condition for being a phase in the second rule (15b). Only when the Specifier of the phrase in question has a <u>base-generated</u> argument can it becomes a phase. This means that if the Specifier of the phrase is occupied by a moved element, it still does not count as a phase.

Structurally, note that there is a salient difference between the Kinyarwanda Benefactive construction and the German unaccusative AcI construction. The applied NP in the former is derived by base-generation, while the applied NP in the latter is derived by movement (possessor raising). Let us first take a small detour to differentiate between these two different applied NPs before proceeding further. Recall that in a typical structure involving an ApplP, the applied NP is a base-generated one, such as in the Venda example repeated here as (18).

(18) Venda

    Nd-o-tandulela   tshimu   ya   mukegulu.   (= (1))
    1SG-PAST-survey   old.woman   the   field
    'I surveyed the field for the old woman.'

                                          (Pylkkänen 2008: 19)

    However, the possibility that we can have moved applied NPs might also exist. Georgala (2010) and Georgala, Waltraud and Whitman (2008) propose that in the "having"-type double object constructions in German, like (19), the indirect object moves from Spec, VP to Spec, ApplP because of the obligatory EPP feature on Appl.

(19) dass Eva   dem   Kind   eine   Email   schickte
     that Eva.NOM   the.DAT   child.DAT   an.ACC   email.ACC   sent
     'that Eva sent the child an email.'

                                          (Georgala 2010: (1))

(20)
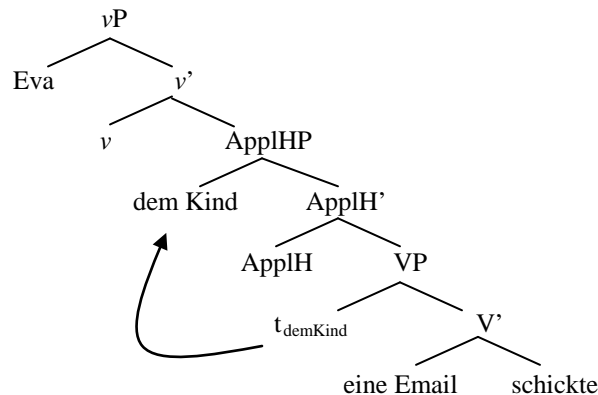
    The relevant supporting evidence is shown in (21) and (22) respectively. The positions of adverb and negation markers indicate that the IO has been out of the VP domain.

(21) Frequency adverbs:
    Jan   hat ihr   drei Mal   die gleiche   Email   geschickt
    Jan.NOM   has her.DAT   trhee times   the.ACC same.ACC   email.ACC   sent
    'Jan sent her the same email three times.'

(22) Sentential negation:

Sie	hat	dem	Jungen	(nicht)	das	Buch	(nicht)	gegeben
she	has	the.$_{DAT}$	boy.$_{DAT}$	(not)	the.$_{ACC}$	book.$_{ACC}$	(not)	given

'She did not give the book to the boy.'

(Georgala 2010: 9)

In contrast to the base-generated "Thematic Applicative," this applied IO is called an "Expletive/Raising Applicative" under their analysis. The differences between the Thematic Applicative and Expletive/Raising Applicative are summarized in (23) and (24).

(23) Thematic Applicative Structure:
Applicative argument is introduced in ApplP.
[$_{ApplP}$ Benefactive [$_{Appl'}$ Appl [$_{VP}$ V Theme]]]

(24) Expletive/Raising Applicative Structure:
Appl licenses an argument in VP.
[$_{ApplP}$ Recipient$_i$ [$_{Appl'}$ Appl [$_{VP}$ t$_i$ [$_{V'}$ V Theme]]]]]

Based on (23) and (24), the high ApplP in the Kinyarwanda Benefactive applicative construction can count as a phase. Recall that it has a base-generated argument beneficiary at Spec, ApplP. On the other hand, the high ApplP in the German unaccusative AcI construction is not a phase. The Spec, ApplHP is occupied by a moved argument IO; hence, the high ApplP in the German unaccusative AcI construction does not constitute a phase according to the revised phasehood definition in (17).

To summarize, if we adopt the distinction between the Thematic and Raising applicative, Rule (15c) can arguably be eliminated, and the apparent conflict about the phasehood of the high ApplP can be resolved.

Finally, I would like to tentatively propose a revised definition of phasehood that eliminates the necessity of listing potential phrase candidates. The essential requirement for any phrase to be a phase is to be saturated.[2]

(25) Revised Conditions for Phasehood:
a.   A phrase of type α that is saturated is a phase.
b.   A phrase of type α is saturated if it has the maximum number of base-generated arguments that lexical items of type α can in principle take.

There are three consequences that I can think of according to the above simplified rules. First, the binding fact in German presented by Lee-Schoenfeld (2008) can still be generalized, including DP, PP, *v*P and CP. For DP and *v*P, since they in principle can take two arguments, as long as these two argument positions are saturated, the whole phrase becomes a phase. As for CP and PP, following Lee-Schoenfeld (2008), I assume that they take maximally one semantically selected argument. Once this requirement is fulfilled, they can become a phase.

Second, the current proposal predicts that the low ApplP is a phase, which seems to contradict to McGinnis (2001). As one can see, the low ApplP has both its Specifier and Complement occupied by arguments. Since all positions are saturated, the low ApplP should be a phase. But recall that in McGinnis (2001), the DO cannot move out of the low ApplP in the Kinyarwanda Locative applicative construction. If the low ApplP is a phase, the DO should be able to make use of the edge of the low ApplP as an escape hatch. However, there is a solution to this apparent contradiction. As pointed out by Lee (2005), movement out of low ApplP is ruled out by the anti-locality proposal (cf. (26)) by Abels (2003). This constraint prohibits a movement from the Complement position to the Specifier position of the same phrase.

(26) Anti-locality constraint: *$[_{XP}$ YP$_i$ X   t$_i$]   (Abels 2003: 12)
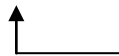
Therefore, even if the low ApplP is a phase and has an optional EPP feature, the DO movement from Complement to Spec of the low ApplP is banned.

Third, it is well-known that IP is not a phase. According to the current phase definition, IP indeed is not a phase. Following the VP-internal Subject hypothesis, the Subject in Spec, IP is derived by movement. Hence, like the German unaccusative AcI construction, it can never constitute a phase.

6. Discussion and Conclusion

In this paper I discuss the issue of whether the high ApplP is a phase or not. I compare two proposals concerning applicatives and phasehood: McGinnis's (2001) discussion of Kinyarwanda applicative constructions and Lee-Schoenfeld's (2008) discussion of German binding phenomena. Once we distinguish the Thematic applicative from the Raising applicative, a reconciled phase proposal can solve the seeming conflict between McGinnis (2001) and Lee-Schoenfeld (2008).

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Although I have proposed a revised version of phasehood, this redefinition needs further exploration to verify its legitimacy. In contrast to Chomsky's (2000, 2001b) proposal that a phase is a proposition, the current version resorts to the CFC concept to define phasehood, which can be traced back to the original binding stories in the GB era. To test these two versions of phase theory (the current proposed theory and Chomsky's theory, or more generally a CFC-based theory or a proposition-based theory) should be a major goal of future syntactic research.

Notes

[1] There are two other differences of the Kinyarwanda Beneficiary and Locative applicatives: Transitivity and pronoun incorporation. The reader is referred to McGinnis (2001) for details.
[2] As noted by Lee-Schoenfeld (2008), her original version basically adopts the concept of Complete Functional Complex (CFC). The current tentative version, which adopts the saturation requirement, is in line with the notion of CFC.

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NP Ellipsis and the Presence of Definite Determiners with Possessors in Portuguese

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1. Introduction

In Portuguese, a definite determiner in a DP such as in (1) is obligatory (European Portuguese in (1a)), optional (Brazilian Portuguese in (1b)) and absent (Brazilian Portuguese in (1c)), depending on the dialect:[1,2]

(1) a. *(O) meu amigo saiu. (EP)
   b. (O) meu amigo saiu. (BP1)
   c. (*O) Meu amigo saiu. (BP2)
       The my friend left
        'My friend left'

  However, when the possessive co-occurs with an elided NP, the variation seen in (1) disappears: the determiner becomes obligatory in the three dialects:

(2) a. *(O) seu amigo saiu e *(o) meu também. (EP)
   b. (O) seu amigo saiu e *(o) meu também. (BP1)
   c. (*O) seu amigo saiu e *(o) meu também. (BP2)
      The your friend left and the my too
      'Your friend left and mine too'

  This paper provides an account for the asymmetry between (1) and (2), based on the proposal that possessives in the elliptical DPs are post-nominal. Adopting the main insights of previous analysis of phenomena similar to (1) (Longobardi, 1996 and Floripi, 2008), that variation is due to different possible landing sites for the possessive relatively high in the pre-nominal domain, it will be proposed that the low possessors in are invariant because they sit too low, outside the pre-nominal domain of variation.

  Section 2 will show evidence that possessives in elliptical contexts are post-nominal. Section 3 will propose a structure for the variation seen in (1) followed

by an account for why possessives in contexts of ellipsis fail to raise to a pre-nominal position in section 4.

2. NP-ellipsis and Post-nominal Possessives

This section presents evidence that possessives in elliptical constructions are post-nominal, namely, they behave like post-nominal possessives with respect to definiteness, number agreement and coordination and adjective placement.

2.1. Definiteness

Pre-nominal possessors are always definite in the dialects discussed. They never co-occur with indefinite determiners (see Floripi (2008) and Castro (2000, 2006) for extensive discussion and Gonzaga (2004) for additional examples)[3]:

(3) %O/*Um meu amigo
     The/a my friend
     'My friend'/'a friend of mine'

(4) *Tem meu livro na mesa.
     Have my book in-the table
     'There is my book on the table.'

  However post-nominal possessives can be indefinite and co-occur with indefinite determiners:

(5) Um/*o amigo meu
     A/the my friend
     'A friend of mine' /'my friend'

(6) Tem um livro meu na mesa.
     Have a book my in-the table
     'There is a book of mine on the table.'

  Note that post-nominal possessives can also co-occur with definite determiners, as in the relative clause below:

(7) O amigo meu que fala inglês chegou
     The friend my that speaks English arrived
     'My friend who speaks English arrived'

  As with post-nominal possessives, possessives in elliptical DPs can appear in

indefinite contexts:

(8) Um amigo meu
    A my friend
    'A friend of mine'

(9) Tem um meu na mesa.
    Have a my in-the table
    'There is one of mine on the table.'

  As with post-nominal possessives, it can also occur in definite DPs such as those with relative clauses:

(10) %O seu amigo americano chegou, mas o meu que fala inglês não.
     The your friend american arrived but the my that speaks English no
     'Your american friend has arrived but mine who speaks
      English hasn't.'

  Thus, we find that the cases with ellipsis follow the post-nominal pattern, rather than the pre-nominal pattern of definiteness.

2.2. Agreement

As discussed in Guy (1981), Scherre (1996), Naro and Scherre (2007), among others, in certain dialects of Brazilian Portuguese, plural DPs may only display plural marking on the determiner (and other pre-nominal elements), without any overt plural marking on the noun:

(11) Uns/Os amigo
     A-pl/The-pl friend
     'Some/The friends'

(12) *Um/*O amigo*
     A/The friend
     'Some/The friend'/*'The friends'

  Costa and Silva (2006), note that in plural possessive DPs the possessive can carry the plural morpheme instead of the determiner:

(13) O meus amigo
     The my-pl friend
     'My friends'

Costa and Silva's observation applied only to DPs where the possessive is pre-nominal. In cases of post-nominal possessives, the determiner must bear the plural morpheme:

(14) *Um amigo meus
     A friend my-pl
     'Some friends of mine'

(15) Uns amigo meu
     A-pl friend my
     'Some friends of mine'

Compare this with cases where there is ellipsis:

(16) *O/Um meus
     The/a my-pl
     'Mine(pl)'

(17) Os/Uns meu
     The-pl/A-pl my
     'Mine(pl)'

Ellipsis cases pattern with the post-nominal possessives again, as the plural marking is obligatorily on the determiner.

2.3 Coordination

Pre-nominal possessives cannot be coordinated:

(18) *O meu e seu amigo
     The my and your friend
     'My and your friend'

However, post-nominal possessives can be coordinated:

(19) Um amigo meu e seu
     A friend my and your
     'A friend of mine and yours'

In elliptical DPs, possessives can be coordinated:

(20) Um meu e seu
     A my and your

'Mine and yours'

  Thus, as it was the case for definiteness and agreement possessives in elliptical possessors behave as post-nominal possessives.

2.4. Presence of the determiner

Having seen independent cases where possessives in elliptical DPs behave as post-nominal DPs, we can return to consider the ellipsis cases in (2) in the same terms. Recall that the pre-nominal possessives in (1) were subject to dialectal variation. In the examples involving ellipsis (2) variation disappeared as all dialects required a determiner:

(21) %(O) meu amigo que fala inglês saiu.
     The my friend that speaks English left
     'My friend who speaks English left.'

(22) *(O) amigo meu que fala inglês saiu.
     The friend my that speak English left
     'My friend who speaks English left'

  Compare these two cases with the post-nominal possessive below:

(23) %(O) seu amigo americano chegou mas *(o) meu que fala inglês saiu.
     The your friend American arrives but the my that speaks English left
     'Your American friend arrived but mine who speaks English left'

  In both ellipsis and post-nominal cases variation disappears (the determiner is obligatory), in contrast to pre-nominal possessives where there is variation. Again, elliptical cases pattern with post-nominal cases.
  The following table summarizes the facts covered so far in section 2:

Table 1: Comparison between pre-nominal, post-nominal and elliptical possessive

	Pre-nominal	Post-nominal	Ellipsis
Indefinite	*	√	√
Coordination	*	√	√
Pl on poss only	√	*	*
D+Poss variation	√	*	*

Given this evidence, I propose that possessives in elliptical DPs are in fact post-nominal. The last subsection of this section will show an additional piece of supporting data considering a prediction of this proposal.

2.5. Adjective placement

The adjective *pobre* ('poor') means something to the effect of 'unfortunate', though not necessarily financially poor pre-nominally. Post-nominally, it means the opposite of rich (financially poor). These two meanings can be seen in (24) and (25) respectively:

(24) A minha amiga pobre teve que ficar em casa para economizar
       dinheiro.
     The my friend poor had that stay at home to save
       money
     'My (financially) poor friend had to stay home to save money.'

(25) A minha pobre amiga (rica) teve que ficar em casa para administrar
       os seus milhões de dólares.
     The my poor friend rich had to stay home to administer
       the her millions of dollars
     'My poor (rich) friend had to stay home to administer her millions of
       dollars.'

In light of the proposal that possessives co-occurring with ellipsis are post-nominal, the behavior of this adjective leads to a prediction. Since the possessive *minha* precedes the adjective *pobre*, if the possessive in elliptical DPs is indeed post-nominal, *pobre* must also be post-nominal in ellipsis. Thus, we only expect the post-nominal meaning to be available in these cases. This prediction is borne out:

(26) ?*A sua amiga veio, mas a minha pobre teve que ficar em casa para
       administrar os seus milhões de dólares.
     The your friend came but the my poor had to stay home to administer
       the her millions of dollars
     'Your friend came, but poor mine had to stay home to administer her
       millions of dollars.'

(27) A sua amiga rica veio, mas a minha pobre teve que ficar em casa para
       economizar dinheiro.
     The my friend poor had that stay at home to
       save money
     'My (financially) poor friend had to stay home to save money.'

This contrast in the elliptical cases can be accounted for if possessives in elliptical contexts are taken to be post-nominal, but is unexpected otherwise.

This section empirically supported the proposal that elliptical possessives are post-nominal. The next section builds on this proposal to provide and account for contrast between (1) and (2).

3. Analysis

This section accounts for the contrast in (1) and (2) by adopting a structure for pre-nominal variation in non-elliptical DPs, followed by an analysis of the post-nominal status of possessives in elliptical DPs.

3.1. Pre-nominal variation

Floripi's (2008) follows insights by Longobardi (1994, 1996, 2000) that in D is sometimes filled by lower nominal material (as for example in N to D movement in Italian). She proposes that in Classical Portuguese and Brazilian Portuguese, the possessive raises to the DP domain (to D, in her approach), with no other determiner with the possessive. In modern European, where there is co-occurrence, the determiner appears in D and the possessive raises to a position just below D.

 I adopt Floripi's main insight that variation is due to movement of the possessive to either the DP domain or to a position just below the DP level, recasting her insights in terms of phrasal movement (for a cleaner account of post-nominal possessives in section 2.2).[4] Adopting the same fairly standard structure for the DP as Floripi (see also Koppen and Cover (2010), Schoorlemmer (1998), and references therein), I propose that the possessive phrase raises from its theta-role position in nP to the specifier of PossP (BP2) or to spec-DP (EP):

(28) Positions for the of the pre-nominal possessive:
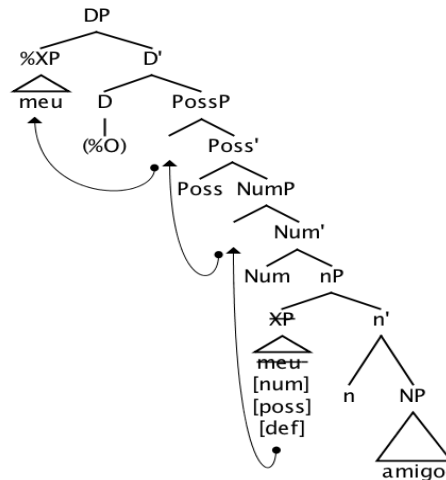
The possessive is merged in spec-nP, its theta position. I assume that the possessive minimally has number and possessive features that it checks in Spec-NumP and Spec-PossP, respectively.

The next move is where dialectal variation occurs. Following Floripi (2008), the possessive in some dialects stops at PossP, having no features to be checked in D. In this case, the definite determiner is the overt head of the DP, just as in ordinary, non possessive DPs. This leads to the co-occurrence of the determiner and the possessive, as in European Portuguese.

However, in some other dialects, the possessive also has a +def feature which needs to be checked in the DP level, so the possessive raises to Spec-DP. I propose that the pronunciation of the D head in this case is blocked by a doubly-filled-COMP effect.[5] Following the idea started in Abney and Szabolcsi's (1987) work and still fruitfully pursued today that the structure of DP parallels CP, I propose that the D is omitted when the possessive is in Spec-DP by a similar process to the omission of the complementizer 'that', when a Wh-word occupies Spec-CP in English and other languages subject to the filter.[6] This leads to the dialects where there is no co-occurrence of determiners with possessives.

I have adopted an account where variation of pre-nominal possessives is analyzed as a difference in how high the pre-nominal possessive has to raise. Under this analysis, the same variation would not be expected in the cases of post-nominal possessives: they are proposed to stay low in the structure, never reaching a height (spec DP) where it could affect the spell out of D. Hence, there is no variation with post-nominal ellipsis cases: in these cases the definite determiner is always overt.

3.2. Ellipsis

Section 1 provided a variety of empirical arguments for the proposal that possessives in elliptical DPs are post-nominal and section 2 showed how this finding can provide an account of the lack of variation in the presence of determiners in NP-ellipsis. In this section I will present an analysis of why elliptical possessors must be post-nominal, based on insights obtained in Cover and van Koppen's (2010) analysis of variation in Dutch DPs.

  Cover and van Koppen (2010) studied variation in determiners, possessives and possessive doubling in 57 dialects of Dutch. In their account of the latter type of ellipsis with no overt NP pro form (akin to Portuguese), they follow Lobeck (1995), Kester (1996), Sleeman (1996) and Schoorlemmer (1998), among others, in the idea that there is an unpronounced NP-pro which replaces the elided noun. Based on extensive comparison of morphological forms and syntactic behavior across dialects, they further propose that this null NP-pro always has to check its features in a Spec-head configuration with certain heads within the DP projection.[7] The identity of the heads that are able to license the null NP-pro is subject to dialectal variation in Dutch. However, in all dialects the *NP-pro* is proposed to raise at least to NumP (and possibly further).

  I will adopt Cover and Koppen's analysis and propose that, as in the Dutch cases with a silent NP-pro, there is a NP-pro that needs to be licensed minimally at spec-DP in all the three dialects of Portuguese examined here.[8,9] This then provides us with an explanation of why there can't be pre-nominal possessives with NP-ellipsis. Pre-nominal possessives are excluded because in elliptical construction both the pre-nominal possessive and the NP-pro would need to be checked in the same position (Spec-NumP), resulting in a crash. This is illustrated in (29):

(29) Pre-nominal possessive and ellipsis:

```
                    DP
                   /  \
                  X    D'
                      /  \
                     D   PossP
                          \
                          Poss'
                         /   \
                       Poss  NumP
                            /   \
                          *↑    Num'
                               /   \
                             Num    nP
                                   /  \
                                  XP   n'
                                 /    /  \
                              meu    n   NP
                               •          \
                                           pro
```
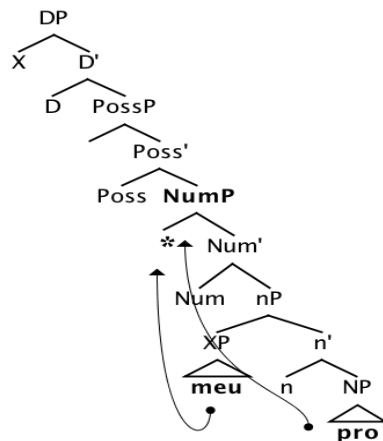
  As it can be seen in (29), a pre-nominal possessive (which needs to check

features in Num, Poss and, in some dialects, D) in ellipsis would correctly lead to a crash in either of the three dialects in this approach.

An assumption of the analysis is that the pre-nominal and post-nominal possessives are crucially different, and have different licensing requirements: the post-nominal possessive does not need to raise to check a feature in Num or Poss and is thus grammatical in elliptical DPs.

Along the lines of Cardinaletti (1998), I suggest that on the one hand the pre-nominal possessive may be 'defective' and thus need to raise to pre-nominal positions to be licensed (possibly akin to object clitics in the clausal domain). On the other hand, the post-nominal possessive has what it needs to stay low. This could be a silent case marker preposition as proposed for other languages by Dielsing (1998) and Kayne (2003).

Thus, although the pre-nominal and post-nominal possessives have the same phonological shape, they are proposed to actually be distinct. The difference is only visible in the syntactic behavior of the two forms in the dialects studies here (see section 2). However it appears that it is indeed overtly manifested in the morphology of at least one dialect of Portuguese. Castro (2000, p. 7) notes that the dialect of European Portuguese spoken in the South of Portugal has different forms for pre-nominal possessives and those in elliptical DPs, with the former being a reduced form. Consistent with the current proposals, this is also true of post-nominal possessives (see Floripi, 2008, p. 85):

(30) a. Viste o [me]/*[mew] filho chegar?
　　　　Saw the my mine son arrive
　　　　'Have you seen my son arrive?'

　　b. Não vi o [tew]/*[te]; só vi o [mew]/*[me]
　　　　No saw the yours your only saw the mine my
　　　　　　　(CASTRO, 2000, p.7, 2006, p. 207)

(31) a. O [me] livro
　　　　The my book
　　　　'My book'

　　b. Um livro *[me]/[mew]
　　　　A book my mine
　　　　'A book my of mine' (FLORIPI 2008, p. 85)

4. Conclusion

This paper discussed an asymmetry between DPs with overt NPs and those with NP-ellipsis, where only the former exhibits dialectal variation with respect to the

presence of definite determiners before possessives. Variation on the presence of determiners with possessives is proposed to be related to how high the possessive raises (spec D or spec Poss P). Possessives in elliptical constructions were proposed to be post-nominal, thus not expected to be affected by dialectal variation. The Portuguese data was consistent with Cover' and Koppen's typology and analysis of Dutch dialectal variation.

Notes

1 I thank Hilda Koopman and the audience at WECOL 2010, especially Chris Golston, Sean Fulop and Jennifer Culbertson the for interesting discussion of related material helpful for this research; Tereza Lima, Camila Santos, Nayara Salbego, Jacqueline Thompson and speakers who completed a related an online questionnaire for judgements. All mistakes are mine.

2 Data for EP was taken mainly from Castro, 2000, 2006 and Floripi, 2008. BP1 grammatical judgments obtained from speakers from Brasília, Minas Gerais, Rio de Janeiro and Bahia. Judgments of BP2 were obtained from speakers from Bahia, Minas Gerais and Pernambuco.

3 Floripi (2008, p.100, citing Miguel, 2002) notes that there are dialects that do allow an specific indefinite to occur with a pre-nominal possessive (I was not able to find a speaker of this dialect):

      (i) Um meu amigo vai oferecer-me um quadro antigo que lhe pedi.
       A my friend go offer-me a painting old that I him asked.
      'A friend of mine will offer me an old painting that I asked him for."

4 My adaptation of Floripi's structure seems identical to of Brito's (2007, p. 44, cited in Floripi, 2008, p. 106) proposal for some dialects of European Portuguese.

5 Although there is a wealth of examples of the doubly-filled-COMP effect in the clausal domain, there is also a wealth of exceptions (e.g. Bianchi, 1999, chapter 7). Often there will be dialectal variation where one language will exhibit the effect and another closely related language will not (Bayer and Brandner). For an approach that derived the doubly-filled-COMP effect from Kayne's (1994) LCA, see Koopman (2000). For an approach that derives it from restrictions on sluicing, see Baltin (2010).

6 Warnasch (2010) provides another example of a proposal of a doubly-filled COMP effect in DP, in his analysis of Arabic construct states.

7 I refer the reader to Cover and Koppen's paper for argumentation. As their discussion involves the comparison of several constructions in several dialects, I will limit my exposition to the main conclusions relevant to the present approach, for reasons of space.

8 The properties of Portuguese are consistent with Cover and Koppen's typology of Dutch dialects. They find two types of dialects. Type 1a dialects are those where the possessive paradigm expresses gender agreement with the possessee for all persons. Type 1b are dialects where gender agreement with the possessee is missing for at least one person in the possessive paradigm. They fond that the presence of a determiner is obligatory in NP-ellipsis in dialects of type 1b. Since the three dialects of Portuguese require a determiner in NP-ellipsis, it would be expected that they were of type 1b. This is indeed the case. The three varieties show possesee gender agreement in the 1st and 2nd possessives:

      (i) A minha/sua casa
       O meu/seu carro.
      However, there are 3rd person possessives that do not:
      (ii) A casa dele
       O carro dele.

9 For a brief discussion of some other the properties of the NP-pro in ellipsis in Brazilian Portuguese, see Lima (2007).

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Phonetic Realization of Focus Particles *Always* and *Only* in Korean: Theoretical Implications of Association with Focus[*]

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1. Introduction

This study addresses the relationship between prosodic features and semantic functions of focus particles (henceforth, FP). Well known as focus-sensitive operators, FPs, such as *only*, are sensitive to the placement of focus as in (1).

(1) a. Jan only gave Bill [money]$_F$.
    (Everything Jan gave Bill was money.)
  b. Jan only gave [Bill]$_F$ money.
    (Everyone Jan gave money was Bill.)   (Beaver et al., 2007)

In (1), focused elements accompanied by prosodic salience are marked by a subscripted F. We can interpret the sentence differently depending on which element is focused. Thus, (1) indicates that the prosodic marking by focus affects truth-conditional meaning, interacting with the FP *only*. In this sense, FPs associate with focus (cf., Jackendoff, 1972; Rooth, 1985). Beaver and Clark (2003) investigated properties of two FPs, *always* and *only*, in terms of how to associate with focus. Even though *always* and *only* are similar in meaning, Beaver and Clark claim that English *always* and *only* and their equivalents in other languages such as German differ in ways of associating with focus. To account for the different behaviors of the FPs, they proposed the Quasi/Free/Conventional theory, a hybrid theory of semantics and pragmatics. This paper explores properties of Korean FPs *hangsang* 'always' and *ocik* 'only' to provide additional support to the cross-linguistic observation by Beaver and Clark. Because focus is closely tied to prosodic salience (cf., Selkirk, 1996; Kadmon, 2001), we conducted a production experiment in order to examine the phonetic realizations of *hangsang* and *ocik*. This experiment is requisite to gain a deep understanding of association with focus from a perspective of prosodic

features of FPs and focus. In this paper, we will show that the phonetic realizations of the FPs *hangsang* and *ocik* reflect their different semantic functions, supporting the Beaver and Clark's theory.

2. *Always* and *Only*

2.1. Background

Beaver and Clark (2003, 2008) examined and compared the two FPs, *always* and *only*, since they are categorized as focus-sensitive operators and normally analyzed as universal quantifiers. The following example illustrates the similarity in their interpretations.

(2) a. Sandy always feeds [Fido]$_F$ Nutrapup.
   b. Sandy only feeds [Fido]$_F$ Nutrapup.
   c. $\forall x$ feed(sandy, x, nutrapup) $\rightarrow x =$ fido
      'Everything Sandy feeds Nutrapup to is Fido.'   (Beaver and Clark, 2003)

Although they are similar in meaning, they behave differently with respect to association with focus. Beaver and Clark (2003, 2008) conducted several tests to clarify the difference, and the results show that *only* needs a prosodic cue to create an association. *Always*, on the other hand, can make an association without any prosodic cues. This paper replicates their reduced pronoun (or leaner), extraction, and ellipsis tests to investigate Korean FPs *hangsang* 'always' and *ocik* 'only'. In the next section, we will provide the results of the tests and show that the Korean FPs behave in the same way as the English counterparts.

2.2. *Hangsang* and *ocik*

In this section, we provide examples of *hangsang* and *ocik* with respect to association with focus, using three tests from Beaver and Clark (2003, 2008). The results from the tests for the English *always* and *only* indicate that *always* shows a free association and *only* has a more restricted association. Among their findings, Beaver and Clark show that English *always* can associate with a reduced pronoun, whereas *only* cannot. This evidence indicates that *always* does not need a prosodic cue to create an association; however, *only* does. Since reduced pronouns are not available in Korean, we substituted pro to investigate the phenomenon in Korean. In (3) and (4), the given context assigns focus on *hangsang/ocik* in a sentence that includes pro.[1] The examples show that *hangsang* can associate with pro but *ocik* cannot.

Context: You had many discussions with Sandy, but what I want to know is the extent to which you talked about Fred. Of all the times you talked with Sandy, how often was Fred the person you talked about?

(3) *Na-nun   [hangsang]_F   Sandy-wa   <u>pro</u> tholon-ha-yess-ta.*
   I-Top   always   Sandy-with   discuss-do-Pst-Decl
   'I always discussed'im with Sandy.'
   (Whenever I discussed someone with Sandy, I discussed Fred.)

(4) #*Na-nun   [ocik]_F   Sandy-wa   <u>pro</u> tholon-ha-yess-ta.*
    I-Top   only   Sandy-with   discuss-do-Pst-Decl
    Cannot mean: 'I only discussed Fred (and no one else) with Sandy.'

  Given the evidence presented in (3) and (4), we claim that the properties of *hangsang* and *ocik* are the same as their English counterparts in Beaver and Clark (2003, 2008). *Hangsang* does not need a prosodic cue to create an association, in contrast to *ocik*, which does need a prosodic cue.
  The second test, extraction, clarifies the difference between *hangsang* and *ocik*. In the context described below, (5) shows that *hangsang* can associate with the extracted element. The interpretation (5a) that is true in the given context is available. Alternatively, *ocik* cannot create such an association, and the interpretation that is true as in (6a) is not available. These results are the same as their English counterparts.

Context: I have two roommates, Kim and Sandy. I always stock their fishtanks. I stock Sandy's fishtank with goldfish and nothing else. I stock Kim's fishtank with goldfish and with clownfish.

(5) *Kimssi-uy ket-un   nay-ka hangsang clownfish-lo   chaywu-nun*
   Kim-Gen thing-Top I-Nom always   clownfish-with stock-Comp
   ehang-ita.
   tank-Decl
   a. 'I said I stock Kim's and no other tank with clownfish.' [TRUE]
   b. 'I said I stock Kim's tank with clownfish and nothing else.' [FALSE]

(6) *Kimssi-uy ket-un   nay-ka ocik clownfish-lo   chaywu-nun ehang-ita.*
   Kim-Gen thing-Top I-Nom only clownfish-with stock-Comp tank-Decl
   a. *'I said I stock Kim's and no other tank with clownfish.' [TRUE]
   b. 'I said I stock Kim's tank with clownfish and nothing else.' [FALSE]

  Using the ellipsis test, Beaver and Clark (2008) have shown that English *always* can associate with the elided element in contrast to *only*. The following examples show that *hangsang* and *ocik* behave the same as English under the

same condition.

Context: At the meeting, some people prepare their presentation and others clean up the table. Some do both. What about Yenghuy and Chelswu?

(7) *Yenghuy-ka   hangsang   palphyo-lul   cwunpi-ha-ki*
　 Yenghuy-Nom always   presentation-Acc   prepare-do-Nominal
　 ttaymwuney Chelswu-to   hangsang kulehkey hap-ni-ta.
　 because   Chelswu-too always   so   do-Hon-Dec
　 'Because Yenghuy always prepares a presentation, Chelswu always does so.'
　 (Chelswu prepares a presentation at every meeting because Yenghuy prepares a presentation at every meeting.)

(8) #*Yenghuy-ka   ocik palphyo-lul   cwunpi-ha-ki   ttaymwuney*
　 Yenghuy-Nom only presentation-Acc prepare-do-Nominal because
　 Chelswu-to   ocik kulehkey hap-ni-ta.
　 Chelswu-too only so   do-Hon-Dec
　 'Lit. Because Yenghuy only prepares a presentation, Chelswu only does so.'
　 (cannot mean: 'Chelswu prepares a presentation (and does nothing else) because Yenghuy prepares a presentation (and does nothing else).')

  Thus, these three tests indicate that the Korean *hangsang* and *ocik* behave the same as the English *always* and *only*. *Hangsang* is able to create an association freely, and *ocik* has a more restricted association. In the next section, we will briefly introduce a theory of focus by Beaver and Clark (2008), which provides an explanation of how *always* and *only* form their associations with focus differently.

2.3. Theory of association with focus

Previous studies have argued that either pragmatics or semantics should explain the way in which focus-sensitive operators associate with focused elements (e.g., Rooth, 1992, 1996a; von Fintel, 1994; Lambrecht, 1994). Beaver and Clark (2008) proposed a hybrid theory of semantics and pragmatics called the Quasi/Free/Conventional (QFC) theory, which is equivalent to an "intermediate theory" of focus discussed by Rooth (1992). They claim that associations of *always* and *only* with focus are formed differently, as we observed with the Korean examples in the previous section. This approach stipulates the different properties of *always* and *only*, dividing FPs into subsets, which contrasts with previous analyses that make no difference in treatment of FPs (e.g., Rooth, 1992, 2010; Büring, 2008). In the QFC theory, the function of *always* is categorized as free association, constructing an association with contextually

salient sets of events or situations. *Only*, on the other hand, functions as conventional association, which constructs an association based on a lexically-encoded dependency on focus. The semantic formulae for the two FPs by Beaver and Clark are given in (9) and (10).[2]

(9) **Always**: free association
   Truth conditions of *NP always VP*: $\forall e\ \sigma(e) \rightarrow\ \exists e'\ \rho(e, e') \wedge q(e')$

(10) **Only**: conventional association
   Truth conditions of *NP only VP*: $\forall e\ p(e) \rightarrow\ q(e)$
σ = a function which identifies a context
ρ = a function which maps an events to events
p = a meaning of *NP VP* minus content related to any focused parts of the VP
q = an ordinary meaning of a sentence *NP VP*

<div align="right">Beaver and Clark (2003, 2008)</div>

As described in (9), the QFC theory, a mixture of semantics and pragmatics, accounts for the free association of *always* making use of contextual variables σ and ρ bound by a given context. Since *always* associates with an element that is salient in the given context, it does not need an element to be associated to in its domain. In contrast, *only* needs an element to be associated in its domain as stipulated in (10). Their analysis implies that prosodic salience of a focused element is requisite for *only* to create an association. Prosodic salience is not necessary for *always*, in contrast, because *always* takes a contextually salient element to create an association. Our assumption based on this analysis is that the conventional association for *only* and the free association for *always* should be reflected in their phonetic realizations. On the basis of this assumption, we conducted a production experiment, which we will present in the next section.

3. Production Experiment

3.1. Stimuli

Three sets of data served as stimuli. The first set was given without context. The second set was preceded by a prompt question. The third set was provided with a discourse context in order to elicit a focus effect. These three sets consist of 90 target sentences with fillers and contextual sentences. The following are sample data sets for *hangsang*, where the target sentences are in square brackets and the FPs are in angle brackets.

(11) Prompt question + FP (*hangsang*)
   Q: *Ocik mwues.ul cohahaseyyo?*

A: *[Nanun <hangsang> mantwulul cohahapnita].*
'What do you only like?' 'I always like dumplings.'

(12) Context + FP (*hangsang*)
Ce nun elyessul ttaypwuthe han kaci cohahanun umsiki isssupnita. Pika okena myengcel naley hokun ceyka aphul ttay celul wihayse nwunimkkeyse sonswu picecwusin mantwuka isssupnita. Kulayse, [nanun <hangsang> mantwulul cohahapnita].
'There is something I have liked since I was young. When it rained, when it was a holiday, or when I was sick, my elder sister used to make dumplings for me. For this reason, I always like dumplings.'

3.2. Subjects

Three males and three females participated in the experiment. All participants were native speakers of Korean. We recruited the subjects at the University of Pennsylvania and paid them for their participation. The participants did not exhibit problems with their speech and hearing nor did they show noticeable accents and dialects.

3.3. Procedure

The stimuli were recorded in a sound-proof booth in the Department of Linguistics at the University of Pennsylvania. A head-mounted microphone was used for recording. The recordings were made electronically and saved directly on a computer through Praat (Boersma & Weenik, 2009). The stimuli were presented on a paper sheet in a randomized order. Before the recordings, the material was first presented to the subjects in order for them to become familiar with the material. They were instructed to repeat the token(s) when they made a mispronunciation or mistake.

 A Praat script was used to measure the acoustic parameters of the target sentences (Xu, 2005-2011). In order to extract F0, word boundaries are marked by hand. After the process of F0 extraction, all the target sentences were converted to graphs, provided in the next section. A logarithmic algorithm was performed in order to smooth over and/or remove abrupt bumps and sharp edges. Then, time-normalized F0 curves of all the target sentences were computed.

4. Analyses and Results

Figure 1 displays normalized F0 contours for *hangsang* and *ocik* in three different conditions. They are the mean F0 curves of all the sentences produced

by six speakers, and each F0 curve is an average of 36 repetitions. The region [FP], where the FPs are located, indicates that *hangsang* has a higher pitch than *ocik*. The pitch contours in other regions for *hangsang* and *ocik* overlap in the graphs. Table 1 shows that there are significant differences in all the measurements between *hangsang* and *ocik*. All the values in the region of *hangsang* are significantly higher than those of *ocik* (duration of *hangsang* vs. *ocik*: 357.9 vs. 292.2 ms., intensity: 72.2 vs. 69.1 dB, mean F0: 219.6 vs. 176.7 Hz, maximum F0: 242.4 vs. 205.0 Hz). Table 1 also shows that the phonetic realizations are consistent among the three conditions ([1] without a context, [2] with a prompt question, [3] with a discourse context).
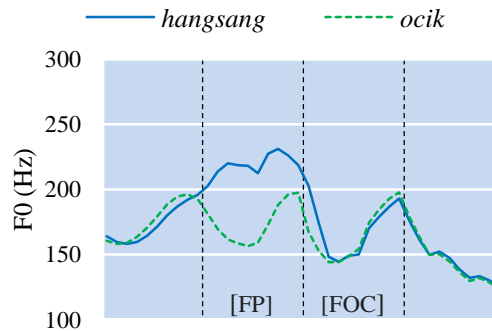
Figure 1: Mean F0 curves of all the stimuli with *hangsang* and *ocik* produced six times by each of six speakers ([FP]=a region for FP, [FOC]=a focused element). The target sentence is *Nanun {hangsang, ocik} mantwulul cohahapnita.*

		(df = 1, 5)
	FPs	Focused elements
Duration	F=260.9, *p*<.0001	F=1.41, *p*=0.24
Mean Intensity	F=58.97, *p*<.0001	F=1.29, *p*=0.28
Mean F0	F=84.61, *p*<.0001	F=0.55, *p*=0.46
Max F0	F=71.15, *p*<.0001	F=0.44, *p*=0.51

Table 1: Results of a one-way ANOVA for all measurements a) between *hangsang* and *ocik* and b) between focused elements in the three different conditions

In addition, Figure 1 shows that the pitch of *hangsang* is higher than the

focused element ([FOC]), but the difference in pitch of *ocik* with the focused element is not that large. Before we conclude that the two FPs have different relationships with the focused element in terms of pitch, we need to take into account a possible F0 declination effect. To compare the two peaks in a sentence, an F0 declination effect has to be excluded so that the exact intonational functions of the target sentence can be observed. We conducted a linear regression using the formula (13) to neutralize the effect and measure the slope.

$$(13) \quad \hat{\beta} = (X'X)^{-1} X'y = (\frac{1}{n}\sum x_i x'_i)^{-1} (\frac{1}{n}\sum x_i x'_i)$$

Figure 2 displays F0 residuals, which exclude the F0 declination effect. Just as was shown in Figure 1, Figure 2 also demonstrates that *hangsang* has a higher pitch than *ocik* (F[1,5]=591.867, *p*<.0001). Additionally, the pitch for *hangsang* is higher than the focused element, whereas the pitch of *ocik* is not. However, there is a difference between the pitches of the focused elements with *hangsang* and *ocik* (F[1,5]=104.89, *p*<.0001). This finding contrasts with the data in Figure 1, where the pitch of the focused element with *ocik* is higher than the one with *hangsang*.
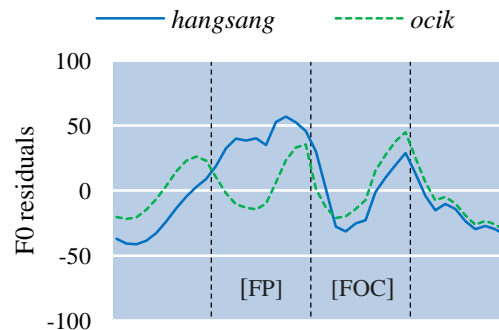
Figure 2: F0 residuals of all the sentences spoken produced six times by each of six speakers. Each F0 curve is an average of 36 repetitions. The target sentence is *Nanun {hangsang, ocik} mantwulul cohahapnita*.

5. Discussion

The results of our experiment show that *hangsang* has a higher pitch than the focused element and also has the most salient prosody in the sentence. In contrast, the pitch of *ocik* is lower than its focused element and the focused

element has the most salient prosody in the sentence. This supports the QFC theory by Beaver and Clark (2008), which distinguishes *hangsang/always* and *ocik/only* as free association and conventional association. Since *hangsang* associates with an element that is the most salient in a context, it does not need to have prosodic prominence on a focused element to create an association. However, *ocik* needs a prosodic cue to associate with a focused element. Thus, the results imply that the prosodic patterns of *hangsang* and *ocik* reflect a semantic distinction as stipulated in the QFC theory. From the perspective of phonetic realizations of FPs and focus, this experiment clarified the different functions of *hangsang* and *ocik* with respect to association with focus.

However, there remains a question: why does *hangsang* have the most salient prosody? Although the QFC theory predicts that *hangsang/always* does not need a prosodic cue to create an association, it does not require that the highest prosodic prominence should be on *hangsang/always* in the sentence. The most plausible account for the prosodic prominence is that the interpretation of *hangsang* was affected by "association with presupposition" (Rooth, 1996b). Since there is an overlap between a stative predicate *cohahapnita* 'like' and a temporal meaning of *hangsang* in the stimuli, *hangsang* can be interpreted as an intensifier, which emphasizes the meaning of the sentence and associates with a presupposition, that is, *I like dumplings*. When the participants interpret *hangsang* as intensifier, it seems natural that *hangsang* was realized with stress.[3] In contrast, such an interpretation is not available for *ocik*. Thus, we assume that the interpretation of *hangsang* as intensifier correlates with the prosodic salience of *hangsang*, which is different from *ocik*. To exclude the intensifier interpretation of *hangsang* in the experiment, the predicate type needs to be non-stative such as *eat* so that the overlap observed in our stimuli can be avoided. With the non-stative predicate, we are able to compare prosodies of *hangsang* and *ocik* that have the same function in stimuli. For our current purpose, however, the different functions of *hangsang* and *ocik* do not cause a problem, since it does not contradict our prediction based on the QFC theory. Rather, it supports the theory, presenting the unconfined association of *hangsang/always*, in contrast to *ocik/only* that has a more restricted association.

One final point in the results needs to be explained. Figure 2 shows a difference in pitch between the focused elements with *hangsang* and *ocik*. As we explored above, if *hangsang* was interpreted as intensifier, the low pitch of the focused element with *hangsang* is caused by Post-Focus Compression (Chen et al., 2009; Lee & Xu, 2010), which is known to compress the F0 contour after focus. Since *hangsang* associates with presupposition and has the highest pitch, which can be interpreted as focus, the pitch contours following *hangsang* experiences the compression that lowers pitches of the following words. Thus, the focused element with *hangsang* is lower in pitch than the focused element that follows *ocik*.

6. Conclusion

Following Beaver and Clark (2003, 2008), we investigated Korean FPs *hangsang* and *ocik* and found that they behave the same as the English counterparts in terms of their association with focus. Furthermore, the results of our production experiment indicate that the phonetic realizations of *hangsang* and *ocik* reflect their semantic distinction explicated in the QFC theory. Since our stimuli contain the use of *hangsang* as intensifier, it is requisite to investigate a prosodic feature of *hangsang* with a non-stative predicate such as *eat*. In addition to the Korean FPs, further research is needed to ascertain the relationship between semantic functions of FPs and their phonetic realizations in other languages. Moreover, a comprehension or perception study is necessary to elucidate the way in which listeners make use of prosodic information with respect to FPs and association with focus.

Notes

1. All of the contexts for the Korean examples given in this paper are equivalent to the English one in Beaver and Clark (2003).
2. As for the details of the formula, refer Beaver and Clark (2003, 2008).
3. To support the idea that *hangsang* 'always' in our stimuli was realized as an intensifier, we compared two pitch contours with *hangsang* and a genuine intensifier *cengmal* 'really' as below. It represents that the pitch contours have the similarity in that *hangsang* and *cengmal* have the most prominent pitch in the sentence.
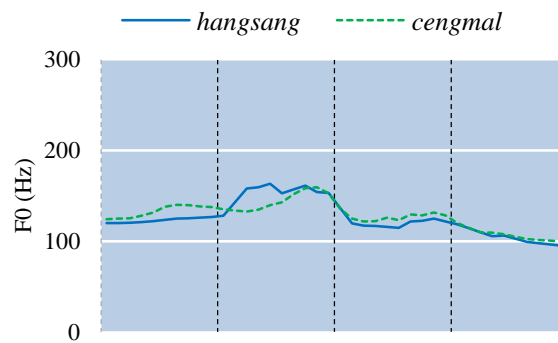
Figure 3: Mean F0 curves of the stimuli with *hangsang* and *cengmal* 'really' produced seven times by one speaker. The sentence is *Nanun {hangsang, cengmal} mantwulul cohahapnita*.

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The Use of Magnitude Estimation to Understand the Behavior of Reflexive Pronouns

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1. Introduction

Magnitude Estimation is a data collection technique that has been used in psychology research since Stevens (1957). More recently, this technique has been adopted for linguistic research (e.g., Bard et al 1996, Featherston 2005, Sorace and Keller 2005). Since the adoption of Magnitude Estimation in linguistics is recent, it has been used to investigate only a limited set of phenomena. To my knowledge, it has not been used in the collection of data from speakers of non-standard dialects. It is also unclear if this technique can be used to probe subjects' understanding of ambiguous sentences. In this paper, I report on a case study that addresses these two issues. I show that Magnitude Estimation can be used to collect judgments on specific interpretations of ambiguous sentences from speakers of non-standard dialects. In the case study, I investigate the behavior of reflexive pronouns (e.g., *himself*) in Iron Range English (IRE), a non-standard dialect spoken in the Arrowhead region of Minnesota. IRE reflexive pronouns are interesting because they can corefer with nominal expressions both inside and outside their simple clause, creating a potentially ambiguous sentence. The focus of the case study is to determine if Iron Range English reflexives behave like monomorphemic long-distance reflexives (similar to Mandarin Chinese *ziji* 'self'), or if they behave like reflexives that are not specified for anaphoric and pronominal features (similar to Malay *dirinya* 'himself/herself'). The results of the case study indicate that IRE reflexives have a distribution similar to Mandarin *ziji* 'self,' which is unexpected as it is thought that only monomorphemic reflexives behave this way; IRE reflexives are bimorphemic.

The paper is organized as follows. First I report on previous use of Magnitude Estimation for linguistic research. In the next section I report the case study. In §3.1, I provide background information on Iron Range English. In §3.2, I give

an overview of long-distance reflexives. In §3.3 I describe the study design, and in §3.4 I report the results: that IRE reflexives are long-distance reflexives and are not indeterminate between an anaphor and a pronominal (in the sense of Chomsky's Binding Theory 1986). §4 concludes the paper.

2. Magnitude Estimation and linguistic research

It has long been known that naturalness judgments are subject to "degrees of grammaticalness" (e.g., Chomsky 1975: 131). A potential benefit of incorporating gradability into linguistic theories is that we can increase their predictive power (Sorace & Keller 2005). Magnitude Estimation is a useful data collection technique because the scale allows participants to report gradabilty while they are doing a task (Featherston 2004).

In a Magnitude Estimation task, informants rate stimuli against a modulus with a numerical rating. The rating indicates how each stimulus compares to the modulus. For example, if you were participating in a study on the perception of line length, you would be presented with a modulus line to which you would compare subsequent lines. Say the modulus line is 10 centimeters. If you were then presented with a stimulus line that you perceived to be twice as long, you would give that line a numerical rating twice that of the modulus, in this case 20. If you were presented with a line that you perceived to be half as long, you would give that line a numerical rating half that of the modulus, in this case 5. This rating system allows informants to create a flexible rating scale where values are not restricted. The end scale is an interval scale, which allows for more types of statistical analyses than a Likert scale (ratio scale) allows for.

Like other methods of data collection, Magnitude Estimation has advantages and disadvantages. First, I will list some advantages. In a Magnitude Estimation task, naturalness ratings are not restricted. This is an advantage because informants are not "trapped" into a closed scale. If an informant rates a sentence with the highest naturalness rating on a closed scale and then encounters a sentence that is more natural, the informant must rate both sentences with the same ranking. The difference between the two sentences cannot be expressed. In a Magnitude Estimation task, on the other hand, the informant can manipulate the scale to show the difference of naturalness between the two sentences. Another advantage is that Magnitude Estimation tasks can record gradability in naturalness judgments. It is advantageous to record gradability because linguistic data (such as Blocking Effects in Mandarin Chinese as reported by Cole, Hermon & Huang 2006) often shows gradability in judgments. Finally, Magnitude Estimation produces a scale that can be analyzed with more types of statistical methods than a Likert scale, since it produces an interval scale rather than a ration scale (see Bard et al 1996 for discussion about interval scales).

A potential disadvantage of using this method to investigate a nonstandard dialect is that informants may have difficulty using the scale, especially those informants who have less education (Cowart 1997). Cowart suggests that the scale may be difficult for some people to use because of the need to be mathematically savvy. If informants cannot accurately use the scale, then the results may not be accurate.

Magnitude Estimation has previously been used to gather naturalness judgments for linguistic data (Bard et al 1996 & Cowart 1997). Magnitude Estimation tasks provide reliable results within groups and can reflect similar ordering of sentences as traditional naturalness collection techniques. Magnitude Estimation has also been used to gather coreference judgments (Keller 2000, Keller & Asudeh 2001). The case study is presented in the next section.

3. Case study: behavior of reflexive pronouns in Iron Range English

The purpose of the case study is to understand the behavior of reflexive pronouns in Iron Range English. It has previously been shown that Iron Range English reflexives can corefer with a nominal expression outside their clause. This is illustrated in (1).

(1) **IRE** (adapted from Schmelzer 2006: 126)
[Bill$_i$ said [that John knew [that Mike often criticized himself$_i$]]].

Here, *himself* in the simple clause can corefer with *Bill* in the matrix clause. It is unexpected that *himself* can behave this way because it has previously been assumed that only (i) monomorphemic reflexives or (ii) reflexives that are not specified for anaphoric and pronominal features can behave this way (Katada 1991, Cole, Hermon & Huang 2006, Cole & Hermon 2003, *inter alia*). The focus of this study is to determine if Iron Range English reflexives behave like monomorphemic long-distance reflexives (similar to Mandarin Chinese *ziji* 'self') or if they behave like reflexives that are not specified for anaphor and pronominal features (similar to Malay *dirinya* 'self').

3.1 Iron Range English

Iron Range English is spoken on the Mesabi Iron Range, which is located in the Arrowhead region of northern Minnesota. Before the discovery of iron ore in the 1880's, the Iron Range was largely uninhabited by immigrant Europeans: dense forests and rocky soil were both deterrents for would-be settlers who wanted to farm. During a small-scale gold rush in what is now the Vermilion Range, high-grade iron ore was found rather than gold. The ore (hematite) was so rich and so

easy to mine, that demands for laborers shot up after the first mine was built in Mountain Iron, MN in 1890 (De Kruif 1929, Geology 1887, Underwood 1981). Because of the mines' need for laborers, the population of the Iron Range increased from almost no people of European decent in the 1880's to over 70,000 by 1920 (Underwood 1981).

The origins of early Iron Rangers were mostly: Cornish, English, French-Canadian, Swedish, Slovenian, Croatian, Polish, Italian, Slovenian, Bohemian and Lithuanian (among others) (Sirjamaki 1965). Sirjamaki also suggests that while some inhabitants of the area immigrated to the Iron Range, some settlers may have come from other mining communities in the Great Lakes (such as Iron Mountain in the Upper Peninsula of Michigan). Sirjamaki states that by the mid 1930's, as many as one third of Iron Rangers had intermarried; therefore, he concludes that "[t]he range is actually a melting pot" (Sirjamaki 1965: 127).

Little research has been done on Iron Range English (c.f., Allen 1976, Underwood 1981, Linn 1988, Bauer 2005). Linn (1988) reports on a number of non-standard features of Iron Range English such as: (i) a unique lexicon (e.g., *location* means a housing area originally constructed by the mining companies), (ii) absence of copulas (e.g., *he late* means "he is late"), and (iii) non-standard word order (e.g., *you play with five cards just* which means "you play with just five cards").

3.2 Reflexive forms that are not anaphors

A long-distance reflexive is one type of nominal expression that can corefer with a nominal expression outside its simple clause. An example of a long-distance reflexive is below. Here, *ziji* 'self' can corefer with *Wangwu* or *Zhangsan*, both of which are outside the clause of the reflexive. Clauses are indicated with brackets.

(2) **Mandarin** (Huang & Tang 1989: 192)
[Zhangsan$_i$ shuo [Wangwu$_j$ zhidao [Lisi$_k$ chang piping ziji$_{i/j/k}$]]]
Zhangsan said Wangwu know Lisi often criticize self
'Zhangsan said that Wangwu knows that Lisi often criticized self.'

It is thought that true long-distance reflexives are monomorphemic since *ziji* 'self' can corefer with a nominal expression outside its clause, as in (2), but *taziji* 'himself/herself' can only corefer with the nominal expression within the same clause, as in (3) (Pica 1987).

(3) **Mandarin** (Cole & Sung 1994: 192)
[Zhangsan$_i$ shuo [Wangwu$_j$ zhidao [Lisi$_k$ xihuan ta ziji$_{*i/*j/k}$]]]
Zhangsan said Wangwu know Lisi like him self
'Zhangsan said that Lisi knows that Wangwu likes himself.'

In languages without subject/verb agreement, such as Mandarin Chinese, the reflexive is "blocked" from coreferring with a nominal expression outside the simple clause when there is an intervening subject that does not match a lower nominal form for person. This phenomenon is called Blocking Effects. An example is below in (4). Here, *ziji* is prevented from coreferring with *Zhangsan* due to the intervening first person subject *wo* in the middle clause.

(4) **Mandarin** (Cole & Sung 1994: modified from 363)
Zhangsan$_i$ shuo [**wo$_j$** zhidao [Lisi$_k$ xihuan   ziji$_{*i/*j/k}$]]
Zhangsan said   I   know   Lisi   like   self
'Zhangsan said that I know that Lisi$_k$ likes himself.'

Blocking Effects are not exhibited in languages that have subject/verb agreement, such as Italian. In (5), the intervening second person subject *tu* does not prevent *propria* 'self's' from coreferring with *Gianni* in the matrix clause.

(5) **Italian** (Cole & Sung 1994: 364)
Gianni$_i$ suppone [che tu   sia inamorato della propria$_i$ moglie]
Gianni supposes that you are in love   with self's   wife
'Gianni supposes that you are in love with his/your wife.'

Blocking Effects in Mandarin are reported to have gradient effects. An intervening first person subject (as in (6)) causes a more ungrammatical sentence than an intervening third person subject (as in (7)).

(6) **Mandarin** (Cole et al 2006: 63)
Zhangsan$_i$ renwei [Wangwu$_j$ zhidao [wo$_k$ xihuan ziji$_{*i/*j/k}$]]
Zhangsan think   Wangwu know   I   like   self
'Zhangsan thinks that Wangwu knows that I like myself.'

(7) **Mandarin** (Cole et al 2006: 63)
[Zhangsan$_i$ renwei [wo$_j$ zhidao [Wangwu$_k$ xihuan ziji$_{*i/??j/k}$]]]
Zhangsan think   I   know   Wangwu like   self
'Zhangsan thinks that I know that Wangwu likes himself/??me'

The standard analysis is that only monomorphemic reflexives can raise to a position where they are in a local relationship with a nominal expression in a higher clause (Cole, Hermon, & Huang 2001, 2006). As a result, the reflexive is in a local relationship with a nominal expression outside the minimal clause. Blocking Effects only occur in languages without subject/verb agreement due to a percolation of person features that only occurs in agreement-less languages (Cole & Sung 1994).

There are potential counterexamples to these claims. Malay *diri-nya* 'himself/herself' & Turkish *kendi-sin* 'himself/herself' are bimorphemic reflexives that can corefer with a nominal expression outside the simple clause. An example is below in (8). Here, *dirinya* 'himself/herself' can corefer with *Salmah* in the simple clause or *Ahmad* in the matrix clause.

(8) **Malay** (Cole & Hermon 2003: 629)
Ahmad$_i$ tahu [Salmah$_j$ akan membeli baju   untuk dirinya$_{i/j}$]
Ahmad know Salmah will   buy   clothes for   self.3sg
'Ahmad knows that Salmah will buy clothes for him/herself.'

Malay does not exhibit Blocking Effects even though it does not have subject/verb agreement.

(9) **Malay** (Cole & Hermon 2003: 629)
Siti mengingatkan Mohamed [yang *saya* tahu dirinya   seorang
Siti remind   Mohamed   that 1SG know self.3SG one
penjenayah]
criminal
'Siti reminded Mohamed that I know he/she is a criminal.'

Finally, Malay *dirinya* can corefer with a possessor, which normally only pronominals can do:

(10) **Malay** (Cole & Hermon 2005: 631)
[$_{NP}$ Bapa$_i$ Siti]$_j$ tidak suka dirinya$_{i/j}$
    father Siti not   like self.3SG
'Siti's father does not like her/himself.'

Malay and Turkish are not true counter-examples because they behave as items that are indeterminate between an anaphor and a pronominal (Cole & Hermon 2003; Kornfilt 2001). *Diri* + pronoun is unspecified in the lexicon with regard to the features [α anaphor] and [α pronominal]. As a result, *dirinya* can be used both in the environments appropriate for anaphors and in those appropriate for pronominals, which explains why there is a lack of Blocking Effects and the reflexive can always corefer with a possessor.

3.3 Study Design

The main goal of the study is to understand if IRE reflexives behave like (i) Mandarin Chinese *ziji*, (ii) Malay *dirinya*, or (iii) something else. In order to understand the distribution of IRE reflexive pronouns, it is necessary to collect

judgments because there are not enough corpora instances of reflexives in IRE to develop an accurate analysis of their distribution.

There are challenges associated with collecting judgments of ambiguous sentences with reflexives in Iron Range English. First, one must collect judgments in a way that allows for gradience in judgments to become apparent. This is needed because the long-distance use of *ziji* is reported to have gradient judgments (e.g., a first person nominal expression does not produce as severe of blocking effects as a third person nominal expression). Another challenge is collecting judgments that reflect the non-standard dialect rather than (what people believe are) standard judgments. This is a challenge for two reasons. First, an informant may believe their dialect is not "good enough" to be investigated, and will provide judgments about what they believe to be the standard dialect. Second, informants may be influenced by orthography (which is typically standard) and give judgments about the standard dialect rather than the typically unwritten non-standard dialect. Finally, collecting judgments about coreference can be challenging even among a linguistically savvy group. This is challenging because one reading may be easier to see than another reading, and a secondary reading might seem less grammatical when compared to a reading that is easier to get. For example, in (11), the sentence has two readings and one reading may not come as readily as another reading, which would potentially make the second reading seem not as grammatical.

(11) **(Standard American) English**
Joe wonders which picture of himself [John bought].
= [. . .] which picture of John John bought
= [. . .] which picture of Joe John bought

Gradience in naturalness judgments was collected using a Magnitude Estimation task, which allows for gradient judgments to become apparent. In order to collect coreference judgments of what could be secondary interpretations, each sentence was marked with a specific interpretation. Nominal expressions that were meant to corefer with each other were in CAPITAL letters. Also, each stimulus included an imaginary situation in which the sentence could possibly be used. In order to ensure collection of non-standard judgments rather than what informants believed is the standard judgment for a sentence, each stimulus was accompanied by an audio clip of a speaker of the participant's dialect producing the target sentence. Also, non-standard sentences that are acceptable in Iron Range English were included in the stimuli to ensure that nonstandard forms were not rejected by the participant. An example of such a sentence is below. The *s* on *beside* is non-standard.

(12) I was besides myself with fear.

Below is an example stimulus. The pragmatic situation is at the top of the screenshot. Next is the target sentence with coreference indicated with capital letters. In this example, *himself* is meant to corefer with *John*. Below the target sentence is an audio file with a speaker saying the sentence. Last, there is an open field space for informants to enter their rating.
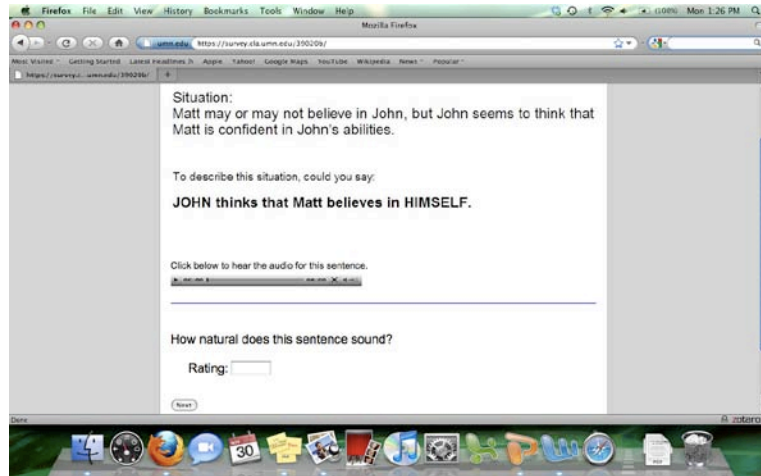
Figure 1. Example stimulus

Both a test group and a control group participated in the study. The control group consisted of 12 English-speaking participants from Minneapolis/St. Paul metropolitan area (ages 23-56 (M=36.5, SD=9.66)). The test group consisted of 31 IRE speaking participants (ages 22-77 (M=46.26, SD=15.66)). I normalized the data following Baylis (2001) and Engen (1971).

Nonstandard speaking informants were determined to be accurately using the Magnitude Estimation scale to report naturalness judgments. I worked through practice stimuli with informants to be sure that they understood the scale. Also, I examined sentences with known grammaticality judgments (i.e., sentences with reflexives that coreferred with a local binder are known to be grammatical and sentences with the reflexive in the possessor position are known to be ungrammatical) to determine that grammatical sentences were rated higher than ungrammatical sentences.

3.4 Results

IRE has reflexives that can corefer with a nominal expression outside their minimal clause. As a group, IRE speaking women 35 and older (13 participants

(M=54.3; SD=14.39)) found sentences like (13) to be significantly more natural than Metro English speakers in a two-tailed independent t-test (p = .035).

(13) **IRE**

[Bill$_i$ knows that [Tom$_j$ likes himself$_{i/j}$]]

Iron Range English reflexives are not indeterminate between an anaphor and a pronominal (like Malay *dirinya*) because they do not have a true pronominal distribution. Unlike pronominals, Iron Range English reflexives (i) exhibit island effects, (ii) cannot corefer with a possessor when the c-commanding nominal expression is animate, and (iii) exhibit Blocking Effects. Rather, Iron Range English reflexives behave like Mandarin Chinese long-distance reflexives.

IRE reflexives cannot corefer with a nominal expression outside the simple clause when in an island. These sentences were rated significantly worse than long-distance reflexives not in islands (p = .003). The subscript I indicates the island.

(14) **Iron Range English**

    a. Bill$_i$ said that Paul$_j$ saw [the person [$_I$ who dislikes himself $_{*i/*j}$]].

    b. John$_i$ made [$_I$ the claim that Bill$_j$ likes himself$_{*i/j}$].

    c. Bill$_i$ wonders [$_I$ who$_j$ likes himself$_{*i/j}$].

In contrast, a pronoun is acceptable in an island.

(15) **Iron Range English**

    a**.** Bill$_i$ said that Paul$_j$ saw [the person [$_I$ who dislikes him$_{i/j}$]].

    b. John$_i$ made [$_I$ the claim that Bill$_j$ likes him$_{i/*j}$].

    c. Bill$_i$ wonders [$_I$ who$_j$ likes him$_{i/*j}$].

Usually, only pronominals can corefer with a possessor. IRE reflexives cannot corefer with a possessor. The sentence in (16) was rated significantly less natural than sentences where the antecedent c-commanded the reflexive (p = .013).

(16) **IRE**

*[Jim$_i$'s coworker] harmed himself$_i$.

Finally, IRE exhibits Blocking Effects: sentences with an intervening subject that does not match for person with a lower nominal expression were rated as significantly less natural than sentences where all subjects agreed for person (p = .003), as illustrated in (17). This finding is unexpected, since IRE has

subject/verb agreement. It is thought that only languages without subject/verb agreement exhibit Blocking Effects (e.g., Cole & Sung 1994).

(17) **Iron Range English**
   a.   John$_i$ said that [I$_j$ know that [Tom$_k$ likes himself$_{*i/*j/k}$]]
   b.   John$_i$ said that [you$_j$ know that [Tom$_k$ likes himself$_{*i/*j/k}$]]
   c.   John$_i$ said that [Bill$_j$ knows that [Tom$_k$ likes himself$_{i/j/k}$]]

4.   Conclusion

For some speakers, Iron Range English reflexives can have a long-distance interpretation. Iron Range English reflexives are true long-distance reflexives because they do not have a true pronominal distribution. IRE reflexives challenge two assumptions about the distribution of long-distance reflexives: (i) that long-distance reflexives must be monomorphemic (Pica 1987) and (ii) that Blocking Effects only occur in languages without subject/verb agreement (Cole, Hermon, & Huang 2006). The non-standard speakers in my study accurately assigned values to stimuli in a Magnitude Estimation task. Subjects were able to report their judgments of ambiguous sentences. The case study suggests that indicating coreference with CAPITALS and providing pragmatic situations aid participants' evaluation of ambiguous sentences.

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Right Node Raising, Plurality, and Multiple-Dominance

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1. Introduction

This paper argues for the existence of multi-dominant structures by focusing on interpretation of Right Node Raising (RNR) constructions. In recent years it has been debated whether Parallel Merge, a structure building operation that yields multi-dominant structures, is a legitimate operation of the human language faculty. For example, Citko (2005) argues that the existence of Parallel Merge, illustrated (3), is a natural consequence, given the existence of External Merge and Internal Merge in (1) and (2).

(1) External Merge
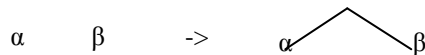
(2) Internal Merge (cf. Chomsky 2004)
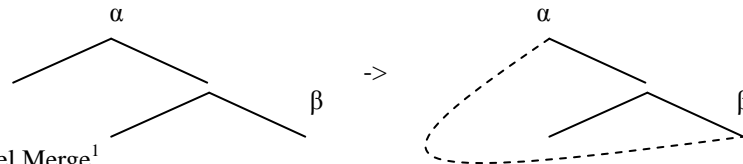
(3) Parallel Merge[1]
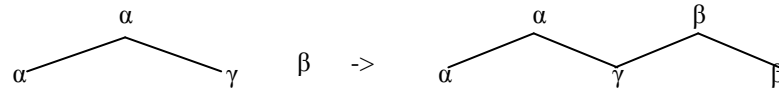
(Citko 2005:475-476)

External Merge takes two rooted syntactic objects, α and β, and combines them into one. Internal Merge differs from External Merge in that the merged element β is a term of α, thus yielding the effects of syntactic movement (Chomsky 2004). Parallel Merge, according to Citko, is a hybrid of External Merge and Internal Merge: it is similar to External Merge in that it involves two distinct rooted syntactic objects, α and β, but it is also similar to Internal Merge in that it targets a subpart of one of the roots. Citko argues that, since the existence of Parallel

Merge is a natural theoretical possibility, it is worth considering whether there are any empirical arguments for or against it.[2]

Chomsky (2007:8), on the other hand, criticizes Citko's view on Parallel Merge, saying that '(w)ithout further complication, Merge cannot create objects in which some object O is shared by the merged elements X, Y. It has been argued that such objects exist. If so, that is a departure from SMT [Strong Minimalist Thesis, K.O.], hence a complication of UG'. He further notes that 'Citko argues that parallel Merge is "predicted" as IM [Internal Merge, K.O.] is, but that is not quite accurate. It requires new operations and conditions on what counts as a copy, hence additional properties of UG' (Chomsky 2007: 8. fn.10).

In this paper, focusing on Japanese RNR constructions, I propose that a) RNR constructions are derived from a multi-dominant structure, which has been considered to result from the application of Parallel Merge, and b) they involve an underlying structure corresponding to a *respective* sentence. The account is based on the observation that RNR constructions exhibit the property of underlying plurality in (4).

(4) Underlying plurality (cf. Moltmann 1992)
     The elements α and β that occupy the same syntactic position in different RNR conjuncts are interpreted as if they form a conjunction 'α and β' underlyingly.
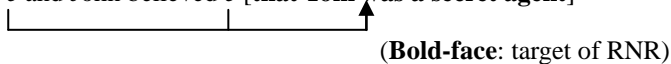
This observation is incompatible with a phonological deletion analysis of RNR (e.g., Wexler and Culicover 1980, Mukai 2003, An 2007).

2. Theories of Right Node Raising

2.1. Across-the-board (ATB) movement

Under the across-the-board (ATB) movement analysis, the target (the shared parts in RNR) is considered to result from actual rightward movement (Ross 1967, Postal 1974, among many others). As illustrated in (5), the identical parts of each conjunct undergo rightward movement in a parallel fashion, and are somehow realized as one element.

(5) Mary suspected *e* and John believed *e* [**that Tom was a secret agent**]

(**Bold-face**: target of RNR)

This approach, however, has been challenged by a wide range of evidence. First, it has been observed that RNR is insensitive to well-established island constraints, which syntactic movement should obey in general (Wexler and Culicover 1980).

(6) *Wh*-island

    a. John wonders [when Bob Dylan wrote __] and Mary wants to know [when
      he recorded __] **his great song about the death of Emmett Till**.
    b. *What does John wonder when Bob Dylan wrote?

(7) Complex-NP island
    a. I know [a man who buys __] and you know [a woman who sells __]
      gold rings and raw diamonds from South Africa.
    b. *What do you know a man who sells?

(8) Adjunct island
    a. Josh got angry [after he discovered __], and Willow quit [after finding out
      about __] **the company's pro-discriminatory policy**.
    b. *What did Josh get angry after he discovered?

                      (The data in (6-8) are adopted from Abels 2004: 48)

In the b-examples above, extraction from the *wh*-clause, complex NP, and adjunct
is prohibited in (6b), (7b), and (8b), respectively. On the other hand, the RNR
counterparts in the a-examples are grammatical, even though the target of RNR is
extraposed from the islands. This is unexpected if RNR involves syntactic
movement.

    Second, preposition stranding (P-stranding) is allowed in RNR even in
languages that basically disallow it. McCloskey (1986) observes that P-stranding
with Heavy NP Shift is not possible in Irish, as shown in (9a). The RNR example
in (9b), on the other hand, allows P-stranding: the target DP *ráidió agus teilefí an
Iarthair* is extraposed to the right edge with the prepositions *le* and *ar* left behind.
The same point is made by Gracanin-Yuksek (2007) for Serbo-Croatian, as shown
in (10).

(9) Irish (McCloskey 1986:184-185)
    a. *Bhí   mé   ag éisteacht [$_{PP}$ le t_i]inné
      wasI   listen(prog)   with   yesterday
    [$_{DP}$ clár   mór   fada ar   an   ráidió faoin   toghachán]$_i$
        program great   long on   the   radio   about-the   election
    'I was listening yesterday to a great long program on the radio about the
    election.'
    b. Níl   sé in aghaidh   an   dlí   a thuilleadh a bheith   ag éisteacht le
      is-not   it against   the   law anymore   be(-fin)   listen(prog) with
    nó   ag breathnú ar   [$_{DP}$ **ráidió agus   teilefís   an   Iarthair**]
    or   look(prog) on   radio   and   television   the   West(gen)
    'It's no longer against the law to listen to, or to watch, Western radio and
    television.'

(10) Serbo-Croatian (Gracanin-Yuksek 2007:113)
    a. * Koga   je   Petar   glasao za?
      Who   Aux.cl Petar   voted   for

'Who did Petar vote for?'

    b.   Petar je   glasao za, a   Ivan je   glasao protiv
         Petar Aux.cl voted for and Ivan Aux.cl voted against
         kandidata desnice.
         candidate right.Gen
         'Petar voted for and Ivan voted against the candidate of the right wing.'

Since it seems to me that it is hard to overcome these drawbacks with maintaining syntactic movement, I will focus on non-movement approaches in the rest of the discussions (but see Sabbagh 2007 for recent supporting arguments for the movement analysis).

2.2. Phonological deletion

The phonological deletion analysis (PDA) argues that RNR constructions involve full sentential coordination in the narrow syntax, followed by PF-deletion of the shared part in the first conjunct, as illustrated in (11) (e.g., Wexler and Culicover 1980, Mukai 2003, Bošković 2004, An 2007).

(11) Mary suspected [~~that Tom was a secret agent~~] and John believed [**that Tom was a secret agent**]

Since the shared material is part of the second conjunct and no movement is involved here, this analysis successfully explains the lack of movement constraints in RNR.

2.3. Multiple dominance

Multiple dominance analyses (MDA) employ a structure in which the target is dominated by more than one mother node at the same time by the application of Parallel Merge (e.g., McCawley 1982, Wilder 1999, Abels 2004, Bachrach and Katzir 2009). The structure of (5) under the MDA is given in (12).

(12)
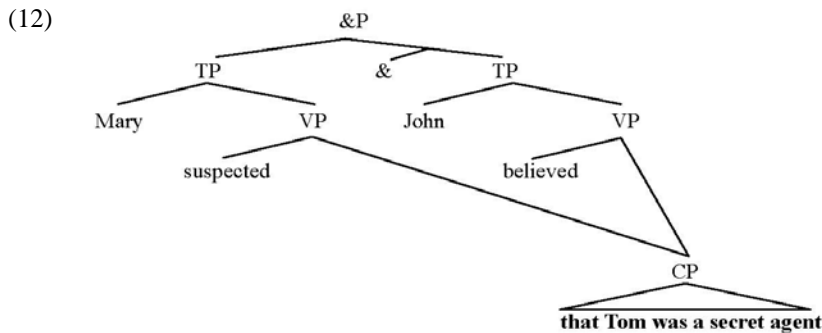
The crucial difference between the PDA and the MDA is the number of targets in narrow syntax: there are two occurrences of the target under the PDA, but there is only one target under the MDA. In the remainder of the paper, I will provide reasons for the assumption that the latter is correct.

3. Underlying Plurality

As we have seen in the previous section, the PDA involves full sentential coordination, and part of the first conjunct is deleted under PF identity. This predicts that RNR has the same interpretation as its full coordination counterpart. For instance, the interpretation of (13a) should be identical to the full coordination sentence in (13b) under this approach.

(13) a. Mary suspected and John believed **that Tom was a secret agent**.
　　 b. Mary suspected that Tom was a secret agent and John believed that Tom was a secret agent.

This prediction looks correct as far as simple RNR sentences such as (13) are concerned. However, more complex cases where the interpretation of the target depends on the plurality of the elements in each conjunct suggest that the interpretation of RNR is not always identical to its full coordination counterpart. More specifically, I will show that RNR has the property of underlying plurality in (4), repeated in (14) below (see Moltmann 1992, and Grosz 2007 for extensive surveys of this property in English).

(14) Underlying plurality
　　 The elements α and β that occupy the same syntactic position in different RNR conjuncts are interpreted as if they form a conjunction 'α and β' underlyingly.

In the rest of this section, I provide data supporting (14) from Japanese RNR, which will pose a serious challenge to the PDA.

3.1. Reciprocal binding

Consider the following Japanese RNR sentence.

(15) Masa$_i$-wa　 te-de,　　　(sosite)　 Ken$_j$-wa　　 batto-de
　　 Masa-Top　 hand-with　 and　　　 Ken-Top　　 bat-with
　　 otagai$_{i+j}$-o　　　 nagut-ta.[3]
　　 each.other-Acc　 hit-Past
　　 'lit. Masa by hand, and Ken hit each other with a bat.'

In (15) the reciprocal *otagai* is licensed, despite the fact that there is no plural

antecedent in any of the conjuncts. Yet, Condition A is satisfied. This suggests that the subjects *Masa* and *Ken* form a conjunction '*Masa and Ken*' at some level of representation; otherwise the reciprocal cannot be licensed. Crucially, the full coordination sentence in (16) is ungrammatical if both conjuncts involve the reciprocal, contrary to the prediction of the PDA.

(16) *Masa$_i$-wa te-de   otagai$_{i+j}$-o   nagut-te, (sosite)
    Masa-Top hand-with each.other-Acc hit-TE   and
    Ken$_j$-wa batto-de otagai$_{i+j}$-o   nagut-ta.
    Ken-Top   bat-with each.other-Acc hit-Past

Rather, (15) can be paraphrased with the respective sentence in (17).

(17) [Masa to Ken]-wa   sorezore   [te to batto]-de   otagai-o
    [*Masa and Ken*]-*Top respectively [hand and bat]-with each.other-Acc*
    nagut-ta.
    hit-Past
    'Masa and Ken hit each other with hand and bat, respectively.'

3.2. Plural pronoun interpretation

The interpretation of the Japanese plural pronoun *karera* makes the same point. As shown in (18), *karera* can refer to Masa and Ken: that is, the sentence either means that Masa and Ken are brothers, and they met their mother in different places, or Masa met Masa's mother in Tokyo and Ken met Ken's mother in Nagoya. Again, its full coordination counterpart in (19) is ungrammatical: *karera* cannot be interpreted as Masa and Ken; it must get a referent from discourse. (The sentence is still bad even if Masa and Ken have the same mother in an out-of-blue context.)

(18) Masa$_i$-wa   Tokyo-de, (sosite) Ken$_j$-wa   Nagoya-de
    Masa-Top Tokyo-in   and   Ken-Top   Nagoya-in
    karera$_{i+j}$-no hahaoya-ni   at-ta.
    they-Gen   mother-Dat   meet-Past
    'lit. Masa in Tokyo, and Ken met their mother(s) in Nagoya.'

(19) *Masa$_i$-wa Tokyo-de   karera$_{i+j}$-no hahaoya-ni at-te,   (sosite)
    Masa-Top Tokyo-in   their-Gen   mother-Dat meet-TE   and
    Ken$_j$-wa   Nagoya-de karera$_{i+j}$-no hahaoya-ni at-ta.
    Ken-Top   Nagoya-in their-Gen   mother-Dat meet-Past

Like in the 'each other' example discussed above, the interpretation of (18) is again similar to the respective sentence in (20), where the subject *Ken* and *Masa*, and the location *Tokyo* and *Nagoya*, are coordinated.

(20) Masa$_i$-to-Ken$_j$-wa   sorezore   Tokyo-to-Nagoya-de   karera$_{i+j}$-no

Masa-and-Ken-Top   respectively Tokyo-and-Nagoya-in   they-Gen
hahaoya-ni   at-ta.
mother-Dat   meet-Past

It is hard to see how the contrast between (18) and (19) can be accounted for under the PDA.[4]

3.3. Relational adjective modification

It has been observed that relational adjectives like *different* exhibit two kinds of interpretations (Carlson 1987). Consider (21).

(21) Smith went to a different place on his vacation this year. (Carlson 1987: 531)

In (21) *different* could refer to a different place Smith went to this year compared to last year, or a different place compared to some other contextually salient person. Carlson (1987) calls this kind of interpretation a *sentence-external reading*, because the comparison is made outside the sentence. Next, let us consider (22).

(22) Bob and Alice attend different classes.   (Carlson 1987: 532)

In addition to the sentence-external reading, (22) has an interpretation that Bob attends a class, Alice attends a class, and the two classes are different. That is, (22) is consistent with the interpretation of the sentence in (23).

(23) Bob attends Biology 101 and Alice attends Philosophy 799.
                                                    (Carlson 1987: 532)

This type of interpretation is called a *sentence-internal reading*, because the comparison is made sentence-internally. What is important for our purpose is the fact that the presence of plural subjects opens the possibility of the sentence-internal reading in (22).

Bearing this in mind, let us consider Japanese RNR. As shown in (24), the adjective *betubetu* 'different from each other' only has the sentence-internal reading, which means that comparison cannot be made outside the sentence (cf. Takano 2004).

(24) a.   Masa-to-Ken-wa   betubetu-no   ronbun-o   kopii   si-ta.
           Masa-and-Ken-Top   different-Gen paper-Acc   copy   do-Past
           'Masa and Ken made copies of different papers.'
     b. * Masa-wa   betubetu-no   ronbun-o   kopii   si-ta.
           Masa-Top   different-Gen paper-Acc   copy   do-Past
           'Masa made copies of different papers.'

(24b) is ungrammatical because the subject is singular. The RNR sentence in (25),

on the other hand, is grammatical, even though *betubetu* is used in the target and there is no plural subject involved.[5]

(25) Masa-wa   tosyokan-de, (sosite) Ken-wa   kenkyuusitu-de
Masa-Top   library-in   and   Ken-Top   office-in
betubetu-no   ronbun-o   kopii   si-ta.
different-Gen paper-Acc   copy   do-Past
'lit. Masa in the library, and Ken made copies of different papers in the office.'

As expected under a MDA, and contrary to the expectation of a PDA, the full coordination counterpart is again ungrammatical, as shown in (26). (This sentence is still bad even if *betubetu* in the first conjunct is not present).

(26) *Masa-wa   tosyokan-de   betubetu-no   ronbun-o   kopii   si-te,
Masa-Top library-in   different-Gen paper-Acc   copy   do-TE
Ken-wa   kenkyuusitu-de betubetu-no   ronbun-o   kopii   si-ta.
Ken-Top   office-in   different-Gen paper-Acc   copy   do-Past

Again, the interpretation of (25) is similar to the respective sentence in (27).

(27) [Masa to Ken]-wa   sorezore   [tosyokan to kenkyuusitu]-de
[*Masa and Ken*]-*Top respectively   [*library and office*]-*in*
betubetu-no   ronbun-o   kopii   si-ta.
different-Gen paper-Acc   copy   do-Past
'Masa and Ken made copies of different papers in the library and in the office, respectively.'

3.4. *A total of*

The final property indicating the underlying plurality involves quantified targets. In RNR constructions such as (28), a possible interpretation is that Masa peeled two apples with a knife, and Ken peeled eight apples with a peeler. That is, a total of ten apples have been peeled.[6]

(28) Masa-wa   naifu-de, (sosite) Ken-wa   piiraa-de
Masa-Top   knife-with and   Ken-Top   peeler-with
ringo-o   gookei   juk-ko   mui-ta.
apple-Acc   a.total.of ten-CL   peel-Past
'lit. Masa with a knife, and Ken peeled a total of ten apples with a peeler.'

The full coordination sentence in (29), on the other hand, does not have such an interpretation. (29) can only mean that Masa peeled a total of ten apples with a knife, and Ken peeled a total of ten apples with a peeler - that is, a total of twenty apples have been peeled.

(29) Masa-wa   naifu-de   ringo-o   gookei juk-ko   mui-te,
Masa-Top knife-with apple-Acc a.total.of ten-CL   peel-TE
Ken-wa   piiraa-de   ringo-o   gookei juk-ko   mui-ta.
Ken-Top   peeler-with apple-Acc a.total.of ten-CL   peel-Past
'Masa peeled a total of ten apples with a knife, and Ken peeled a total of ten apples with a peeler.'

As before, the interpretation of the RNR example in (28) is comparable to the respective sentence in (30).

(30) Masa-to-Ken-wa   sorezore   naifu-to-piiraa-de   ringo-o
Masa-and-Ken-Top respectively knife-and-peeler-with apple-Acc
gookei   juk-ko   mui-ta.
a.total.of   ten-CL   peel-Past

3.5. Interim summery

The data presented in this section converge on (4): elements that occupy the same position in different conjuncts of RNR are conjoined underlyingly. More specifically, RNR, which is schematically shown in (31a), cannot be paraphrased by full coordination sentences like (31b), contrary to the prediction of the PDA. Rather, the interpretation of RNR is similar to (31c), where the respective elements in both conjuncts are conjoined, thus giving rise to 'respective' interpretations. In the next section, I will provide an account along the lines of (31c).

(31) a. A B C..., and D E F..., **X Y Z**.   RNR (X Y Z are the target)
    b. A B C ... X Y Z, and D E F ... X Y Z.   Full coordination
    c. A and D B and E C and F ... XYZ.   Respective reading

4. Analysis

4.1. The 'null &' analysis

To account for the property of *underlying plurality* in Japanese RNR, I propose the structure in (33) for (15), repeated in (32), where the elements that occupy the same syntactic position in different RNR conjuncts are conjoined by a phonologically null & in the underlying structure (cf. Grosz 2007). (This analysis can be naturally extended to the other RNR examples in (18), (25), and (28).)

(32) Masa$_i$-wa   te-de,   (sosite) Ken$_j$-wa   batto-de
Masa-Top hand-with and   Ken-Top   bat-with
otagai$_{i+j}$-o   nagut-ta.
each.other-Acc   hit-Past

'lit. Masa by hand, and Ken hit each other with a bat.'

(33)
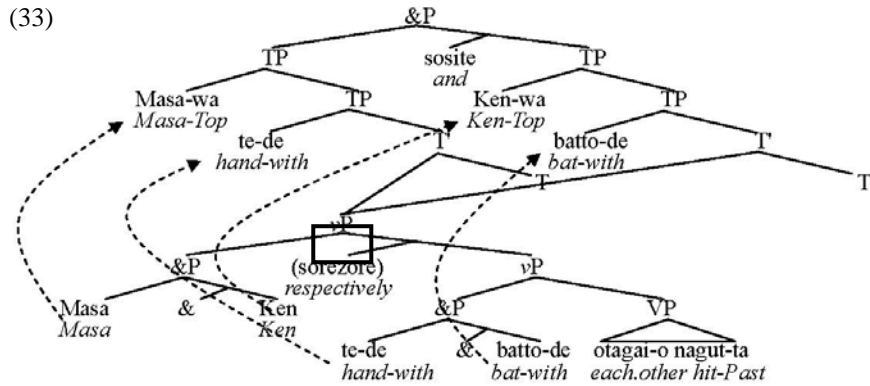
The derivation of (33) proceeds as follows. Up to the boxed *v*P, the derivation proceeds just like the one for an overt *respective* sentence as in (17).[7] The &P 'Masa & Ken', which denotes plurality, properly binds the reciprocal *otagai* at this point. Potential support for the 'null &' analysis comes from the fact that English RNR constructions exhibit 'cumulative agreement' (cf. Grosz 2007, 2009). As shown in (34), T exhibits plural agreement. Assuming that plural agreement occurs only when T agrees with an element that denotes a plurality, Grosz (2007) argues that it seems plausible that *Bill* and *John* form a conjunct in their base position.[8]

(34) [Sue's proud that Bill$_{[SG]}$ __] and [Mary's glad that John$_{[SG]}$ __]
     have$_{[PL]}$ / ?*has$_{[SG]}$traveled *t*$_{Bill/John}$ to Cameroon.   (Grosz 2009:4)

I think Grosz's (2007) argument can be straightforwardly extended to the Japanese case. Given that a reciprocal is licensed only when it is bound by an element which denotes a plurality, the postulation of the null &P in (33) seems again plausible. In the next step of the derivation, two distinct Ts in numeration are introduced and merged with the *v*P simultaneously by Parallel Merge, creating the multi-dominant structure. Then, the elements that are conjoined by the phonologically null & ('Masa & Ken' and 'te-de & batto-de') undergo movement to distinct Spec of TPs due to the EPP/Case requirement on T or via ATB-Scrambling. Finally, two rooted TPs are combined by the sentential conjunction *sosite*, yielding the surface RNR structure. Under this analysis, the difference between the *respective* sentence in (17) and the RNR sentence in (15) can be reduced to a difference in numeration: (17) has only one T, but (15) has two Ts and the sentential conjunction *sosite*.

4.2. A note on the Coordinate Structure Constraint

One might wonder why movement out of a conjunct is ever possible in this analysis. Let us consider Ross's (1967) original Coordinate Structure Constraint (CSC), which is given in (35).

(35) The Coordinate Structure Constraint (CSC) (Ross 1967: 161)
      In a coordinate structure, no conjunct may be moved, or may any element contained in a conjunct be moved out of that conjunct.

It is important to note that the CSC has two subparts: Prohibition against the extraction *of* conjuncts (CSC1), and prohibition against the extraction *out of* conjuncts (CSC2). Grosu (1973, 1981) and Merchant (2001) argue that CSC1 and CSC2 must be treated differently. For example, (36a) shows that CSC2 can be violated, when an element is extracted in an across-the-board manner. On the other hand, the across-the-board extraction is impossible in (36b-c), where at least one of the extracted elements is a whole conjunct.

(36) a. The doctor who Kim worked for and Sandy relied on died.
      b. *I wonder who you saw [[*e*] and [*e*]]?
      c. *I wonder who you saw [[*e*] and [a picture of [*e*]] ?
                                                    (Gazdar et al. 1985: 177-178)

Merchant (2001) argues that CSC1 is a constraint on PF that rules out sequences such as 'A and ∅', '∅ and B', and '∅ and ∅'. Evidence comes from data that exhibit a null conjunct apart from movement. Consider (37).

(37) a. I have five cats, but he has six __ !
      b.* I have five cats, but he has six [__ and dogs]!
      c.* I have five cats, but he has six [dogs and __]!   (Merchant 2001: 196)

Although English basically allows NP-ellipsis, as in (37a), (37b-c) are ungrammatical, because one of the conjuncts is phonologically null. Since it is unlikely that these null conjuncts are created by movement, it is natural to think that (37b-c) are excluded by a PF constraint. Going back to the derivation in (33), nothing is left inside the &Ps at PF after the extraction of the conjuncts, because the conjunction & is phonologically null. This in effect nullifies the effect of CSC1. Since movement of conjuncts *per se* is not problematic with respect to CSC1, (33) is not excluded by the CSC.

4.3. A consequence

One welcome consequence of the 'null &' analysis is that we can solve the 'trace problem' raised by An (2007). He observes that multiple elements can be scrambled out of one target of RNR.

(38) pan$_i$-o   Tomo-wa, (sosite) gohan$_j$-o   Nina-wa,

bread-Acc   Tomo-Top   and   rice-Acc   Nina-Top
[Ana-ga   *t* tabeta-to] it-ta
Ana-Nom   ate-Comp   say-Past
'lit. Bread, Tomo (said that Ana ate) *t* and rice, Nina said that Ana ate *t*.'

(An 2007:108)

In (38) the embedded objects *pan-o* and *gohan-o* undergo long-distance scrambling to the initial position of each conjunct. An (2007) claims that this poses a serious problem for the MDA. If the target is literally shared (or multiply-dominated) by the RNR conjuncts, there should be only one base-position for the two scrambled elements. However, the number of traces is no longer problematic under the current analysis: Since the scrambled elements form a conjunction with a null & in the underlying structure, it provides enough base-positions, and the 'trace problem' is naturally subsumed under the MDA.

5. Conclusion

In this paper, I demonstrated that Parallel Merge, which is necessary to yield multi-dominant structures, is an indispensable structure-building operation of language faculty. This claim is supported by the empirical data that the interpretation of RNR exhibits the property of 'underlying plurality'. Also, I showed that, although the PDA cannot deal with the property of underlying plurality, the MDA can, once we adopt the 'null &' analysis. I did not discuss in this paper whether the multi-dominant structure is the 'unique' source of RNR: what this paper has shown is that any theory that entirely rejects the multi-dominance structures is insufficient. Coexistence of both the phonological deletion and the multi-dominance as the source of RNR is still a logical possibility (cf. Barros 2010, Barros and Vicente, to appear). I leave this issue for future research.

Notes

1 For any structure K, a) K is a term of K, b) if L is a term of K, then the members of the members of L are terms of K (Chomsky 1995:247).
2 Actually, this argument is older. For example, Bobaljik (1995) (later developed in Bobaljik and Brown (1997)) proposes interarboreal operations as a possible structure building operation based on the assumption that phrase markers are defined in terms of a set of 'terms'. Though terminology is different

from Citko (2005), this work explores the possibility that syntactic objects that are already merged in a previous derivation can be a target of subsequent (external) Merge. Similar idea is also found in Gärtner (1999).

3 An (2007) points out that the English example in (i) would be problematic for the PDA because the full coordination sentence in (ii) is ungrammatical.

(i)   John wants, but Mary refuses, to get themselves on "Jerry Springer".   (An 2007: 230)

(ii) * John wants to get themselves on "Jerry Springer," but Mary refuses to get themselves on "Jerry Springer."

However, it is not clear whether the anaphor *themselves* is bound directly by the two antecedents *John* and *Mary* in (i), because the sentence involves an infinitive with a PRO subject, hence it could be the case that the anaphor is bound by a partially controlled PRO. Although I agree with An (2007) that (i) is problematic for the phonological deletion analysis, the potential of partial control makes these examples less clear cases of anaphors being bound by a conjoined subject than the examples given in the text.

4 Moltmann (1992) reports that in English, only plural reflexives in picture NPs can be bound by separate subjects in RNR; a bare plural reflexive cannot be licensed in RNR, as shown in (ii).

(i)   Bill bought and John sold pictures of themselves.

(ii) * Bill admired and Mary despised themselves.   (Moltmann 1992:165)

Of relevance here is An's (2007) argument that targets of RNR must be able to stand as an independent I(ntonational)-phrase (An 2007:179). This principle might somehow prefer the heavier target in (i) over the lighter one in (ii).

5 The possibility of the sentence-internal reading in (i) has been noted for English RNR in several works (see Abbott 1976, Jackendoff 1977, Gazdar 1981, Moltmann 1992, and Abels 2004 for more data and discussions).

(i)   John sang, and Mary recorded, **two quite different songs**.   (Abels 2004:51)

6 Moltmann (1992) reports that the expression *a total of* makes the same point in English.

(i)   John painted and Mary drew **a total of ten pictures**.   (Moltmann 1992:166)

7 In Otaki (2010), I propose that what is involved in RNR sentences is not the word 'respectively' itself, but the **-operator (cf. Sauerland 1998, Sternefeld 1998, Beck 2000, Beck and Sauerland 2000, among others). See Otaki (2010) for the details.

8 I leave open whether agreement can also be done in the Spec of TP (i.e. after movement, not via pure-Agree). Actually, the judgments for (34) are subject to speaker variation - certain speakers do accept singular agreement. If this is the case, agreement can be determined either before or after movement of the subject to the Spec of TP. See also the discussions in Otaki (2010) about further agreement facts in RNR. I argue there that agreement in the Spec of TP is necessary in certain contexts.

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Which-Phrases Reconstruct? A Syntactic Investigation of D-linked *Wh*-movement[*]

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1. Introduction

This paper investigates a class of expressions that obviate a Condition C violation predicted under reconstruction. The effect is illustrated in (1).

(1) a. Which picture of Jack$_1$ did he$_1$ like best?
    b. Which claim that Liz$_1$ was guilty did she$_1$ successfully refute?

  These expressions, which contain R-expressions inside displaced *wh*-phrases, are predicted to undergo *reconstruction*, an operation whereby the lexical restriction of the *wh*-operator is interpreted in its pre-movement position. Reconstruction in (1a) yields the interpretation in (2). Condition C of the Binding Theory (Chomsky 1981) prohibits coreference between the R-expression and the c-commanding pronoun.

(2) a. **LF:** [which *x*] did he$_1$ like [*x* picture of Jack$_1$] best

  Interestingly, many speakers find coreference in expressions such as (1) to be perfectly acceptable. To account for the recalcitrant data, I follow Pesetsky (1987) and Rizzi (1997, 2003) in developing the proposal that the lexical restriction of an argumental D-linked *wh*-phrase (such as in (1)) is not subject to reconstruction. Once the details of the proposal are made explicit, we will find that there is an appropriately licensed LF representation for the expressions in (1) such that Condition C is satisfied. Lastly, we will extend the analysis to account for the lack of island/locality effects predicted in certain instances of *wh*-extraction from ellipsis.

2. Background

The term *reconstruction* refers to a phenomenon in which some portion of a displaced *wh*-phrase is interpreted in its pre-movement position.[i] Syntactic evidence for reconstruction comes from an interaction between *wh*-movement and the Binding Theory. The binding conditions are given in (3). For our purposes, binding requires c-command and co-indexation, and the local domain is the clause. The expressions in (4) illustrate typical reconstruction effects.

(3) a. Condition A: An anaphor must be locally bound.
    b. Condition B: A pronoun must be locally free.
    c. Condition C: An R-expression must be free.

(4) a. Which picture of herself$_1$ did Jenna$_1$ like ?   (Condition A ✓)
    b. *Which picture of Jenna$_1$ did she$_1$ like?   (*Condition C)

If the c-command requirement on binding holds, why doesn't (4a) violate Condition A, and why is disjointness of reference enforced in (4b)? Assuming that binding relations are evaluated at LF (Chomsky 1993:211), the idea is that some portion of the displaced *wh*-phrase is "reconstructed" back in its pre-movement position where the necessary c-command relation holds. Reconstruction in (4) creates LF configurations in which the anaphor is properly bound by its antecedent (= Condition A ✓), and the R-expression is c-commanded by the co-indexed pronoun (= *Condition C). Adopting the copy theory of movement, reconstruction can be thought of as a form of selective deletion of copies (Chomsky 1993:202-204). The full copy representations of (4) are given below.

(5) a. [which picture of herself$_1$] did Jenna$_1$ like [which picture of herself$_1$]
    b. **PF**: [which picture of herself$_1$] did Jenna$_1$ like [~~which picture of herself$_1$~~]
    c. **LF**: [~~which picture of herself$_1$~~] did Jenna$_1$ like [which picture of herself$_1$]

(6) a. [which picture of Jenna$_1$] did she$_1$ like [which picture of Jenna$_1$]
    b. **PF**: [which picture of Jenna$_1$] did she$_1$ like [~~which picture of Jenna$_1$~~]
    c. **LF**: [~~which picture of Jenna$_1$~~] did she$_1$ like [which picture of Jenna$_1$]

At PF, the lower copy undergoes deletion and the higher copy is pronounced. At LF, the higher copy undergoes deletion, and the lower copy is interpreted.[ii] In order for the derivation to converge at LF, (5) and (6) must be interpreted as the operator-variable structures in (7) and (8) respectively.

(7) a. [which x] did Jenna$_1$ like [x picture of herself$_1$]
    b. [which x, x picture of herself$_1$] did Jenna$_1$ like [x]
(8) a. [which x] did she$_1$ like [x picture of Jenna$_1$]
    b. [which x, x picture of Jenna$_1$] did she$_1$ like [x]

Although the higher copies in (5) and (6) are available for interpretation (an issue we set aside here, see endnote 1), we must be able to account for the judgments as indicated in (4). To do this, Chomsky (1993:209) introduces the Preference Principle in (9), which will select (7a) and (8a) for interpretation.

(9) *Preference Principle*
 Try to minimize the restriction in the operator position.

To summarize, the final syntactic representation is subject to two economy-based constraints: (i) *Copy Economy*: delete redundant copies under recoverability, and (ii) *Preference Principle* (Barss 2003 ex. (34)). As applied above in (5-8), these two economy principles conspire to force reconstruction in typical instances of *wh*-movement involving pied-piped material.

3. Unpredicted Anti-reconstruction Effects

Given the reconstruction outlined above, consider (10) and (11) (modified from Barss 2003 ex. (80-81)).

(10) a. Which theory that Tracy$_1$ was guilty did he$_1$ successfully refute?
 b. Which story that Jack$_1$ found a mistake in the report did he$_1$ enjoy best?
 c. Which report that Liz$_1$ was incompetent did she$_1$ shred yesterday?
 a. Which picture of Jenna$_1$ did she think was most flattering?

(11) a. *How proud of Jack$_1$ did Cerie believe he$_1$ would be?
 b. *How proud that Kenneth$_1$ owns a book did Liz say he$_1$ was?
 c. *How upset that Avery$_1$ left the party did Jack think she$_1$ was?

All of the expressions in (10) and (11) are predicted to undergo reconstruction in the manner illustrated below. Condition C should prohibit coreference between the R-expression and the c-commanding, co-indexed pronoun.

(10') [which x] did he$_1$ successfully refute [x theory that Tracy$_1$ was guilty]

(11') [how x] did Liz say he$_1$ was [x proud that Kenneth$_1$ owns a book]

Contrary to theoretical predictions, most speakers find coreference in (10) to be "mildly deviant to perfect" (judgments from Barss 2003). That is, there is a complete lack of any enforced disjointness of reference between the R-expression and co-indexed pronoun (see Chierchia 1995, Heycock 1995, and Lasnik 1998 for supporting judgments). This suggests that the examples in (10)

do not undergo reconstruction i.e. they exhibit *anti*-reconstruction effects (Riemsdjik & Williams 1981). What's even more puzzling is that those speakers who find coreference in (10) to be perfect find that the expressions in (11) produce the predicted "total Condition C level ungrammaticality".[iii]

4. Previous Accounts

There have been several proposals put forth to account for the unpredicted anti-reconstruction effects in (10). We will briefly review relevant analyses developed by Huang (1993) and Heycock (1995).

4.1 Huang (1993): predicate/argument asymmetry

One difference between (10) and (11) is that the *wh*-elements in (10) are *wh*-arguments, whereas they are *wh*-predicates in (11). Huang (1993) notes that fronted predicates, unlike fronted arguments, contain a trace of the subject in the displaced phrase, and it is this trace that triggers the Condition C effects in (11).

(12) a. $[_{AP} t_1 [_{A'}$ How proud of himself$_1]_2$ did Cerie believe Jack$_1$ would be t_2?
    b.*$[_{AP} t_1 [_{A'}$ How proud of Jack$_1]_2$ did Cerie believe he$_1$ would be t_2?

  In (12a), the trace of the subject properly binds the anaphor *himself*, satisfying Condition A. In (12b), a repetition of (11a), the R-expression is no longer free, violating Condition C.
  While this analysis accounts for the unacceptability of examples like (11), the lack of a subject trace in the *wh*-argument examples in (10) does not account for their acceptability. Reconstruction should still be enforced by the Preference Principle, predicting uniform Condition C effects in (10).[iv]

4.1 Heycock (1993): referential/non-referential asymmetry

Heycock (1995) attributes the difference between (10) and (11) to a referential/non-referential asymmetry. She observes that in examples like (10), the *wh*-phrases are referential, whereas in (11) they are non-referential.[v] According to her description, non-referential phrases obligatorily reconstruct, but referential phrases are permitted to remain in their fronted position. Obligatory reconstruction for the non-referential *wh*-phrases in (11) gives rise to the observed Condition C effects, and the optionality of reconstruction for the referential *wh*-phrases in (10) allows for a configuration in which the R-expression remains free in accordance with Condition C.
  While this account certainly captures the asymmetry, it raises a few questions. In particular, the "optionality" of reconstruction for referential *wh*-phrases seems

a bit peculiar. While I do not think it is a convenient trick to capture the judgments, it certainly behooves us to ask under what conditions, if any, reconstruction is enforced for referential *wh*-phrases.

5. Restricted Reconstruction

I take Heycock's (1995) proposal to be on the right track. In a moment, we will see that the optionality issue raised above disappears once we adopt the necessary syntactic mechanisms. However, there are several issues regarding the nature of reconstruction that need further examination before we can move along. For one, it is not clear why the Preference Principle in (9) is not consistently enforced in the cases involving a referential *wh*-phrase. How is it that the less preferred derivation (i.e. the one in which the lexical restriction is interpreted in the scope position) can be sometimes selected given (9)? One possibility is that for some reason, in the referential cases, the derivation in which the lower copy is selected for interpretation does not converge. If this is the case, then the two derivations are not in competition with each other rendering the Preference Principle inapplicable.[vi] We will explore this possibility in more detail later. Furthermore, if the only derivation that converges is the one in which the higher copy is selected for interpretation, why doesn't the expression in (13) trigger a Condition A violation? This is where the optionality noted above comes in handy, but again, it would make for a more precise theory if we could properly describe the conditions under which reconstruction is enforced for referential *wh*-phrases. I will set this issue aside for now, briefly returning to it below.

(13) Which picture of herself$_1$ did Jenna think was most flattering?

  In short, we need to be more explicit about what properties of a referential phrase actually give rise to the anti-reconstruction effects in (10). I will now outline an analysis that may help us develop a better understanding about the relationship between referentiality and (anti-)reconstruction.

5.1 Reconstructing D-linked *wh*-phrases

Following Cinque (1989), we can recapitulate Heycock's referential/non-referential asymmetry in terms of D-linking i.e. referential, *wh*-arguments are D-linked, and non-referential *wh*-predicates are non-D-linked. For our purposes, we will adopt Kroch's (1998:23) articulation of D-linking.

(14) *D-linking*

"D-linked *wh*-phrases refer to members of a set that has been evoked in the discourse, while non-D-linked *wh*-phrases, being operators, make no such reference."

The basic idea we will pursue here, stated informally, is that the restriction of argumental D-linked *wh*-phrases is not subject to reconstruction. Below, we will see that the D-linked *wh*-restriction has an independently licensed interpretation in the left periphery as a topic. As such, an R-expression contained inside the restriction has the potential to remain free in accordance with Condition C.

Rizzi (1990, 2003) reveals some very interesting properties of D-linked *wh*-phrases. For example, he notes that while *wh*-extraction from a *wh*-clause (i.e. a *wh*-island) is barred, as in (15a), "a systematic exception involves D-linked argumental *wh*-phrases" as in (15b) (2003:98).[vii] Rizzi proposes that displaced D-linked *wh*-phrases are linked to their traces in a way different from standard chain formation, and are not subject to locality constraints on movement.

(15) a. *What the hell do you wonder how to say?
      b. ?Which problem do you wonder how to say?

To handle long-distance chain formation in D-linked *wh*-movement (and long-distance binding of pronouns from quantified expressions), Rizzi introduces the mechanisms in (16).

(16) α binds β iff:
      (i) α and β are non-distinct [co-indexed] DPs, and
      (ii) α c-commands β.

In short, the DP status of the D-linked *wh*-restriction in examples such as (10) allows access to (16) to form a long-distance DP dependency at LF. As we will see below, I rely on this mechanism to account for the unpredicted availability of coreference in (10).

5.2 The syntax of D-linked *wh*-phrases

Let's explore how the D-linked *wh*-phrases in (10) might be represented under (16). Adopting Rizzi's (1997) Split-CP hypothesis, consider (17).

(17) Which theory that Tracy$_1$ was guilty did he$_1$ refute?
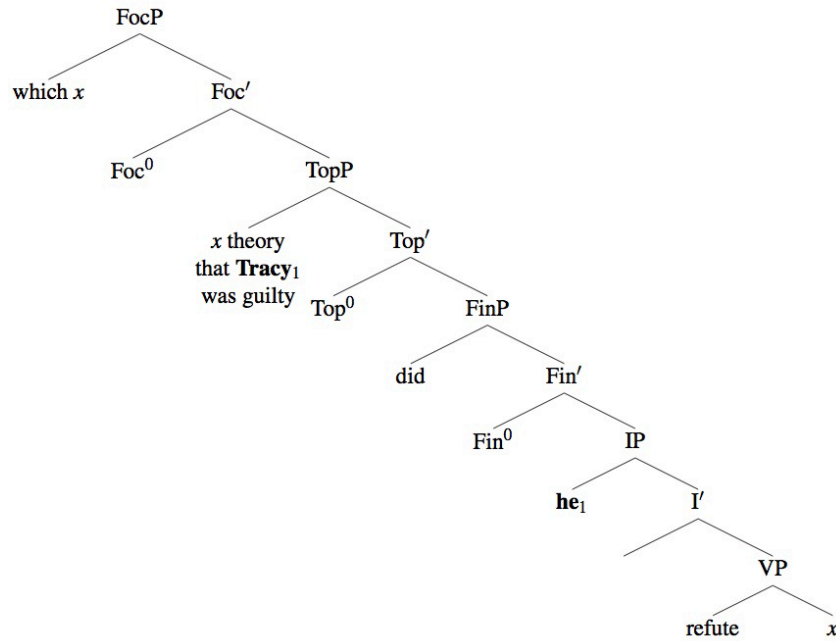
In (17), the *wh*-operator is interpreted in [Spec, FocP]. The D-linked *wh*-restriction is independently licensed in the left periphery as a topic in [Spec, TopP]. Notice that in this representation, the R-expression remains free, allowing for the coreference attested in (10). I suggest that the unrestricted variable in the trace position be interpreted as a PRO-like element. Through (16), the D-linked *wh*-restriction and this PRO enter into a long distance DP dependency, forming an extended chain with the *wh*-operator at LF. It should be noted that further investigation is needed to decide between a slightly different approach under which the *wh*-restriction in (17) is base-generated in [Spec, TopP] (though not relative to our anti-reconstruction effects, see Villa-García 2010 for discussion about this possibility).

Let's now consider the non-D-linked representation in (18).

(18) *How proud that Kenneth₁ owns a book did Liz say he₁ was?
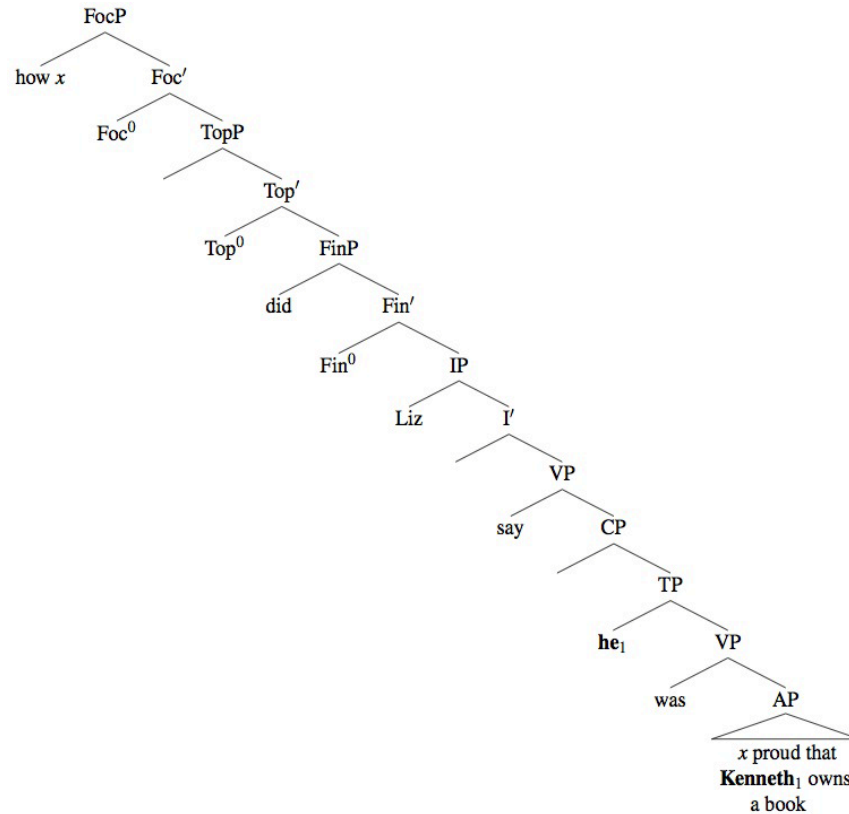
Notice that the non-D-linked *wh*-restriction is interpreted in its trace position. As Heycock (1995) and Huang (1993) have noted, reconstruction here is obligatory. Why is this? Non-D-linked *wh*-phrases such as *wh*-predicates are APs, thus restricting access to (16), which relates two DPs. As such, the Preference Principle enforces reconstruction, triggering the Condition C violation upon interpretation.

Before we move along to the next section, I would like to briefly comment on an issue brought up earlier, namely cases involving anaphors contained inside displaced D-linked *wh*-phrases. At the beginning of this section, I asked why the Preference Principle does not always enforce reconstruction for D-linked *wh*-movement. I suggested that in cases involving D-linked *wh*-phrases, the lexical restriction must be interpreted in the scope position for the derivation to converge, rendering the Preference Principle inapplicable. I take this to be the case here. Though it is not clear how to state the idea formally, there is

presumably an incompatibility interpreting a phrase marked [+topic] outside of the topic domain of the left-periphery. Of course, this problem completely disappears if the *wh*-restriction is base-generated in [Spec, TopP]. Since there is no movement, there will be no copies, thus no reconstruction. However, we are still left with the problem of (13) repeated below in (19).

(19) Which picture of herself$_1$ did Jenna think was most flattering?

  At this time, I do not have a satisfying solution to this problem. It is a problem for both the movement/PRO analysis and the base-generation analysis. One possibility is that the binding conditions somehow take precedence over topic-raising. Under the movement/PRO analysis, binding considerations outrank topic interpretation. This suggests an Optimality Theoretic approach to the evaluation of syntactic constraints, an issue well beyond the scope of this paper.

6. Consequences and Extensions

In this section, I will show that our D-linking analysis of the anti-reconstruction effects in (10) reveals a potential explanation for the lack of locality/island effects in certain instances of *wh*-extraction from ellipsis. Notice that *wh*-extraction from a sluicing site (=IP) is well-formed (20), but *wh*-extraction from a VP-ellipsis site is ungrammatical (21).

(20) *Sluicing*
    Frank criticized someone, but I don't remember who$_1$ [$_{IP}$ ~~Frank criticized~~ ~~t_1~~].

(21) *VP-ellipsis*
    *Frank criticized someone, but I don't remember who he did [$_{VP}$ ~~criticize~~ ~~t_1~~].

To capture this contrast, Merchant (2008) proposes a novel constraint on the ellipsis operation, *MaxElide*. Informally, MaxElide states that when possible, elide more rather than less.

(22) *MaxElide*
    Let XP be an elided constituent containing an A'-trace. Let YP be a possible target for deletion. YP must not properly contain XP (XP $\not\subset$ YP).

  Given that the conditions for (IP and VP) ellipsis are met in (20) and (21), and both involve an elided constituent that contains an A'-trace, MaxElide selects the sluice in (20) since it elides more material than VP-ellipsis.

Fox & Lasnik (2003; henceforth F&L) provide an alternative account of the contrast in (20)-(21). For F&L, the parallelism constraint on ellipsis is inviolable. If there is no successive-cyclic movement in the antecedent, then there can be none in the target. Representationally, this equates to the statement that if there are no intermediate traces in the antecedent, then there can be none in the target. To satisfy parallelism, they argue that the *wh*-phrase moves in one-fell-swoop to its landing site. This type of movement, which does not leave any intermediate traces, radically violates locality. To track locality violations, F&L adopt Chomsky's (1972) * notation, whereby a * is assigned to an island barrier when it is crossed. The offending *-marked island can be "repaired" so long as it is removed via (PF-)deletion. Notice that in the sluicing example, repeated below in (23), all of the crossed island barriers are elided, whereas at least one remains in the VP-ellipsis example repeated in (24).

(23) *Sluicing*
   Frank hit someone, but I don't remember who$_1$ [$_{IP}$ * Frank hit t_1].

(24) *VP-ellipsis*
   *Frank hit someone, but I don't remember who [$_{IP}$ * he did [$_{VP}$ hit t_1]].

6.1 Empirical problems for the sluicing/VP-ellipsis asymmetry

Parker & Seely (2010; henceforth P&S) reveal several cases where the conditions for MaxElide are met, but where sluicing and VP-ellipsis are not in the predicted complementary distribution. Instead both sluicing and VP-ellipsis are allowed. Consider (25) and (26).

(25) *Sluicing*
   a. Frank hit some of the workers, and I know exactly which ONES.
   b. I know WHAT Pete will read, and I also know WHEN.

(26) *VP-ellipsis*
   a. Frank hit some of the workers, and I know exactly which ONES he did.
   b. I know WHAT Pete will read, and I also know WHEN he will.

P&S attribute the acceptability of *wh*-extraction from VP-ellipsis in (26) to the fact that the *wh*-phrase is D-linked and stressed. In short, they propose that the trace of a displaced D-linked *wh*-phrase is not constrained by MaxElide (i.e. it does "not count" as a true A'-trace as far as MaxElide is concerned).

6.2 Linking the analyses together

I would now like to show how the D-linking analysis we developed to account for the anti-reconstruction effects in (10) could be linked up to the P&S analysis for *wh*-extraction from VP-ellipsis in (26). One question that the P&S proposal raises is *why* doesn't the trace of a displaced D-linked *wh*-phrase count as a "true" *wh*-trace? Recall that under our D-linking analysis for the anti-reconstruction effects, we proposed that the trace of a D-linked *wh*-phrase is a PRO. According to the formal statement in (22), MaxElide applies only over instances for which the elided constituent contains an A'-trace. PRO and A'-trace are not equivalent, and as such MaxElide will not apply over instances of D-linked *wh*-extraction (from sluicing or VP-ellipsis). The idea holds also for the Villa-García (2010) base-generation hypothesis: if the D-linked *wh*-restriction is base-generated in [Spec, TopP], then there is no movement, hence no A'-trace relevant for MaxElide.

One potential problem for the P&S analysis is that according to F&L, at least one * will remain in (26). However, recall that D-linked *wh*-movement is not subject to locality. As such, D-linked *wh*-extraction from VP-ellipsis in (26) (or from sluicing for that matter) will not introduce any *-markings (i.e. D-linked *wh*-movement flies under the radar of the *-marking mechanism because it is exempt from locality). Furthermore, D-linked *wh*-movement will not introduce any intermediate traces, thereby satisfying parallelism. Again, this idea holds for the base-generation hypothesis: since there is no movement to begin with, no barriers will be crossed.

From this, we predict *wh*-extraction involving non-D-linked *wh*-predicates (such as those in (11)) to be acceptable when followed by sluicing, but unacceptable when followed by predicate/AP-ellipsis. This prediction is borne out in (27).

(27) Jack is somewhat likely to leave, but …
      a. I don't know exactly how likely.   (sluicing)
      b. *I don't know exactly how likely he is.   (Predicate-ellipsis)

The unacceptability of (27b) follows from the fact that APs such as *how likely* do not have access to the long-distance binding mechanism in (16). As such, movement in (27) takes place in one fell swoop. Just as in (23), sluicing in (27a) eliminates all of the *-markings, but at least one crossed barrier with a *-marking remains in (27).

7. Conclusion

The main goal of this paper was to account for the unpredicted anti-reconstruction effects in (10). The effects were signaled by the lack of predicted Condition C effects. Following Rizzi (1997, 2003), we pursued a D-linking

analysis that helped us capture the relevant contrast between those expressions that give rise to the predicted Condition C effects under reconstruction and those that do not. We then saw how this analysis could be linked up to the P&S analysis for the acceptability of D-linked *wh*-extraction from VP-ellipsis.

From an empirical standpoint, it remains to be seen how the analysis we pursued here maps onto languages that exhibit more complex *wh*-behavior. For example, it would be interesting to see how our analysis handles languages that exhibit multiple *wh*-fronting and multiple *wh*-sluicing (e.g. Polish). Also, because there is such wide-spread variation in acceptability judgments reported in the literature for our examples, this area of research would benefit greatly from controlled experimental studies designed to determine the precise status of the reported examples.

Many questions also arise at the theoretical level. For example, why should something like the Preference Principle in (9) hold? It would also be interesting to see if we can develop a better understanding of what it means to be D-linked. Why should D-linked *wh*-movement be exempt from locality? How is it that its referential link to the discourse gives rise to a whole slew of exceptional syntactic behaviors? These are certainly difficult questions to answer, but they should keep us writing and exploring for some time to come.

Notes

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[i] More neutrally, this phenomenon is known as *connectivity* (Heycock 1995).

[ii] Further highlighting the nature of selective deletion is the example below, where either copy may contribute to the meaning of the sentence (Chomsky 1993 ex. (35)). In this example *himself* may be interpreted as being coreferential with either *John* or *Bill,* depending on which copy is selected for interpretation.

(i)   a. John wondered which picture of himself Bill saw
      b. John wondered [which picture of himself] Bill saw [which picture of himself].

[iii] This effect is not to be confused with the Freidin (1986) and Lebeaux (1988) argument/adjunct asymmetry noted below.

(i) a. Which award that Liz$_1$ won did she$_1$ display in her dressing room?
   b. *Which report that Liz$_1$ was incompetent did she$_1$ shred yesterday?

The *wh*-phrase in (ia) contains an R-expression inside a relative clause adjunct, whereas (ib) contains an R-expression inside an argument. According to their judgments, disjointness of reference is enforced in (ib), but coreference is acceptable in (ia). The idea behind their account is that

adjuncts can undergo late insertion. Speakers polled by Barss (2003) found no difference between these argument/adjunct examples.

[iv] Heycock (1995) outlines several other problems for predicate-internal traces.

[v] For discussion of what it means to be non-referential see Kroch (1998). Following Heycock (1995), the non-referential *how*-phrases that we are interested in here quantify over amounts, rather than other entities. See her footnote 16.

[vi] This follows from the idea that economy-based principles such as the Preference Principle in (9) only compare convergent derivations.

[vii] According to Rizzi's judgments, extraction of D-linked *wh*-phrases from a *wh*-island is marginal. I find these examples to be just fine, with little to no deviance in acceptability.

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Clefts and Free-Relatives in Japanese
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1. Introduction[1]

1.1 Data

Clefts in Japanese have stimulated a number of studies (Hiraiwa and Ishihara to appear and references therein), but it has not been explored sufficiently how clefts, as in (1)[2], differ from free-relatives (f-relatives), as in (2).

(1)   [*Nai-ta*]   *no*   *wa*   *Tom*   *da*.
        [cry-PAST]   TOP   Tom   COP
        'It is Tom that cried.'

(2)   [*Nai-ta*]   *no*   *wa*   *nige-ta*.
        [cry-PAST]   TOP   run.away-PAST
        'The person who cried ran away.'

Both clefts/f-relatives contain a clause with a gap. The clause is bracketed, and the gap in these cases is a subject of the predicate *nai*. This clause is headed by *no* and the *no*-headed part may be topicalized by *wa*. The category of *no* is discussed in §3. In both clefts and f-relatives, a predicate in the *no*-headed part (i.e. *nai*) is conjugated as an "ad-nominal" form, rather than a "conclusive" from, which is used to end a sentence in a declarative.).

Despite these similarities, clefts and f-relatives display distinct properties. First, the cleft (1) is "specificational"; *nai-ta no* represents some sort of variable, and its value is specified by the content of *Tom*. By contrast, the f-relative (2) is "predicational"; *nai-ta no* refers to a fixed entity, to which a certain property is ascribed by the content of *nige*.[3] Second, *no* in the f-relative (2) has some type of connotation, but *no* in the cleft (1) does not. For instance, *no* in (2) may express a derogatory connotation, though the type of connotation is context-dependent; thus, in the f-relative (3), *no* expresses something like "familiarity" to the denoted person (Seraku 2010).

(3)   *Ano-wakai*   *no*   *wa*   *ganbatteiru*   *njyanai?*
        that-young   TOP   working.hard   isn't.he
        'That young person is working hard, isn't he?'

Third, as observed by Nishiyama (2003) among others, *nai-ta no* in clefts may be followed by *sore* but not *kare*; the situation is opposite in f-relatives.

(4)   *Nai-ta*   *no,*   *sore/*kare*   *wa*   *Tom*   *da.*[4]
         cry-PAST   it/he   TOP   Tom   COP

(5)   *Nai-ta*   *no,*   **sore/kare*   *wa*   *nige-ta.*
         cry-PAST   it/he   TOP   run.away-PAST

To sum up the data, in spite of their affinities, clefts and f-relatives behave differently. A challenge is how to capture both parallelisms and differences in an explanatory way. This is what the present paper is about.

1.2 Outline

Though the number of previous studies which tackle the relation between clefts and f-relatives is small, the tendency is to argue that their differences come from a syntactic/lexical ambiguity, especially the different categories of *no*; thus, *no* in clefts is often seen as complementizer, and *no* in f-relatives pronominal (e.g. Kizu 2005, Matsuda 2000). An exception is Hasegawa (1997), according to which *no* is pronominal in both clefts and f-relatives. Despite this uniform characterization of *no*, it ends up stipulating a rule for the interpretation of pronominal *no* in f-relatives.

This paper agrees with Hasegawa (1997) in regarding *no* as pronominal uniformly, but proposes that the differences between clefts and f-relatives are reducible to an independently motivated property of language use, "Semantic Incrementality" (cf. Rayner and Clifton 2009). Basic insights have been put forward in Seraku (2010); the present paper, then, advances the insights.

In §2, a model of Semantic Incrementality, Dynamic Syntax is introduced. Couched within this framework, §3 tackles the cleft/f-relative divide, and §4 discusses a number of consequences.

2. Dynamic Syntax

Dynamic Syntax (DS) is a grammar formalism of "Knowledge of Language," or a set of constraints on the incremental growth of semantic representation (Cann et al. 2005, Kempson et al. 2001). In this conception of Knowledge of Language, there is no syntactic structure, and a string of words is mapped onto semantic structure on the basis of left-to-right parsing.

The growth of semantic structure is motivated by some combination of the three types of action: (a) actions run by the DS system, (b) actions run by the parsing of lexical items, and (c) actions run by pragmatic inference. The last one indicates that the DS system is not encapsulated; thus, pragmatic inference intrudes into the growth of semantic structure. Following Cann et al.

(2005) and Kempson et al. (2001), this paper adopts Relevance-Theoretic pragmatics (Sperber and Wilson 1995).

To illustrate, let me show how the string (6) is progressively mapped onto semantic structure word-by-word.

(6) *Otoko-ga*   *nige-ta.*
     man-NOM   run.away-PAST
     'A man ran away.'

The initial state is (7).[5] "?t" is a requirement that the node be decorated with type-t content. In this sense, the growth of semantic structure is goal-driven, the goal being to construct a type-t content, or the interpretation of the string.

(7)   ?t   (8)   ?t

                                    (ε , x, *otoko'*(x)) : e

Once the initial state is set out, the parsing of (6) starts. The first item is *otoko*. As Japanese allows permutation of arguments, *otoko* may be a subject or an object, and so on. So, the node for *otoko* is underspecified and later gets fixed. This fixation is made by the parsing of the next item *ga*, which fixes the node for *otoko* as a subject, as shown in (8). In this structure, a subject node is decorated with two pieces of information. First, the content of *otoko* is notated as (ε , x, *otoko'*(x)) in "Epsilon Calculus": ε is an existential operator that binds the variable x, and *otoko'* is a restrictor on the variable. Second, "e" indicates that the content at this node is of type-e. Within DS, all quantified expressions are treated as a type-e term.

The next item to be parsed is a one-place predicate *nige*. Since Japanese is a pro-drop language, a predicate constructs an open proposition with gaps for arguments. Thus, the parsing of *nige* updates the tree (8) into (9), where a gap for a subject has been already identified as the node for *otoko*.

(9)   ?t   (10)   *nige'*(ε , x, *otoko'*(x)), PAST : t

(ε , x, *otoko'*(x)) : e   *nige'* : <e, t>   (ε , x, *otoko'*(x)) : e   *nige'* : <e, t>

Finally, functional application takes place, and the parsing of the tense marker *ta* decorates the root node with tense information. The final state of the growth of semantic representation is presented in (10). The tree in (10) is "well-formed" in the sense that it has no outstanding requirements (i.e. "?").

Once a proposition is built up, it is "evaluated": thus, each term stores a record of the proposition by enriching restrictors, and this record-storing results in an E-type interpretation of the term. To take (10) as an example, the proposition *nige'*(ε , x, *otoko'*(x)) is evaluated as *nige'*(a), where "a" is the E-type entity (ε , x, *otoko'*(x)&*nige'*(x)).

To summarize, the set of DS constraints, together with pragmatic inference,

maps a string of words onto semantic structure incrementally.

3. Proposals

Before making the proposals, it should be clarified how "gaps" are notated. Based on Kempson and Kurosawa (2009), I assume that the parsing of *nai-ta* in the cleft (1) and the f-relative (2) yields the structure (11) uniformly.[6]

(11) $nai'(\varepsilon, x, P(x))$, PAST : t

$(\varepsilon, x, P(x))$: e nai' : <e, t>

In (11), a gap is represented as $(\varepsilon, x, P(x))$, where "P" is a maximally abstract restrictor. This paper assumes that if a term involves "P," the term is not referential unless "P" is specified as a concrete restrictor.

   With this preliminary remark in mind, let me make two proposals in order to model the parallelisms and differences between clefts and f-relatives.

3.1 The entry of *no*: Capturing the parallelisms

The first proposal is concerned with *no*. Cann et al. (2005) and Otsuka (1999) claim that *no* in Head-Internal Relatives (HIRs) is pronominal nominalizer.[7, 8] The lexical entry of *no* is given as follows (Cann et al. 2005: 285).[9]

(12)
IF	Ty(t)	
THEN	IF	Fo(ϕ(a))
	THEN	make(<L^{-1}>); go(<L^{-1}>); put(Fo(a), Ty(e))
	ELSE	Abort
ELSE	Abort	

My contention is that *no* in clefts and f-relatives is characterized in the same way. Thus, the lexical constraint (12) updates the structure (11) into (13).

(13)   *"no"*
   $nai'(\varepsilon, x, P(x))$, PAST : t $(\varepsilon, x, P(x)\&nai'(x))$: e

$(\varepsilon, x, P(x))$: e nai' : <e, t>

So far, we have parsed *nai-ta no*. At this stage, the tree transition of clefts and f-relatives is exactly the same. In this way, our entry of *no* enables a uniform treatment of clefts and f-relatives (and HIRs).

   In this analysis, since *no* is a pronominal nominalizer, the clause preceding *no* is an ad-nominal clause. This is why a predicate within a *no*-headed part (i.e. *nai*) is conjugated as an "ad-nominal" form, as mentioned in §1.1.

   Finally, let's discuss the connotation of pronominal *no*. It has been noted

that if pronominal *no* refers to humans, it expresses a derogatory connotation (cf. Kuroda 1992), though it is not always derogatory (cf. §1.1.). In DS terms, this constraint on *no* can be re-stated as (14).

(14)   A connotation emerges when "P" in the term induced by *no* is specified as a human property.

(14) looks a description, but a deeper explanation may obtain if we suppose that (14) is a result of pragmatic inference. It would not be illicit to assume that pronominal *no* primarily refers to "things," and that if a speaker uses *no* to refer to humans, it is as if the denoted humans were treated as "things." Together with contextual premises, this would engender a certain connotation, like "derogatory." This pragmatic explanation needs to be further elaborated, but, given our current concern, the rest of the paper simply adopts (14).[10]

3.2 The timing of specifying "P": Capturing the differences

An intuition behind the differences between clefts and f-relatives has to do with "referentiality" (cf. Nishiyama 2003): *nai-ta no* in f-relatives refers to an entity, whereas *nai-ta no* in clefts does not. This leads me to propose that the non-referential term (ε , x, P(x)&*nai'*(x)), which is induced by *nai-ta no*, is made referential in f-relatives, but not in clefts.

First, in f-relatives, the term (ε , x, P(x)&*nai'*(x)) is made referential by specifying "P" pragmatically, by the time we process an item to be parsed after *no*, namely *wa*. This "pragmatic" specification is motivated by the fact that the referent of *nai-ta no* varies across contexts; it may refer to "the person who cried," "the student who cried," and so on.

Second, in clefts, the term (ε , x, P(x)&*nai'*(x)) is not made referential, since *nai-ta no* does not refer to anything. Rather, as will be argued in §4.2, "another occurrence" of the term becomes referential by the parsing of a pre-copula item. That is, in case of clefts, a specification process is delayed.

The above idea is formulated as in (15), the crux of which is the "timing" at which a "semantic" restrictor is specified. This insight can be implemented only in a framework that models "Semantic Incrementality." This is where the DS architectural design comes into play.

(15)   The cleft/f-relative divide is reduced to the timing of specifying "P."
  -   <u>F-relatives</u>: "P" has been specified by the time we parse *wa*.
  -   <u>Clefts</u>: "P" is specified when we parse a pre-copula item.

3.3 Summary

In a nutshell, *no* in clefts and f-relatives is uniformly viewed as a pronominal nominalizer, and the cleft/f-relative divide reflects Semantic Incrementality.

4. Analyses

4.1 Free-relatives

This section explores the properties of the f-relative (2), repeated here as (16). According to the first proposal in §3.1, the parsing of *nai-ta no* results in the structure (13), cited again as (17).

(16)   *Nai-ta   no   wa   nige-ta.*
         cry-PAST   TOP   run.away-PAST
         'The person who cried ran away.'

(17)
         nai'(ε , x, P(x)), PAST : t   (ε , x, P(x)&*nai'*(x)) : e
                                     "*no*"

(ε , x, P(x)) : e   *nai'* : <e, t>
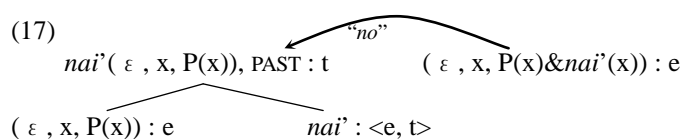
Then, due to the second proposal in §3.2, "P" is specified pragmatically at this stage.[11] Let's suppose that it is consistent with the Principle of Relevance to specify "P" as *hito'* (= *human'*). (In other contexts, "P" is specified as, say, *student'*.) This specification updates the term into (ι , x, *hito'*(x)&*nai'*(x)), where the existential operator ε has been replaced with the iota operator ι , on the assumption that the term is referential and definite.[12]

(18)
         nai'(ε , x, P(x)), PAST : t   (ι , x, *hito'*(x)&*nai'*(x)) : e
                                     "*no*"

(ε , x, P(x)) : e   *nai'* : <e, t>
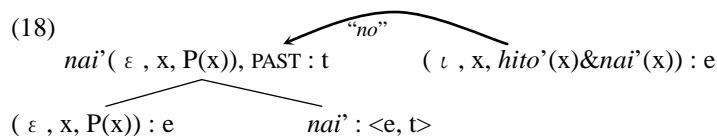
Two remarks are to be made. First, since the parsing of *nai-ta no* results in a term referring to a human, it is correctly predicted that it is referred to by a personal pronoun *kare*, but not a non-personal pronoun *sore*. Second, "P" is specified as the human property *hito'*. This is why a connotation emerges in (16), due to the generalization (14) in §3.1.[13] In (16), because of the predicate *nai*, only humans are referred to; but in (19), "P" is specified as, say, *thing'*, *book'*, and so on, and in these cases, as we expect, no connotation arises.

(19)   *Tom-ga   katta   no   wa   yogoreteita.*
         T.-NOM   bought   TOP   was.dirty
         'The thing that Tom bought was dirty.'

The rest of the tree transition is as usually conceived within DS (Cann et al. 2005). As shown in (20), the topic marker *wa* builds up a type-t node, and posits ?<D>(ι , x, *hito'*(x)&*nai'*(x)), a requirement that some node below the type-t node be decorated with (ι , x, *hito'*(x)&*nai'*(x)).

(20)   "*no*"

$$nai'(\,\varepsilon\,,\text{x},\text{P(x)}),\text{PAST}:\text{t} \qquad (\,\iota\,,\text{x},\textit{hito'}(\text{x})\&\textit{nai'}(\text{x})):\text{e}$$
$$\downarrow\text{``wa''}$$
$$(\,\varepsilon\,,\text{x},\text{P(x)}):\text{e} \qquad \textit{nai'}:\text{<e, t>} \qquad ?\text{<D>}(\,\iota\,,\text{x},\textit{hito'}(\text{x})\&\textit{nai'}(\text{x})),\,?\text{t}$$
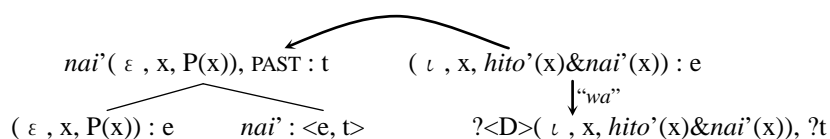
The predicate *nige* then constructs an open proposition with a gap for a subject, which is notated with a meta-variable "U."

(21)
$$nai'(\,\varepsilon\,,\text{x},\text{P(x)}),\text{PAST}:\text{t} \qquad (\,\iota\,,\text{x},\textit{hito'}(\text{x})\&\textit{nai'}(\text{x})):\text{e}$$
"no"
$$\downarrow\text{``wa''}$$
$$(\,\varepsilon\,,\text{x},\text{P(x)}):\text{e} \qquad \textit{nai'}:\text{<e, t>} \qquad ?\text{<D>}(\,\iota\,,\text{x},\textit{hito'}(\text{x})\&\textit{nai'}(\text{x})),\,?\text{t}$$
$$\text{U}:\text{e} \qquad \textit{nige'}:\text{<e,t>}$$
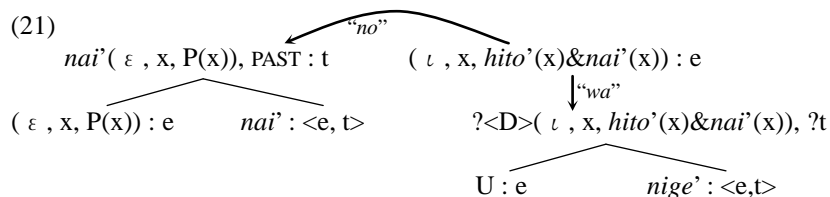
In order to satisfy the requirement posited by *wa*, the meta-variable "U" is substituted with $(\,\iota\,,\text{x},\textit{hito'}(\text{x})\&\textit{nai'}(\text{x}))$. Functional application then takes place, and the tense marker *ta* adds tense information. The final state is (22).

(22)
$$nai'(\,\varepsilon\,,\text{x},\text{P(x)}),\text{PAST}:\text{t} \qquad (\,\iota\,,\text{x},\textit{hito'}(\text{x})\&\textit{nai'}(\text{x})):\text{e}$$
"no"
$$\downarrow\text{``wa''}$$
$$(\,\varepsilon\,,\text{x},\text{P(x)}):\text{e} \qquad \textit{nai'}:\text{<e, t>} \qquad \textit{nige'}(\,\iota\,,\text{x},\textit{hito'}(\text{x})\&\textit{nai'}(\text{x})),\text{PAST}:\text{t}$$
$$(\,\iota\,,\text{x},\textit{hito'}(\text{x})\&\textit{nai'}(\text{x})):\text{e} \qquad \textit{nige'}:\text{<e,t>}$$
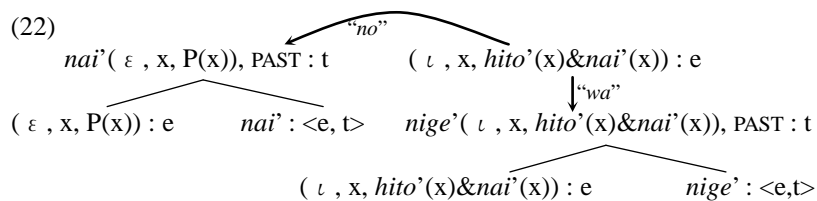
From this structure, the predicational nature of f-relatives follows; thus, the predicate *nige'* applies to the fixed entity $(\,\iota\,,\text{x},\textit{hito'}(\text{x})\&\textit{nai'}(\text{x}))$.

This sub-section has illustrated how the proposals made in §3 successfully work for f-relatives. The next sub-section turns to clefts.

4.2 Clefts

This sub-section is devoted to the analysis of the cleft (1), repeated here as (23). As with f-relatives, the parsing of *nai-ta no* gives rise to the structure (13), cited again as (24).

(23)   *Nai-ta*   *no*   *wa*   *Tom*   *da.*
         cry-PAST   TOP   T.   COP
         'It is Tom that cried.'

(24)
$$nai'(\,\varepsilon\,,\text{x},\text{P(x)}),\text{PAST}:\text{t} \qquad (\,\varepsilon\,,\text{x},\text{P(x)}\&\textit{nai'}(\text{x})):\text{e}$$
"no"
$$(\,\varepsilon\,,\text{x},\text{P(x)}):\text{e} \qquad \textit{nai'}:\text{<e, t>}$$
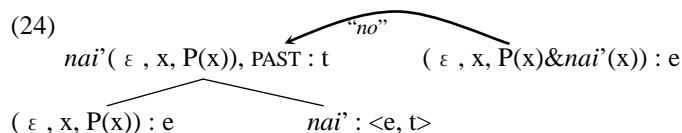
This time, however, "P" is not specified pragmatically, and the tree transition proceeds.[14] After the parsing of *nai-ta no wa*, (24) has been updated as (25).

(25)

$$nai'(\,\varepsilon\,, x, P(x)), \text{PAST}:t \qquad \overset{\text{``no''}}{\curvearrowleft} \qquad (\,\varepsilon\,, x, P(x)\&nai'(x)):e$$

$$(\,\varepsilon\,, x, P(x)):e \qquad nai':<e, t> \qquad \downarrow^{\text{``wa''}}$$

$$?<D>(\,\varepsilon\,, x, P(x)\&nai'(x)), ?t$$
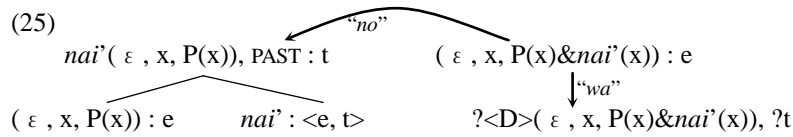
Note that the term induced by *nai-ta no* is still non-referential, since "P" is not specified at all. This explains why *nai-ta no* in clefts may be referred to by a non-personal pronoun *sore* (= 'it') but not by a personal pronoun *kare* (= 'he'). Also notice that "P" in the term induced by *no* remains intact; due to the generalization (14) in §3.1, no connotation is detected.

The propositional node induced by *wa* is fleshed out by "re-running" the action associated with *nai* (Cann et al. 2007).[15] This gives rise to an open proposition with a gap, which is notated as a meta-variable "U" in (26). This meta-variable "U" is substituted with ($\,\varepsilon\,$, x, P(x)&*nai'*(x)) in order to satisfy the requirement ?<D>($\,\varepsilon\,$, x, P(x)&*nai'*(x)), as shown in (27).

(26)

$$nai'(\,\varepsilon\,, x, P(x)), \text{PAST}:t \qquad \overset{\text{``no''}}{\curvearrowleft} \qquad (\,\varepsilon\,, x, P(x)\&nai'(x)):e$$

$$(\,\varepsilon\,, x, P(x)):e \qquad nai':<e, t> \qquad \downarrow^{\text{``wa''}}$$

$$?<D>(\,\varepsilon\,, x, P(x)\&nai'(x)), ?t$$

$$U:e \qquad nai':<e, t>$$

(27)

$$nai'(\,\varepsilon\,, x, P(x)), \text{PAST}:t \qquad \overset{\text{``no''}}{\curvearrowleft} \qquad (\,\varepsilon\,, x, P(x)\&nai'(x)):e$$

$$(\,\varepsilon\,, x, P(x)):e \qquad nai':<e, t> \qquad \downarrow^{\text{``wa''}}$$

$$?<D>(\,\varepsilon\,, x, P(x)\&nai'(x)), ?t$$

$$(\,\varepsilon\,, x, P(x)\&nai'(x)):e \qquad nai':<e, t>$$
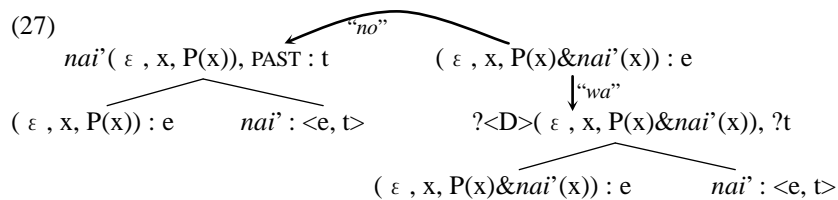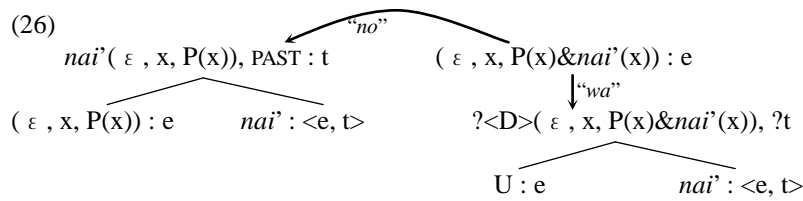
To process the next item *Tom*, a link transition is induced, as shown in (28). Then, the content of *Tom* is reflected in another node by the evaluation rule, like (29).[16] The evaluation process models the specificational nature of clefts; the content of *Tom* specifies "P," which is originally induced by *nai-ta no*.

(28)

$$nai'(\,\varepsilon\,, x, P(x)), \text{PAST}:t \qquad \overset{\text{``no''}}{\curvearrowleft} \qquad (\,\varepsilon\,, x, P(x)\&nai'(x)):e$$

$$(\,\varepsilon\,, x, P(x)):e \qquad nai':<e, t> \qquad \downarrow^{\text{``wa''}}$$

$$?<D>(\,\varepsilon\,, x, P(x)\&nai'(x)), ?t$$

$$(\,\iota\,, x, Tom'(x)):e \qquad (\,\varepsilon\,, x, P(x)\&nai'(x)):e \qquad nai':<e, t>$$

(29)   "no"

$$nai'(\varepsilon, x, P(x)), \text{PAST} : t \qquad (\varepsilon, x, P(x)\&nai'(x)) : e$$

$$\downarrow \text{"wa"}$$

$$(\varepsilon, x, P(x)) : e \qquad nai' : <e, t> \qquad ?<D>(\varepsilon, x, P(x)\&nai'(x)), ?t$$

$$(\iota, x, Tom'(x)) : e \qquad (\iota, x, Tom'(x)\&nai'(x)) : e \qquad nai' : <e, t>$$
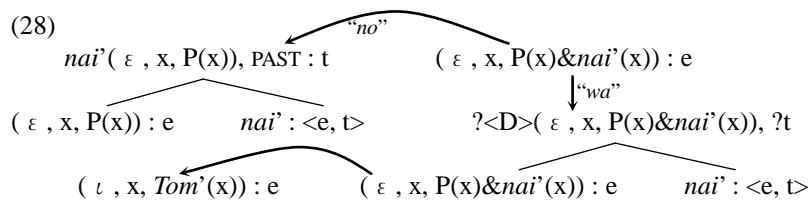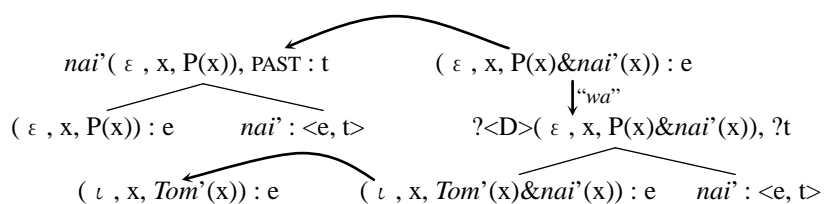
In (29), the requirement $?<D>(\varepsilon, x, P(x)\&nai'(x))$ is still satisfied, since a subject node is decorated with $(\iota, x, Tom'(x)\&nai'(x))$, which entails $(\varepsilon, x, P(x)\&nai'(x))$.

The last item to be parsed is the copula *da*. I assume that the copula is a focus marker (cf. Hiraiwa and Ishihara to appear), and that it does not change the semantic structure.[17] The remainder of the tree transition is omitted since it involves usual processes; the complete structure is given in (30).

(30)

$$nai'(\varepsilon, x, P(x)), \text{PAST} : t \qquad (\varepsilon, x, P(x)\&nai'(x)) : e$$

$$\text{"no"}$$

$$\downarrow \text{"wa"}$$

$$(\varepsilon, x, P(x)) : e \qquad nai' : <e, t> \qquad nai'(\iota, x, Tom'(x)\&nai'(x)) : t$$

$$(\iota, x, Tom'(x)) : e \qquad (\iota, x, Tom'(x)\&nai'(x)) : e \qquad nai' : <e, t>$$
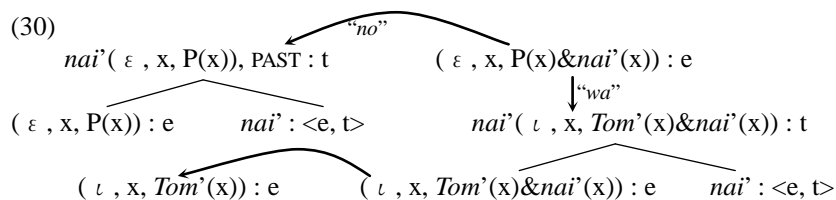
In this way, the proposals made in §3 explicate the intriguing properties of clefts. This analysis is straightforwardly extendable to other cases of clefts. Recall that our entry of *no* requires that a term to be copied be of type-e. Thus, we correctly predict the grammaticality of the clefts (31), where the content of a gap is of type-e (cf. Marten 2002). By contrast, the cleft (32) is ungrammatical, as *isya* is a predicate nominal of type-<e, t>, not of type-e.

(31)   *Tom-ga*   *umareta*   *no*   *wa*   *kinoo/Oxford*   *da.*
       T.-NOM   was.born   TOP   yesterday/Oxford COP
       'It is yesterday/in Oxford that Tom was born.'

(32)   **Tom-ga*   *dearu*   *no*   *wa*   *isya*   *da.*
       T.-NOM   COP   TOP   doctor   COP
       'It is a doctor that Tom is.'

4.3 Summary

The upshot is that the single entry of *no* as a pronominal nominalizer handles both clefts and f-relatives in a unified way, while their differences mentioned in §1.1 boil down to Semantic Incrementality. In the next section, a number of interesting consequences of the analyses are examined.

5. Consequences

5.1 Nature of *no*

As noted in Kamio (1983) and others, *no* cannot stand in its own, as shown in the contrast between (33) and (34).

(33)   *Aoi*   *no*   *ga*   *tondeiru.*
         blue   NOM   is.flying
         'The blue one is flying.'

(34)   **No*   *ga*   *tondeiru.*
                   NOM   is.flying

This is because the entry of *no* requires that a proposition has been built up. In (33), the proposition *aoi*'(ε , x, P(x)) has been created before the parsing of *no*, but in (34), no proposition has been constructed.[18]

In this connection, Kamio (1983) points out that demonstratives and certain determiners cannot precede *no*, as in (35). This is fully expected; no proposition has been created before the parsing of *no*. Notably, (36), which differs minimally from (35), is perfectly acceptable. This is because, due to the adjective *takai*, the proposition *takai*'(ε , x, P(x)) has been constructed.

(35)   **Ano*   *(no)*   *wa*   *omoshiroi.*[19]
         that   TOP   interesting

(36)   *Ano*   *takai*   *no*   *wa*   *omoshiroi*
         that   expensive   TOP   interesting
         'That expensive one (e.g. book) is interesting.'

5.2 Universal quantification

In general, f-relatives may involve universal quantification (van Riemsdijk 2006). In fact, the f-relative (2) in §1 has the reading (37).

(37)   *Nai-ta*   *no*   *wa*   *nige-ta*.
         cry-PAST   TOP   run.away-PAST
         'Everyone who cried ran away.'

This reading may be expected along the following lines. After "P" is specified, the term induced by *no* becomes an iota term; that is, it is a definite description. It is well-known that definite descriptions have "referential" and "attributive" usages (Donnellan 1966). I conjecture that the reading (37) can be equated with the attributive use of the definite description.

What then happens in clefts? Unlike f-relatives, in the case of clefts, the term induced by *no* itself does not become an iota term. Thus, it is predicted that no universal quantification is possible in clefts. At first glance, however, the cleft (1) in §1 seems to have the universally quantified readings (38a/b).

(38)	*Nai-ta*	*no*	*wa*	*Tom*	*da*.
	cry-PAST		TOP	Tom	COP

a. 'Whoever cried, he is Tom.'
b. 'Whoever cried, he has the name of Tom.'

As stressed in Seraku (to appear), however, (38a) is an "identity" reading whereas (38b) is a "predicational" reading in Declerck's (1988) sense. Thus, if the string (38) is interpreted as a cleft, there is no universal quantification.

5.3 Reconstruction in clefts

Since the content of a pre-copula item is reflected in a proposition induced by *wa*, reconstruction effects are anticipated. For instance, in (39), the anaphor *zibunzishin* is "bound" by the antecedent *Tom* in the propositional structure induced by *wa*. In (40), too, the bound variable *sokono* is "bound" by the antecedent *subeteno kaisya* in the propositional structure induced by *wa*.

(39)	*Tom$_i$-ga*	*semeta*	*no*	*wa*	*zibunzishin$_i$*	*da*.
	T.-NOM	blamed		TOP	self	COP

'It is himself$_i$ that Tom$_i$ blamed.'

(40)	*Subeteno*	*kaisya-ga*	*uttaeta*	*no*	*wa*
	every	company-NOM	sued		TOP
	sokono	*kogaisya*	*da*		
	its	subsidiary.company	COP		

'It is its subsidiary company that every company sued.'

Curiously, however, reconstructions of NPIs are not possible; thus, in (41), the NPI *nanimo* cannot be licensed at a pre-copula position.

(41)	**Tom-ga*	*kawa-nakat-ta*	*no*	*wa*	*nanimo*	*da*.
	T.-NOM	buy-NEG-PAST		TOP	anything	COP

Lit. 'It is anything that Tom didn't buy.'

As far as a semantic structure is concerned, there is no problem. Rather, the problem lies in "semantic contradiction." On the one hand, the parsing of *Tom-ga kawa-nakat-ta* only yields the interpretation (42) in Predicate Logic notation. On the other hand, the parsing of the NPI *nanimo* requires that the resulting proposition be (43). The set of these statements is contradictory in that they cannot be true simultaneously, hence the unacceptability of (41).

(42) $\exists x[P(x)\&\sim bought(x)(Tom)]$

(43) $\sim\exists x[P(x)\&bought(x)(Tom)]$

5.4 Island-insensitivity of clefts

Hoji (1990) reports that particle-less *Wa*-clefts (cf. Endnote 2) are insensitive to islands. The example below comes from Hiraiwa and Ishihara (to appear).

(44)   *Naoya-ga* [e$_i$ *kai-ta*   *hito*]-*o*   *hihanshi-ta*
           N.-NOM   [write-PAST   person]-ACC   criticize-PAST
           no   *wa*   *kono-ronbun*$_i$ *da*.
                  TOP   this-paper   COP
           'It is this paper$_i$ that Naoya criticized the person who wrote e$_i$'

In (44), what is copied by *no* is the term (45), where "a" stands for (ι , y, *hito*'(y)&*kai*'(x)(y)). After the parsing of *kono-ronbun*, nothing in our system prevents (45) from being updated into (46). Therefore, the island-insensitivity of clefts like (44) is correctly modelled.[20, 21]

(45)   (ε , x, P(x)&*hihanshi*'(a)(ι , z, *Naoya*'(z)))

(46)   (ι , x, *ronbun*'(x)&*hihanshi*'(a)(ι , z, *Naoya*'(z)))

5.5 Nominalizing-complementizer usage of *no*

In Japanese, *no* also has a nominalizing-complementizer function, as in (47).

(47)   *Tom-wa*   [*Mary-ga*   *kireina*   *no*]-*o*   *shitteiru.*
           T.-TOP   [M.-NOM   beautiful   ]-ACC   know
           'Tom knows that Mary is beautiful.'

Seraku (2010) suggests that if we incorporate event-variables of type-e into DS trees (Gregoromichelaki to appear), our lexical entry of *no* can also treat nominalizing-complementizer function of *no*.[22] The idea is that *no* copies an event-variable, which becomes an object for the predicate *shitteiru*.[23] This unitary approach to *no* is to be preferred over an ambiguity approach in terms of Modified Occam's Razor (Grice 1989), which states that other things being equal, "senses are not to be multiplied beyond necessity."[24]

   Seraku (2010) goes onto claim that clefts can be processed in two distinct ways (i.e. pronominal-/complementizer-based). The duality of tree transitions is vindicated by the dialectal data in Yoshimura and Nishina (2004).[25]

6. Conclusions

This paper has outlined the Dynamic-Syntax analyses of clefts and f-relatives (and HIRs; cf. §3.1) in Japanese. As argued in §3 and §4, their similarities are captured by the single lexical entry of *no* as a pronominal nominalizer, whereas their differences can be reduced to "Semantic Incrementality," an

independently motivated property of language use (cf. Rayner and Clifton 2009). In this sense, the analyses are unitary and explanatory. Furthermore, as surveyed in §5, the analyses are further corroborated by various syntactic and semantic characteristics of clefts and f-relatives.

To conclude, the uniform/explanatory nature of our analyses makes a good case for the "Incremental-Semantics" perspective in the fruitful modelling of the syntax and semantics of Japanese.

Notes

1. This paper benefited greatly from exchanges with David Cram, Mary Dalrymple, Stephen Horn, Ruth Kempson, Jieun Kiaer, and the participants of WECOL 2010. Any inadequacies remaining in the paper are solely my own.

2. Japanese has two types of clefts: *Wa*-clefts, where a *no*-headed part is marked by a topic marker *wa* and *Ga*-clefts, where a *no*-headed part is marked by a nominative marker *ga*. They display systematic syntactic/semantic/pragmatic differences (Hasegawa 1997, Kumamoto 1989).

Wa-clefts are further divided into sub-types, depending on whether a pre-copula item has a particle (Hoji 1990, Kuroda 2005). This paper focuses on the particle-less *Wa*-clefts as in (1), but some remarks are made for *Wa*-clefts with particles in Endnote 20.

3. For the terminology "specificational" and "predicational," this paper follows Declerck (1988), which, in my view, is one of the most coherent and thorough analyses of copula sentences.

4. (4) also has "predicational" and "identity" readings. If (4) is interpreted as either of these, *kare* but not *sore* can occur. For further details, see Seraku (to appear).

5. In Japanese, the end of a clause is signaled by a predicate, but, given the head-finality of the language, it may turn out that the clause is embedded. Embedding phenomena are modeled by means of the "Generalized Adjunction Rule" (Cann et al. 2005). For simplicity's sake, however, the application of this rule is disregarded in this paper.

6. Given that the predicate *nige* is applied to humans, the parsing of *nige* may have updated the term into, say, (ε , x, *hito*'(x)), where *hito*' = *person*'. If this happens, the parsing of *no* copies this updated term; in case of (2), this brings about the desired reading; in case of (1), this does not lead to a cleft-reading but an "identity" reading. For futher details, see Seraku (to appear).

7. In Cann et al. (2005), *no* is called just "nominalizer," but it is virtually seen as a pronominal nominalizer. One contribution of this paper is to show that the lexical entry of *no* defined in Cann et al. (2005) can model an instance of pronominal *no* like (i), which is an f-relative.

(i)   *Nai-ta*   *no*
     cry-PAST
     'The person (or the man, the student, etc.) who cried'

There is another case of pronominal *no*, as in (ii). It is widely held that *John no* in (ii) has the sequence of "*John* + genitive *no* + pronominal *no*," one of the two *no*s being covert (Saito and Murasugi 1990: 287). For dialectal evidence for this, see Yoshimura (2010).

(ii)   *Kono* *hon-wa*   *John* *no* *da*.
     this   book-TOP   J.   COP
     'This book is John's.'

This paper maintains that pronominal *no* as in (ii) forms a distinct item from pronominal *no* in (i). First, there is a gap of several centuries between the first attested occurrence of pronominal *no* as

in (i) and that of pronominal *no* as in (ii) (e.g. Nishi 2006, Wrona to appear). Second, they differ functionally: pronominal *no* as in (i) is a nominalizer, while *no* as in (ii) is not.

8. Our entry of *no* can be further generalized; §5.5 suggests that the same lexical entry of *no* can also model the "nominalizing-complementizer" function of *no*.

9. Within DS, every lexical item encodes constraints on the growth of semantic representation. The format for such constraints is "IF… THEN… ELSE…" The IF line states a condition; if the condition is satisfied, the parser performs the action(s) in the THEN line; if the condition is not satisfied, the parser performs the action(s) in the ELSE line. (In our entry of *no*, the THEN line states the actions of updating the semantic structure (11) into (13).)

10. Another characteristic of pronominal *no* is that it cannot refer to abstract things (Kamio 1983). In DS terms, this generalization can be re-stated as (i), though it is an open issue whether (i) must be lexically encoded or may be pragmatically derived.

(i) "P" in the term induced by *no* cannot be specified as an abstract property.

The idea is that *no* initially denotes a term containing a "maximally abstract" restrictor "P," but if we want to make it referential, "P" must be specified as a concrete, non-abstract restrictor.

11. The specification of "P" at this stage is motivated by our strong intuition that if we process the f-relative up to *nai-ta no*, we feel that some entity is referred to.

In addition, some cues may be available which signal that "P" must be specified at this stage. For instance, if a speaker utters the string by pointing out the entity referred to, it will suggest that "P" should be specified at this stage. Alternatively, if the thematic topic of an exchange is a certain entity, the speaker will be likely to refer to something, which will let the parser specify "P" at this stage. Another cue may be prosody. This issue is left for future research.

12. In some cases, the term is not definite. For instance, suppose the situation where a little girl asks her mother to give her one red candy out of 10 red candies. In this situation, *akai no* in (i) would refer to nothing definite. In this case, the term (ε , x, P(x)&*red*'(x)) continues to contain the existential operator ε after "P" is specified pragmatically as, say, *ame*' (= *candy*').

(i) *Akai   no   o   hitotsu   tyoodai*.
    red   ACC   1-CL   give.me.
    'Give me a red one.'

Thus, the replacement of the existential operator ε with the iota operator ι is optional, and it is a matter of pragmatic inference whether the replacement occurs.

In fact, there is a cross-linguistic tendency that the entities denoted by nominalized clauses are often indefinite. In Spanish, the nominalized clause in (ii), which is bracketed, does not refer to definite entities, even though it is marked by the definite article *el* (Shibatani 2009: 193).

(ii) *El   [que diga   que es mentira] es el   asesino*.
    ART   [that say.3SG.SBJNCT   that is false] is ART   killer
    'The (male) one who says that it is false is the killer.'

13. Kitagawa (2005: 1260, my modification) cites (i), stating that this is a case of f-relatives without connotations.

(i) *Zyoohin-na   obaasan*ᵢ *datta   ga,* [FR [IP proᵢ *sakki-kara   sikirini   zikan-o   ki-ni*
    well.dressed old.lady   was   but [[while-from   frequently time-ACC   mindful
    nasatteirassyat-ta]   *no* [N' proᵢ]]-*ga   tootoo   simpaisoo-ni   tatiagatta.*
    doing.be-HON-PAST]   [   ]]-NOM finally worriedly   stood.up
    'A well-dressed elderly lady she was, who, visibly concerned about the time, finally stood up worriedly.'

I agree that no connotation is expressed here, but object that (i) is not a case of f-relatives. A

possible DS analysis is that in (i), the apparent f-relative clause, marked by [$_{FR}$], is an adverbial clause; formally, this is modeled by assuming that *no* copies an "event-variable" of the clause (cf. Seraku 2010), and that the subject for the main predicate *tatiagatta* is a zero pronoun. (This analysis is close to the adverbial-clause analysis of head-internal relatives in Japanese such as Mihara (1994).) In this analysis, *no* refers not to humans but to an event, and so it is correctly predicted that no connotation arises.

14. Technically, there is no problem even if "P" is pragmatically specified at this point, as in (ι , x, *hito'*(x)&*nai'*(x)), for instance. Then, the parsing of the pre-copula item *Tom* further updates the term into (ι , x, *hito'*(x)&*nai'*(x)&*Tom'*(x)). Seraku (to appear) advocates that this updating process models the "identity" reading, which is paraphrased as 'the person who cried is the same person as Tom.'

15. The action associated with *nai* must be re-run here, but the lexical item *nai* itself cannot be explicitly uttered, like (i).

(i) **Nai-ta   no   wa   nai Tom da*.
     cry-PAST   TOP   cry T.   COP

First of all, for morphological reasons, *nai* cannot be uttered without a tense marker *ta* or other particles. Yet, even if *nai* in (i) is replaced with *nai-ta*, it is still ungrammatical, as in (ii).

(ii) **Nai-ta   no   wa   nai-ta   Tom da*.
      cry-PAST   TOP   cry-PAST   T.   COP

The problem in (ii) is that the parsing of the tense marker *ta* closes off the propositional structure induced by *wa*, which precludes the pre-copula item *Tom* from being processed.

Interestingly, however, there is another possible DS tree transition for (ii). If a parser analyzes the second occurrence of *nai-ta* as a relative clause, that is, if (ii) is analyzed as (ii'), (ii) can be parsed without problems, hence (ii) is predicted to be grammatical.

(ii') **Nai-ta   no   wa   [[$_{RC}$ nai-ta]   Tom]   da*.
       cry-PAST   TOP   [[cry-PAST]   T.]   COP

Why then is (ii) unacceptable? I suspect that the unacceptability lies not in parsability but in the redundancy arising from the duplication of the same predicate *nai*. This makes a prediction that if we replace the second occurrence of *nai* with another predicate, the string becomes acceptable. This prediction is borne out, as shown in (iii).

(iii) *Nai-ta   no   wa   [[$_{RC}$ shiai-ni   make-ta]   Tom]   da*.
       cry- PAST   TOP   [[game-DAT   lose-PAST]   T.]   COP
       'It is Tom, who lost the game, that cried.'

It is also plausible to suspect that a particular intonation exhibited by relative clauses facilitates a parser to process (iii) as involving a relative clause. For details, see Kurosawa (2003).

16. The link introduction and evaluation are made by means of general computational rules. For instance, the link evaluation rule is formalized as follows, which is a quite natural extension of the similar rule defined in Cann et al. (2005: 365).

$$\{…\{Tn(a), …, Fo(\varepsilon , x, P(x)), Ty(e), …\}\} \{\{<L^{-1}>\}Tn(a), …, Fo(\iota , x, \phi(x)), Ty(e), …, \diamond\} …\}$$
$$\overline{\{…\{Tn(a), …, Fo(\iota , x, \phi(x)), Ty(e), …, \diamond\}\} \{\{<L^{-1}>\}Tn(a), …, Fo(\iota , x, \phi(x)), Ty(e), …\} …\}}$$

17. This assumption is provisional. It is interesting to see how the tense information of the copula *da* contributes to the growth of semantic structure. This is a residual issue.

18. Given that DS is not encapsulated, one may wonder whether a proposition may be built up pragmatically. The answer is negative; as stated in §1.1, an embedded predicate is conjugated as an ad-nominal form, and it is reasonable to assume that the pragmatic build-up of a proposition cannot reflect such linguistic notions as ad-nominal forms.

19. The curly bracket of *no* in this example ensures that the unacceptability of the sentence is not due to the consecutive instances of /no/ (cf. Saito and Murasugi 1990).

20. Hoji (1990) also observes that *Wa*-clefts with particle are sensitive to islands. Another characteristic of this type of clefts is that they allow multiple pre-copula elements. My current idea is that in this type of cleft, *no* copies an event-variable (cf. §5.5). After the parsing of *wa*, a type-t node emerges, which is a right environment in which pre-copula items are processed as an instance of "scrambling." Then, the characteristics of this type of cleft (e.g. island-sensitivity, multiple pre-copula items, etc.) follow from the nature of scrambling (cf. Hasegawa 1997). For relevant discussions, see Hiraiwa and Ishihara (to appear) and Kizu (2005).

21. It is well known that relative clauses in Japanese are not sensitive to islands (Kuno 1973: 239, my modification).

(i) [[[e_j e_k *kite-iru*] *yoohuku$_k$*]-*ga* *yogorete-iru*] *shinshi$_j$*
     [[[wear-is] suit]-NOM dirty-is] gentleman
     'A gentleman x such that x is wearing a suit that is dirty'

This is true of f-relatives; thus, in the f-relative counterpart of (i), namely (ii), a gap is located within the complex NP "[e_j e_k *kite-iru*] *yoohuku$_k$*" (= 'a suit that e_j is wearing').

(ii) [[[e_j e_k *kite-iru*] *yoohuku$_k$*]-*ga* *yogorete-iru*] *no$_j$*
      [[[wear-is] suit]-NOM dirty-is]
      'the person x such that x is wearing a suit that is dirty'

Like clefts, our analyses predict that (ii) is acceptable. First, the parsing of (ii) creates the term (iii), where "a" means (ι, y, *yoohuku'*(y)&*yogorete'*(y)). Second, "P" is specified as, say, *hito'* (= *person'*), and the term is updated into (iv).

(iii) (ε, x, P(x)&*kite'*(a)(x))

(iv) (ι, x, *hito'*(x)&*kite'*(a)(x))

Furthermore, in this interpretation, (ii) expresses a certain connotation. This accords with our analyses; a connotation arises since "P" is specified as a human property (cf. (14) in §3.1).

22. A unitary approach to pronominal and complementizer *no* is not novel; see Kitagawa and Ross (1982), Murasugi (1991), Shibatani (2009), Tonoike (1990), etc.

23. According to Endnote 10, "P" cannot be specified as an abstract thing. At first blush, this may look problematic, since an event-variable is an abstract thing. Yet, the copying of an event-variable does not specify "P" at all, since "P" is absent in the term induced by *no* in the first place. So, the copying of an event-variable is compatible with the restriction in Endnote 10.

24. Here, let me spell out further pieces of evidence in favor of our unitary approach. First, there are parallelisms between pronominal *no* and complementizer *no*. As shown in §5.1, pronominal *no* cannot stand in its own, and it must be preceded by an item that represents a proposition. This restriction is true of complementizer *no*, as illustrated below. The string (ii) is still unacceptable if *Tom-wa* is omitted.

(i) *Tom-wa* [*Mary-ga* *kireina* *no*]-*o* *shitteiru*.
     T.-TOP [M.-NOM beautiful]-ACC know
     'Tom knows that Mary is beautiful.'

(ii) **Tom-wa* *no* *o* *shitteiru*.
      T.-TOP ACC know

Moreover, in both pronominal and complementizer cases, a predicate within a clause headed by *no* is conjugated as an ad-nominal form (cf. §1.1).

   Second, there is cross-linguistic evidence. According to one criterion, nominalization may be generally divided into "participant" nominalization, which refers to first-order entities (e.g.

persons, objects) and "event" nominalization, which refers to second- or third-order entities (e.g. actions, states). In some languages, the same nominalizer has a function for the above two types of nominalization. In Numhpuk Singpho (Tibeto-Burman), for instance, the string (iii), which involves a nominalizer $phaa^4$, is ambiguous between the readings (iiia/b) (Yap et al. to appear).

(iii) $Maam^1$ $thuu^5$ $phaa^4$ waa^1 muu^4 n^4-ηaa^5.

    rice   pound   NMZ   DEF   also   NEG-have

  a. 'The rice pounding machine is also not here.'　　　　(First-order entity)

  b. 'There is no event of rice pounding.'　　　　(Second-order entity)

In our case, pronominal *no* substantiates "participant" nominalization, whereas complementizer *no* "event" nominalization. The same sort of ambiguity as (iii) is also found in Japanese.

(iv) *Tom-wa* [*hashitteiru* *no*]-*o*   *mita*.

    T.-TOP [is.running   ]-ACC   saw

  a. 'Tom saw someone who is running.'　　　　(First-order entity)

  b. 'Tom saw the event of someone's running.'　　　　(Second-order entity)

Third, diachronic considerations may shed light on the nature of *no*. In the literature, it has been widely held that pronominal and complementizer functions emerged at almost the same time (e.g. Nishi 2006, Wrona to appear); for a different view, see Kinsui (1995). A central issue is whether the development of pronominal *no* predated and affected that of complementizer *no* or vice versa (Yoshimura 2010 and references therein). Nishi (2006), however, argues that they emerged concurrently but separately. Wrona (to appear) agrees that they emerged concurrently, but argues that they emerged not separately, the idea being that once a single item of *no* acquired a nominalizing usage, it came to be used for a variety of nominalizing functions (e.g. pronominal, complementizer). Wrona's (to appear) view seems to fit well with our unitary approach to *no*.

In sum, a unitary approach to pronominal and complementizer *no* is buttressed from various perspectives. There are some residual issues, however. For instance, in Japanese, there is another complementizer *koto*, which behaves differently from *no* (e.g. Kuno 1973, Watanabe 2008). The issue of how to differentiate *no* from *koto* within DS is left for future work.

25. In the Yatsushiro dialect, pronominal *no* is morphologically realized as *tsu* whereas complementizer *no* as *to*. Crucially, both *tsu* and *to* can appear at the position of *no* in Standard Japanese clefts.

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ATB Application of Case Operations and Genitive Subjects in Japanese[*]

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1. Introduction

In several languages, a single nominal phrase with one grammatical function is allowed to receive different Case markings. Because of its curiousness, this phenomenon has been prompting many researchers to investigate what mechanism it might involve. Representative among such languages is Japanese, where the subject of a relative clause may be marked with either Nominative or Genitive Case (the Nominative-Genitive conversion) (Harada 1971, 1976; Miyagawa 1993, 2008; Watanabe 1994, 1996; Hiraiwa 2000, 2002; Ochi 2001, 2009).

In this paper, we devote ourselves to an inquiry into how Genitive Case is licensed on the subject of a relative clause in Japanese. Extending Richards' (2007) theory of multiple Case assignment/checking to the Nominative-Genitive Case conversion in Japanese, we propose that the operations of Case assignment and Case checking apply in an "Across the Board" fashion. This proposal, together with some additional assumptions we will make, will shed new light not only on the licensing of Genitive Case on the subject of a relative clause in Japanese, but also on the mechanism which enables the alternation of Nominative Case with Genitive Case on such a subject.

This paper is organized as follows. Section 2 illustrates the Nominative-Genitive conversion in Japanese and related facts. Section 3 outlines Richards' theory of multiple Case assignment/checking, and then explicates our proposal in more details. Section 4, in terms of our proposal, accounts for the data identified in section 2. Section 5 indicates that our proposal has implications for the so-called ECM construction in Japanese. Section 6 summarizes the results of the discussion.

2. The Nominative-Genitive Conversion in Japanese

In the literature on Japanese syntax, it is a well-known fact that in Japanese, Nominative Case may alternate with Genitive Case on the subject of a relative clause. (1) exemplifies this fact.

(1)   [Hanako-ga/-no   waratta] riyuu
            Hanako-NOM/-GEN laughed   reason
            'the reason that Hanako laughed'

As shown, the subject *Hanako* of the relative clause (between brackets) may be marked with either Nominative or Genitive Case, and whichever Case marking is used, its grammatical function does not change at all.

   This Nominative-Genitive Case conversion, however, is not always permitted. Harada (1971) is the first to note that Genitive Case is not licensed on the subject of a relative clause when the clause contains an object marked with Accusative Case (see also other references cited in the outset of this paper). This is observed below.

(2)   [Taroo-ga/-*no   Hanako-o   hometa] riyuu
            Taroo-NOM/-*GEN Hanako-ACC praised   reason
            'the reason that Taroo praised Hanako'

This ban on the Genitive Case licensing is dubbed, in general, the Transitivity Restriction (henceforth, abbreviated as TR).

   The TR does not come into effect when the object of a relative clause is a null pronominal element *pro* or an adpositional phrase, as evidenced in (3).

(3)   [Taroo-ga/-no   Hanako-ni *pro$_i$* okutta] tegami$_i$
            Taroo-NOM/-GEN Hanako-to *pro*   sent   letter
            'the letter which Taroo sent to Hanako'

In the literature, Japanese relativization has been pervasively argued not to be an instance of movement operation but rather one of resumption, where the resumptive *pro* is generated in the site of relativization and bound by the head noun (Kuno 1973 and many other proponents). In (3), the head noun *tegami* is logico-semantically interpreted as what Taroo sent, i.e. the internal argument of the verb *okutta*, and binds *pro* inside the relative clause. This means that *pro* in (3) is in the function of the grammatical object. The relative clause in (3) contains not only *pro* but also the adpositional phrase *Hanako-ni*, which functions as the indirect object of *okutta*. As shown, the Genitive Case marking of the subject *Taroo* is fine.

   In addition, the TR is obviated when the relative clause contains an object marked with Nominative Case. This is exemplified below.

(4)   a.   [Taroo-ga/-*no   eigo-o   hanaseru] riyuu
                Taroo-NOM/-*GEN English-ACC   can.speak reason
                'the reason that Taroo can speak English'
       b.   [Taroo-ga/-no   eigo-ga   hanaseru] riyuu
                Traoo-NOM/-GEN English-NOM can.speak reason

In Japanese, a potential predicate like *hanaseru* allows its object to be marked with Nominative Case, as shown in (4b). When this happens, Genitive Case is

licensed on the subject of a relative clause, obviating the TR. When the object of a potential predicate is marked with Accusative Case, the TR effect shows up, as seen in (4a).

3. The Proposal

In this paper, we undertake an extension of Richards' (2007) theory of multiple Case assignment/checking to the Nominative-Genitive Case conversion in Japanese, and put forth the proposal that the operations of Case assignment and Case checking apply in an ATB fashion. Before describing the details of our proposal, we give a brief outline of Richards' theory below.

3.1. A short outline of Richards (2007)

Richards contends that the narrow syntax involves Case assignment and Case checking (hereafter, CA and CC, respectively) as two distinct operations (cf. also Bejar and Massam 1999). When a head assigns a Case feature to a nominal phrase, this feature must be checked off (or deleted) in terms of not being interpretable at LF. We assume in the course of discussion that the Case features which functional heads like T and v assign are all uninterpretable at LF. The head for CC, Richards supposes, may be identical to the Case-assigning head. Case features, though uninterpretable at LF, have an impact on the PF representation: they are translated into Case morphemes after PF-Spellout. This effect, however, is nullified if PF-Spellout applies after Case features have been checked off. Once a head checks off a Case feature on a nominal phrase, another head may assign a different Case feature to the same nominal phrase. Thus, CA may apply to a nominal phrase more than once, and so may CC.[1]

3.2. ATB application of Case operations

In this paper, following Richards (2007), we maintain CA and CC as distinct operations at the narrow syntax. We depart from him in suggesting that these two operations should not apply cyclically. We propose, instead, that CA and CC are ATB operations. By this, we mean that these two apply between Case assigners/checkers and Case assignees/checkees within a certain domain in parallel.[2] The domain, we assume, is the sister of a phase head (Chomsky 2000, et seq.). We then postulate the following condition on CA and CC.

(5)   CA and CC apply in an ATB fashion within the domain of a phase head.

To see how CA and CC are implemented under (5), consider the following schema.

(6) $[_{ZP} \; Z \; [_{XP} \; X \; [_{YP} \; DP_1 \; Y \; DP_2]]]$

i.	CA	
ii.	CC	
iii.	CA	
iv.	CC	
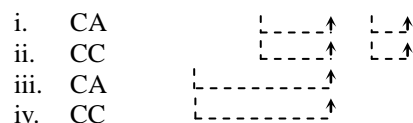
In (6) suppose that Z, X, and Y act as Case assigners/checkers and Z behaves as a phase head. XP is the domain of the phase head Z, which contains DP_1 and DP_2 as well as X and Y. Under condition (5), the derivation starts to carry out CA between X and DP_1 and between Y and DP_2, when it reaches XP ((6i)). These two instances of CA are not executed one by one: they are carried out in an ATB fashion, that is to say more plainly, at the same time. Afterward, the Case features on DP_1 and DP_2 are checked off by the same heads X and Y ((6ii)). These two instances of CC, too, are executed in parallel. The other Case assigner/checker Z is outside the domain of the phase head, hence it does not need to obey condition (5) in exercising CA and CC. Thus, CA/CC by Z does not apply in parallel with CA/CC by X and Y. When ZP is built up, Z is allowed to assign a Case feature to DP_1 ((6iii)), and then check off that feature ((6iv)). Note here that at this point of derivation, DP_1 has already lost the Case feature which it received from X, due to Case checking at (6ii). Z's CA to DP_1 is hence feasible although DP_1 received a Case feature before.

If PF-Spellout applies before CA at (6i) or after CC at (6iv), no Case feature will be translated into Case morphemes on DP_1 and DP_2. At the timing before (6i), CA does not take place yet, so that DP_1 and DP_2 do not receive any Case feature. At the timing after (6iv), all of the Case features which DP_1 and DP_2 received have already been checked off. Similarly, no Case morpheme will be realized on DP_1 and DP_2 if PF-Spellout applies between (6ii) and (6iii). At this timing, the Case features which X and Y assigned to DP_1 and DP_2 have already been checked off, and Z has not yet assigned a Case feature to DP_1. If PF-Spellout applies between (6i) and (6ii), the Case features which X and Y have assigned to DP_1 and DP_2 will be translated into Case morphemes on the latter two. The Case feature which Z assigns to DP_1 can receive the PF-translation, only when PF-Spellout applies between (6iii) and (6iv). In what follows, we assume without any further argument that PF-Spellout applies after CA and that it takes place within a phase only once. In a nutshell, the derivation in (6) has two chances to carry out PF-Spelout but has only one ticket for doing that. In (6) PF-Spellout may apply either after (6i) or (6iii). If it takes place at the former timing, the ticket is no longer available at the latter timing. In this case, spelling out the portion except for the domain of Z is deferred until the next higher phase.

4. How Genitive Subjects in Japanese are Licensed

Having outlined Richards' (2007) theory of multiple CA/CC and described our proposal in details, we are in a position to explain how Genitive Case is licensed on the subject of a relative clause in Japanese.

Before going on, we want to make three more assumptions relevant to the discussion. First, we assume after Miyagawa (1993) and Ochi (2001) that D is

(optionally) responsible for assigning and checking off a Genitive Case feature.[3] Second, we follow Svenonius (2004), Hiraiwa (2005), and others, assuming that D is a phase head.[4] Third and finally, we assume, following Murasugi (1991), that the top-most projection of Japanese relative clauses is TP but not CP.

Let us now begin by examining (1), repeated below as (7). Underneath (7) is represented its internal structure (8), which illustrates how CA and CC therein are implemented under condition (5) (in (8) and the following, we put heads and complements in the head-initial order only for the sake of visual clarity).

(7)   [Hanako-ga/-no   waratta]   riyuu
        Hanako-NOM/-GEN   laughed   reason
        'the reason that Hanako laughed'

(8) $[_{DP}$ D $[_{NP}$ $[_{TP}$ T$_{+PAST}$ $[_{VP}$ $[_{DP}$ *Hanako*] $[_V$ *warau*]]] $[_N$ *riyuu*]]]
        i.   CA
        ii.   CC
        iii. CA
        iv.   CC

As D is a phase head, its sister NP forms the domain of the phase head. Within the domain NP, condition (5) is at work. Since NP contains only one Case assigner/checker T and excludes another one D, (5) has a trivial effect, and does not require these two heads to assign and check off Case features in parallel. D is allowed to exercise CA and CC when the derivation reaches the phase DP.

At (8i), T assigns a Nominative Case feature to the subject *Hanako*, and then, at (8ii), it checks off that feature. If PF-Spellout applies after (8i), the Nominative Case feature on the subject will be translated into the Nominative Case morpheme, so that the subject will be pronounced as *Hanako-ga* at PF. At (8iii), D assigns a Genitive Case feature to the subject. This CA is permitted, since at this point of derivation, there is no Case feature on the subject. At (8iv), D checks off the Case feature on the subject. If PF-Spellout applies after (8iii), the Genitive Case feature on the subject will receive the PF-translation, thereby the Genitive Case morpheme being attached to the subject at PF as in *Hanako-no*.

It is important to note here that in the case that PF-Spellout takes place after (8iii), the Nominative Case morpheme cannot be realized on the subject *Hanako*. This is because the Nominative Case feature has already been checked off in that case. Accordingly, our analysis explains not only how Genitive Case is licensed on the subject of a relative clause in Japanese, but also why Nominative Case is allowed to alternate with Genitive Case on such a subject. The latter issue, as is clear from what we have stated, is concerned with the timing of PF-Spellout.

Next consider (2), which shows the TR effect. We repeat (2) below as (9), and represents the structure for (9) in (10).

(9)   [Taroo-ga/-*no   Hanako-o   hometa]   riyuu

Taroo-NOM/-*GEN Hanako-ACC praised reason
'the reason that Taroo praised Hanako'

(10) $[_{DP}$ D $[_{NP}$ $[_{TP}$ T$_{+PAST}$ $[_{vP}$ $[_{DP}$ *Taroo*$]$ v $[_{VP}$ $[_v$ *homeru*$]$ $[_{DP}$ *Hanako*$]]]]$ $[_N$ *riyuu*$]]]$

  i.   CA
  ii. CC
  iii. CA
  iv. CC

As shown in (10), the domain of the phase head D, namely NP, contains the two Case assigners/checkers T and *v* and also the two DPs *Taroo* and *Hanako* as the grammatical subject and object, respectively. This time, condition (5) has a nontrivial effect. In that domain, T assigns a Nominative Case feature to the subject *Taroo* and *v* assigns an Accusative Case feature to the object *Hanako* ((10i)). Condition (5) requires these two instances of CA to be executed in parallel. If PF-Spellout applies afterward, these Case features will be translated into the Nominative Case morpheme and the Accusative Case morpheme. The subject and the object are then pronounced as *Taroo-ga* and *Hanako-o*, respectively, at PF. Condition (5) also demands T and *v* to check off the Case features on the subject and the object in parallel ((10ii)). When the derivation reaches the phase DP, D assigns a Genitive Case feature to the subject *Taroo* ((10iii)), and then checks off that feature ((10iv)). CA/CC by D does not go along with CA/CC by T and *v*, because D is outside the domain of the phase head. If PF-Spellout applies between (10iii) and (10iv), the Genitive Case morpheme will be realized on the subject *Taroo* as the morphological exponent of the Genitive Case feature.

  Significantly, we should point out that at the timing after (10iii) it is too late for PF-Spellout to realize the Accusative Case morpheme on the object *Hanako*. This is because the Accusative Case feature has already been checked off at that timing. This Case feature is translated into the Accusative Case morpheme only when PF-Spellout applies between (10i) and (10ii). At this timing, on the other hand, it is too early for PF-Spellout to realize the Genitive Case morpheme on the subject *Taroo*, since D does not yet assign a Genitive Case feature to that subject. Accordingly, there is no timing such that PF-Spellout applies so as to realize both the Genitive Case morpheme and the Accusative Case morpheme on the subject *Taroo* and the object *Hanako*, respectively, at the same time. In order to make it possible for these Case morphemes to co-occur, each of the subject and the object should undergo PF-Spellout at different timings. However, recall that we are assuming that PF-Spellout takes place only once within a phase. This explains the TR effect.

  This line of approach leads us to predict that Genitive Case is licensed on the subject of a relative clause when the object in that clause is not accompanied with any Case morpheme. Namely, an example like (11) below should be predicted to be well-formed.

(11) [Taroo-no   Hanako-Ø hometa] riyuu
      Taroo-GEN Hanako-Ø praised   reason
      'the reason that Taroo praised Hanako'

The suppression of Case morphemes (or Case dropping) is not problematic at all in Japanese. Although there might be some idiolectal variation in the acceptability of an example like (11) among Japanese speakers, Ochi (2009) reports that such example is not unacceptable. Therefore, the prediction is borne out, which corroborates our analysis.

Let us turn to another case in which the TR effect is absent. The relevant example is repeated below as (12).

(12)   [Taroo-ga/-no   Hanako-ni *pro*ᵢ   okutta] tegamiᵢ
        Taroo-NOM/-GEN Hanako-to *pro*   sent   letter
        'the letter which Taroo sent to Hanako'

A null pronominal element *pro* and an adpositional phrase like *Hanako-ni* do not induce the TR effect. *Pro*, like other nominal phrases, may be assigned a Case feature. However, Case features on *pro* cannot be translated into any Case morpheme, because Case morphemes are allowed to attach only to phonologically overt elements. Adpositional phrases, in contrast, do not need to be assigned any Case feature. Alternatively, it is possible to conjecture that such phrases are intrinsically endowed with inherent Case features. It is a general consensus that inherent Case features do not have to be checked off in terms of being interpretable at LF. Regardless of which might be correct, it follows that adpositional phrases are not susceptible to CA and CC.

Accordingly, CA and CC in (12) are carried out in the manner which (13) illustrates.

(13)   [$_{DP}$ D [$_{NP}$ [$_{TP}$ T$_{+PAST}$ [$_{vP}$ [$_{DP}$ *Taroo*] *v* [$_{VP}$ [$_{PP}$ *Hanako-ni*] [$_{v'}$[$_{V}$ *okuru*] proᵢ]] [$_{N}$ *tegami*]ᵢ]]

i. CA
ii. CC
iii.CA
iv. CC

In (13), the domain of the phase head D, i.e. NP, contains T and *v* as well as the subject *Taroo* and a null pronominal element *pro*. In this domain, condition (5) requires T and *v* to assign a Nominative Case feature and an Accusative Case feature to the subject and *pro*, respectively, in parallel ((15i)). If PF-Spellout applies afterward, the Nominative Case feature on the subject will be translated into the Nominative Case morpheme, so that *Taroo-ga* will materialize at PF. The Case feature on *pro*, however, does not receive any PF translation, since *pro* itself has no phonological content. T and *v* also exercise CC in parallel ((13ii)). Although the adopositional phrase *Hanako-ni* is also contained in the domain of the phase head, it remains intact throughout the derivation, either because it does not have to be assigned any Case feature, or because it has an inherent Case feature not to be checked off.

As the other Case assigner/checker D is excluded from the domain of the phase head, CA/CC by D does not apply in parallel with CA/CC by T and *v*. When the derivation reaches the phase DP, D assigns a Genitive Case feature to the subject *Taroo* ((13iii)), and then checks off that feature ((13iv)). If

PF-Spellout applies between (13iii) and (13iv), the Genitive Case morpheme will be attached to the subject at PF as in *Taroo-no*. At this timing, the Nominative Case feature has already been checked off, which means that the Nominative Case morpheme cannot be realized on the subject.

PF-Spellout never affects the morphological shapes of *pro* and the adopositional phrase *Hanako-ni* at PF. *Pro* is phonologically null in the first place. Adpositional phrases are neither assigned any Case feature nor have their inherent Case features, if any, checked off. The morphological shapes of such expressions at PF are thus irrelevant to when PF-Spellout may take place. Therefore, the presence of *pro* and an adopositional phrase in a relative clause does not block the licensing of Genitive Case on the subject of that clause. This is why the TR effect is absent in (12).

Finally, consider why Nominative objects do not induce the TR effect. The relevant example is repeated below as (14).

(14)　a.　[Taroo-ga/-*no　eigo-o　　　hanaseru] riyuu
　　　　　Taroo-NOM/-*GEN English-ACC　can.speak reason
　　　　　'the reason that Taroo can speak English'
　　　b.　[Taroo-ga/-no　eigo-ga　　　hanaseru] riyuu
　　　　　Traoo-NOM/-GEN English-NOM　can.speak reason

Takano (2003) argues that the Japanese potential predicate construction is biclausal, where a verbal projection is embedded into another one. When the object is marked with Accusative Case, it is generated in the embedded *v*P/VP. On the other hand, the object is generated in the matrix *v*P/VP when it is marked with Nominative Case. In this case, the embedded *v*P/VP contains a null pronominal element *pro*, which is co-indexed with the object in the matrix *v*P/VP.

Although we concur with Takano's analysis of the Japanese potential construction, we wish to add one assumption with respect to the base position of grammatical subjects in that construction. We assume that the subject is directly base-generated in Spec of TP when the potential predicate marks its object with Nominative Case (cf. Saito 1982). If so, such a subject should not be assigned a Nominative Case feature by T, because it is not generated in a position that T c-commands. A question then arises what should be translated into the morpheme *-ga* on such a subject. We propose that the grammatical subject of a potential predicate with a Nominative object (optionally) possesses a Focus feature, which is decoded into the morpheme *-ga* after PF-Spellout (cf. Kuno 1973; Vermeulen 2005). In passing, Focus features influence the LF interpretation, hence they do not have to be checked off.

According to what we have stated, the structures for (14a) and (14b) are represented as follows.

(15)　a.　$[_{\text{DP}}$ D $[_{\text{NP}}$ $[_{\text{TP}}$ T $[_{v\text{P1}}$ $[_{\text{DP}}$ *Taroo*$]$ v_1 $[_{\text{VP1}}$ V$_1$ $[_{v\text{P2}}$ v_2 $[_{\text{VP2}}$ V$_2$ $[_{\text{DP}}$ *eigo*$]]]]]]$ N $]]$
$(= (14\text{a}))$

　　　b.　$[_{\text{DP}}$ D $[_{\text{NP}}$ $[_{\text{TP}}$ $[_{\text{DP}}$ *Taroo*$]$ T $[_{v\text{P1}}$ v_1 $[_{\text{VP1}}$ $[_{\text{DP}}$ *eigo*$]_i$ V$_1$ $[_{v\text{P2}}$ v_2 $[_{\text{VP2}}$ V$_2$ *pro*$_i]]]]]$ N $]]$
$(= (14\text{b}))$

In (15a) v_2 assigns an Accusative Case feature to the object *eigo*, and T assigns a Nominative Case feature to the subject *Taroo*. In (15b) v_2 assigns an Accusative Case feature to *pro*, and T assigns a Nominative Case feature to the object *eigo*. (In both (15a) and (15b), v_1 does not have any Case feature to be discharged.) The subject *Taroo* in (15b) is base-generated in Spec of TP.

First of all, note that the configuration in (15a) is very similar to that in (10) in that the subject *Taroo* and the object *eigo* as well as the two Case assigner/checkers T and v_2 are contained in one and the same domain of the phase head D, though the former has a more complex structure than the latter. CA and CC in (15a) are thus executed in the same way as in (10). Hence, the reason for the TR effect in (9) can be replicated in (14a).

What is at issue is why Nominative objects do not block the licensing of Genitive Case on the subject of a relative clause. In (15b), under condition (5), T assigns a Nominative Case feature to the object *eigo* in parallel with v_2 assigning an Accusative Case feature to *pro*, since NP, the domain of the phase head D, contains T and v_2 as well as the object and *pro*. If PF-Spellout applies afterward, the Nominative Case feature on the object will be translated into the Nominative Case morpheme. The Accusative Case feature on *pro* do not receive any PF-translation, since *pro* has no phonological content. These Case features are checked off by T and v_2 in parallel. When the derivation reaches the phase DP, D assigns a Genitive Case feature to the subject *Taroo*, and then checks off that feature. Although the subject may have a Focus feature, the presence of this feature does not obstruct D's CA to the subject. If PF-Spellout applies after D has assigned a Genitive Case feature, the Genitive Case morpheme will be realized on the subject. In this case, the Nominative Case feature is no longer given the chance to receive the PF-translation on the object, since it has already been checked off. Therefore, this manner of application of CA/CC fails to account for the fact that the Genitive Case morpheme and the Nominative Case morpheme are allowed to surface on the subject and the object of a potential predicate simultaneously.

In order to solve this problem, we want to tentatively assume that the object of a potential predicate may also be allowed to possess a Focus feature. Given this assumption, suppose that the object *eigo* in (15b) has a Focus feature. This feature, being interpretable at LF, does not have to be checked off, so that it remains unchecked off on the object in the course of the derivation. Hence, the Focus feature on the object can be translated into the morpheme *-ga* whenever PF-Spellout may apply. Namely, it turns to be possible that the morpheme *-ga* may be realized on the object when PF-Spellout applies after D has assigned a Genitive Case feature to the subject *Taroo*. This enables us to explain why the Genitive Case morpheme and the morpheme *-ga* are allowed to co-occur on the subject and the object, respectively, of a potential predicate. A caution is in order here. If this way out of the problem is correct, the morpheme *-ga* on the object *eigo* in (14b) should be viewed as the morphological reflection of the Focus feature, but not as that of the Nominative Case feature.

5. Implications

An essence of the discussion in the last section is that the TR effect emerges when a Genitive subject and an Accusative object are both contained within one and the same domain (or NP) of the phase head D. We demonstrated that there is no timing such that PF-Spellout applies so as to realize both the Genitive Case morpheme and the Accusative Case morpheme on the subject and the object, respectively, in the domain of the phase head D at the same time. In consequence, we obtain the following generalization about the TR.

(16)   The TR effect emerges only when there is no phasal boundary between a Genitive subject and an Accusative object.

   This generalization has an implication for the so-called ECM construction in Japanese. First and foremost, please see the following examples.

(17)   a.   [Taroo-ga/-*no   Hanako-o   [tensai da] to omou] riyuu
              Taroo-NOM/-*GEN Hanako-ACC genius is C think   reason
              'the reason why Taroo believes Hanako to be a genius'
         b.   [Taroo$_i$-ga/-no   [pro_i Hanako-o   hometa] to itta] riyuu
              Taroo-NOM/-GEN *pro* Hanako-ACC praised   C said reason
              'the reason why Taroo said that he praised Hanako'

The relative clause in (17a) is construed as an ECM construction, as the English translation indicates. As shown, Genitive Case is not licensed on the subject of the relative clause, inducing the TR effect. In (17b), the verb *itta* in the relative clause takes a factive clause as its complement. If this clause constitutes a phase, generalization (16) predicts that the presence of an Accusative object in that clause should not block the licensing of Genitive Case on the subject of the relative clause. This is indeed borne out by the acceptability of (17b) with the Genitive subject. Thus, to the extent that (16) is tenable, the grammatical contrast in (17) tells us that there is no phasal boundary like CP between the matrix subject and the Accusative "subject" in the Japanese ECM construction.[5]
   This consequence has a further implication for the position of the Accusative "subject" in the Japanese ECM construction. It is that such subject should be generated within the matrix clause if the embedded clause in that construction is regarded as CP-phase. This sufficiently deserves an intense consideration, because the complementizer-like element *-to* is used in the ECM embedded clause ((17a)) as well as in the factive complement clause ((17b)). In fact, Hoji (1991, 2005) presents lots of intriguing evidence for treating the Accusative "subject" in the Japanese ECM construction as a constituent of the matrix clause, which we do not examine in this paper for a limited space.

6. Summary

We have thus far argued that how Genitive Case is licensed on the subject of a relative clause in Japanese is accounted for in terms of Richard's (2007) theory of multiple CA/CC coupled with our proposal that CA and CC are ATB

operations. It was shown that our approach not only paves the way to an elucidation of the mechanism behind the Nominative-Genitive Case conversion in Japanese, but also it gives an explanation for the TR effect. Moreover, our approach has implications for the so-called ECM construction in Japanese: (i) no phasal boundary like CP intervenes between the matrix subject and the Accusative "subject" in that construction, and (ii) if the embedded clause in the construction constitutes a CP-phase, the Accusative "subject" should be treated as a constituent of the matrix clause.

Notes

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[1] Richards demonstrates that this theory gives accounts of Lardil Case Stacking, Russian Genitive of Negation, and Japanese Topic Marking. See Richards (2007) for more details.

[2] The idea behind this proposal is that all operations apply simultaneously within a phase (Chomsky 2000, et seq.). However, we must suggest that it not be the case that the whole set of operations of every *type* is carried out at the same time. This is because, as CC presupposes CA, the former must be preceded by the latter: CC cannot take place without Case features to be checked off.

[3] In our earlier paper (Uchishiba and Taguchi 2008), we proposed that the head of CaseP, but not D, assigns a Genitive Case feature. Although this proposal fits the analysis to be developed in this paper as well, for the expository purpose we proceed on the assumption that D assigns a Genitive Case feature.

[4] In this paper, we ignore the possibility of vP forming a phase, for our expository convenience. See note 5, however.

[5] Generalization (16) also suggests that vP should not be phasal in Japanese, because it does not contain both the subject and the object in the sister of its head.

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The Progressive and Locative *Zai* in Mandarin Chinese

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1. Introduction

In this paper we discuss the syntactic distributions and semantic contributions of the particle *zai* in Mandarin Chinese. Based on the close relationship between locative expressions and progressive aspect cross-linguistically (Comrie 1976), we argue that the progressive *zai* is derived from the preposition *zai* via a series of head-movements.

  The paper is organized as follows: in section 2 we introduce the functions of the particle *zai* and review two previous accounts of *zai*. In section 3 we give our own account of the syntactic distributions of *zai*. We provide some counter-examples in section 4 and argue that these examples are not real counter-examples. Finally, we summarize and conclude this paper in section 5.

2. The Particle *Zai*

The particle *zai* in Chinese can either function as a progressive marker or a locative preposition. As a progressive marker, *zai* is the only aspectual particle that directly precedes the main predicate as shown in (1a). Based on Demirdache & Uribe-Etxebarria (2004), the temporal relations of the sentence in (1a) can be represented by the diagram in (1b). As can be seen, *zai* indicates that the *assertion time* (i.e., the time at which Zhangsan came in) is contained in the *event time* (i.e., the time at which Lisi was dancing). Also, the *utterance time* (i.e., the speech time) goes after the two time intervals since the sentence has a past-tense interpretation.

(1)　a. Zhangsan jinlai de shihou, Lisi *zai*　tiaowu
　　　　Zhangsan enter DE time　　Lisi zai　dance
　　　　'Lisi was dancing when Zhangsan came in.

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                AST-T                    UT-T
b. ------[---[-----------------]---]------[-----------------]----------→
         EV-T
```
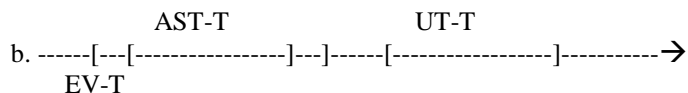
In addition to functioning as a progressive marker, *zai* may also function as a locative preposition or locative verb. The sentences in (2) to (4) represent the three patterns capturing the syntactic placement of *zai*. When functioning as a progressive marker in (2), *zai* precedes the main verb. As a locative verb in (3), *zai* appears before the location and can be roughly translated as *to be in/at*. However, when a location and a verb co-occur in a sentence, *zai* can only appear once and can only precedes the location as demonstrated by (4).

(2) a. ***zai*** + **verb**
　　 b. Ta *zai* kan shu
　　　　he zai read book
　　　　'He is reading.'

(3) a. ***zai*** + **location**
　　 b. Ta *zai* tushuguan
　　　　he zai library
　　　　'He is in the library.'

(4) a. ***zai*** + **location** + **verb**
　　 b. Ta *zai* tushuguan (**zai*) kan   shu
　　　　he zai library   read book
　　　　'He is reading in the library/He reads in the library.'

An interesting point about the sentence in (4b) is that it has two readings: a progressive reading and a habitual one. To disambiguate the sentence, one can use two different negations to do so. When the location of the event is negated, *bu* is used as in (5a); on the contrary, when the event itself is negated, the morpheme *mei(you)* is used as in (5b). [1]

(5) a. Ta **bu** *zai* jiaoshi   kanshu, ta *zai* tushuguan kan shu
　　　　he not zai classroom read   he zai library   read book
　　　　'He does not read in the classroom; he reads in the library.'
　　 b. Ta **mei** *zai*   jiaoshi kan shu, ta *zai* xie   zuoye
　　　　he not zai classroom read book he zai write homework
　　　　'He is not reading in the classroom; he is doing (his) homework.'

In analyzing the patterns in the above three examples, Chao (1968) argues that *zai* in (2) still functions as a locative verb with an omitted direct object *nar* 'there'. According to Chao, the underlying structure of (2) is in (6):

(6) Ta *zai* **nar**　kan　shu.
　　　he zai there　read book
　　　'He is reading there.'

Chao further argues that the sentences in (2b) and (4b) have the same structure and contain a *serial verb construction* with the difference that the direct object of the first verb (i.e., *there*) in (2b) is omitted.

However, Chao's (1968) arguments have been challenged by some studies. Chen (1978), for example, argues that it is infelicitous to add *nar* 'there' in some sentences with a progressive flavor. According to Chen, the only function of *zai* in (7) is to present the ongoing process of the event and can never function as a preposition.[2] With the pronoun *nar* 'there', the sentence in (7) is ungrammatical. Chen (1978) then argues that sentences such as (2b) in fact contain two *zai*s (both imperfective *zai* and prepositional *zai*) and one of the two *zai*s is deleted due to long-distance haplology.

(7) Tianse　　　*zai* (*nar)　bian　　an
　　　Sky-color zai (there) change　dark
　　　'The sky is becoming dark.'

3. The Proposal

In this section we first propose the syntactic structure of *zai* as a locative preposition. We then discuss the close semantic relation between locative expressions and progressive aspect cross-linguistically. Finally, based on the discussions, we provide our own syntactic account of the particle *zai* from a locative expression to progressive marker.

3.1 *Zai* as a locative preposition

We begin the analysis with (3) in which *zai* functions as a locative preposition. Differently from Chao (1968), we believe *zai* in (3) still functions as a preposition. In the spirit of Harley (2002), we propose that the sentence in (3), repeated in (8a), has the basic structure in (8b). The particle *zai* is base-generated as the head of PP that serves as the complement of a functional phrase pP. The function of *zai* is to introduce the *location*. On the other hand, pP is headed by a null morpheme whose specifier is occupied by the *locatee* and the function of p is to build the spatial/temporal relations between the *locatee* and the *location*. This p is strong and always attracts *zai* to adjoin to it. The analysis

then entails that when the *zai*-phrase functions as an adjunct, the pP does not project and it is simply a PP. In order for the *zai*-phrase to function as a locative verb, we follow Harley (2002) and assume that there is a light verb *BE*, which takes pP as its complement. To function as a predicate, *zai* first moves to p and then moves to *BE*. Finally, to derive the correct word order, the *locatee* moves out of vP to TP due to the EPP feature on T.[3]

(8) a. Ta *zai* tushuguan   (*zai* + location)
        he zai library
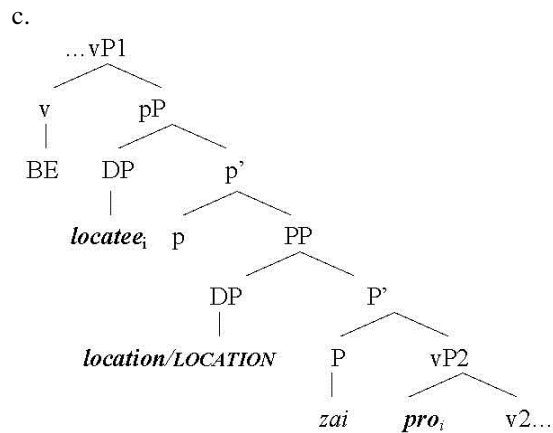   'He is in the library.'

  b.
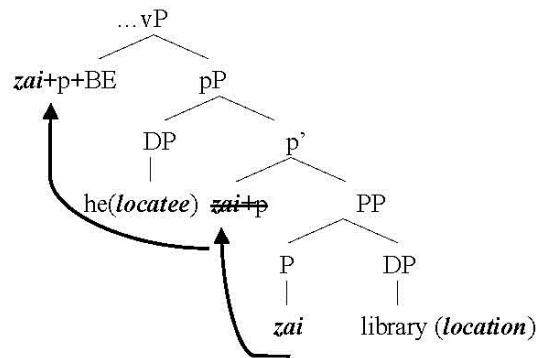
Having given an analysis of the derivation of *zai* as a locative preposition, we now discuss the other two patterns of the placement of *zai* in (2) and (4), repeated in (9a) and (9b), respectively. We argue that these two patterns have the same basic structure as presented in (9c). Following Chao (1968), we assume that both (9a) and (9b) contain a *serial verb construction* with the *zai*-phrase functioning as the first verb phrase that takes another verb as its complement. We further assume that the subject of the second verb phrase is co-indexed with the *locatee* in the *zai*-phrase. The only difference between (9a) and (9b) is that *zai* in (9a) takes a null location which indicates the arbitrary/non-specified location where the event takes place. We name it *LOCATION*. Note that the structure in (9c) does not contain a functional phrase above vP, which is responsible for the progressive reading of the two sentences. We follow Travis (in prep.) and assume that Outer Aspect Phrase encodes the progressive feature. We will discuss this issue in the later section but before discussing the derivation of the progressive reading, we will first discuss the close relation between locative expressions and progressive aspect cross-linguistically. We will argue that the progressive reading of a sentence in Chinese comes from a prepositional phrase that contains the particle *zai*.

(9) a. Ta *zai* kan shu   (*zai* + *LOCATION* +verb)
     he zai read book
     'He is reading.'

   b. Ta *zai* tushuguan kan shu   (*zai* + location + verb)
      he zai   library   read book
      'He is studying in the library.'

c.

```
            ...vP1
           /     \
          v       pP
          |      /   \
         BE    DP      p'
               |      /   \
           locatee_i  p     PP
                          /    \
                        DP       P'
                        |      /    \
              location/LOCATION  P     vP2
                               |      /   \
                              zai  pro_i   v2...
```

3.2 The close relationship between locative expressions & progressive aspect

It has been observed by many studies that there is close relation between locative expressions and progressive aspect. For example, in his typological study on the aspectual system across languages, Comrie (1976) argues that there is similarity between the expression of imperfective aspect, particularly progressive aspect, and locative adverbial phrases in many languages. Bybee *et al*. (1994) also show that the majority of progressive forms in their database are derived from expressions involving locative elements.

  According to Comrie (1976), although the modern English expression such as *he is working* does not synchronically show the trace of the similarity, there is an overtly locative expression *he is at work* that has the same reading. In fact, the English progressive has been claimed to be derived from a locative source (e.g., Vlach 1981). Thus, the progressive is said to have developed out of a construction consisting of "to be + preposition + verbal noun". Remnants of the source construction can be found in Modern English *He is a-sleep* and (regionally restricted) phrases such as *they are a-coming* and *they are a-dancing*.

  Other Germanic languages such as Dutch also have similar locative possibilities for the expression of progressive meaning. For example, the Dutch sentence *hij is aan het tuinieren* 'he is gardening' literally means 'he is at/in the

gardening' (Comrie 1976, p.99). As discussed in the previous section, the particle *zai* can either function as a locative preposition or progressive aspect marker. This conforms to Comrie's observation on the close relation between these two elements.

3.3 A possible null progressive morpheme

In the previous section we have shown that the particle *zai* functions as a preposition introducing the *location* in the three patterns in (2) to (4). One immediate question that needs to be answered is: where does the progressive reading in a sentence containing the particle *zai* such as (9a, b) come from? Based on the close semantic relation between locative expressions and progressive aspect discussed in section 3.2, we argue that the progressive aspect comes from the locative *zai* via a series of head-movements. However, in order to test the validity of this argument, we need to make sure that the progressive reading does not come from other elements. If we compare the two sentences in (10a, b), we might conclude that it is possible that there is a null morpheme attaching to the main verb in (10b) just like the perfective-*le* in (10a). We might further assume that in both sentences, the *zai*-phrase functions as an adjunct and the null morpheme is responsible for the progressive reading in (10b) just like the perfective morpheme *–le* which contributes to the perfective reading in (10a).

(10) a. Ta *zai* tushugaun kan-***le***   yi   ben shu.
        he *zai* library   read-PEF one CL book
        'He read one book in the library.'

     b. Ta *zai* tushuguan kan shu.
        he zai library   read book
        'He is reading in the library.'

  To exclude the possibility of the existence of a null morpheme, we tested other words which have similar status as *zai*. The word *dao* 'to; to arrive' in (11a) and *gei* 'for/to; to give' in (11b) give two examples. According to Li & Thompson (1981), in addition to *zai*, Chinese has several other words that can also function as either a verb or preposition. They named this type of words *coverb*s. Since the sentences in (10b), (11a), and (11b) all contain a coverb and another verb phrase, they have, presumably, the same syntactic structure. Therefore, if (11a, b) also have a progressive reading, then we can confirm the existence of a null progressive morpheme. However, the two sentences in (11) without *zai* do not have a progressive reading. This indicates that *zai* contributes the progressive reading of a sentence and there is no null progressive morpheme.

(11) a. Wo **dao** Zhongguo qu, (ta   dao Meiguo   qu)

       I   to   China   go   he   to   America   go
      'I will go to China; (he will go to the U.S.)'
    b. Mama **gei** wo zuo   jiaozi
      mom for I   make dumpling
     'Mom made dumplings for me.'   (Li & Thompson 1981, p.358)

## 3.4 From a locative preposition to progressive aspect

We discuss the derivation of *zai* from the head of a prepositional phrase in a *serial verb construction* to the progressive particle in this section. In contrast to Huang, Li & Li (2009), we argue that *zai* is not base-generated as the head of Aspect Phrase above vP; rather, we argue that the progressive reading of a sentence is due to the movement of *zai* from a locative preposition to (Outer) Aspect Phrase. As presented in (8b), repeated as (12), *zai* is analyzed as a preposition serving as the complement of a pP, which is the complement of a light verb *BE*. The main function of the little p is to build the spatiotemporal relation between the *locatee* and the *location*. The subject (the *locatee*) is in the Spec, of the *zai*-phrase. The subject of the second verb phrase is co-indexed with the *locatee*.

    (12) ***Zai as a preposition in a serial verb construction***

      …[vP1 *BE* [pP *locatee*i [p [PP *location* [P ***zai*** [vP2 *pro*i [VP]]]]]

In order for a sentence to have a progressive reading, we propose that the head of Outer Aspect Phrase has the strong feature [+progressive] that attracts an element containing aspectual information. The particle *zai* meets the requirement due to its special status as a locative particle that locates both time and location of an event. *Zai* then moves and adjoins to the head of Outer Aspect. Finally, the subject moves out of vP1 due to the EPP feature. The derivation is represented in the structure in (13):

(13)
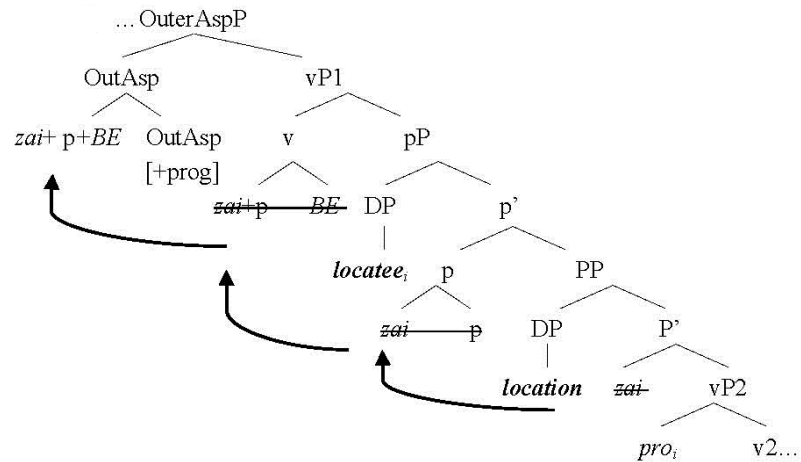
Recall that the sentence in (4b) has a habitual reading in addition to a progressive one. We argue that the habitual reading in (4b) comes from a null morpheme bearing the feature [+habitual] that is base-generated in Outer Aspect. An assumption about the structure of the habitual reading of (4b) is that it does not contain a *serial verb construction* and the *zai*-phrase simply functions an adjunct that adjoins to the main verb. The structure in (14) represents the syntactic structure of the habitual reading in (4b).

(14)
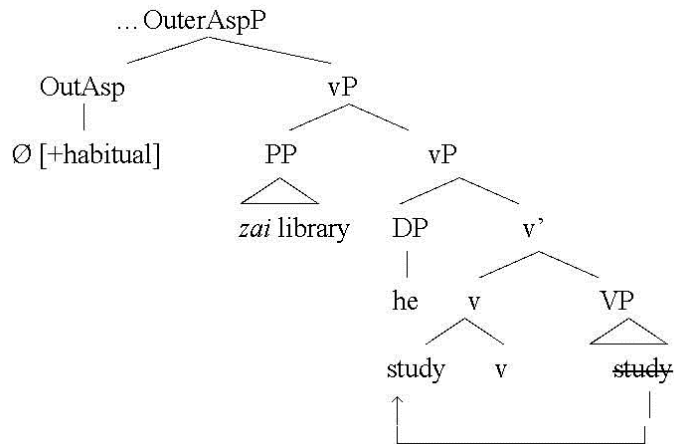
4. Counter Examples

There is a group of sentences that may serve as counter-examples to the above account. The sentence in (15a) gives an example. As shown by the two sentences in (15), the manner adverb *jingjingde* 'quietly' can either appear before or after the *zai*-phrase. According to Tang's (1990) analysis, the two sentences show that location and manner adverbs can freely adjoin to each other with a difference on scope. In (15b), the adverb adjoins to the second verb and modifies it. The current analysis correctly predicts this order. However, our study fails to predict the word order of (15a) unless we assume that the manner adverb adjoins to Outer Aspect Phrase. This is not welcome result since manner adverbs are supposed to be very low.

(15) a. Zhangsan **jingjingde** *zai* nali kan shu
      Zhangsan quietly   zai there read book
      'Zhangsan is reading quietly over there.'
    b. Zhangsan *zai* nali   **jingjingde** kan shu
      Zhangsan zai there quietly   read book
      'Over there he is reading quietly.'

  A close examination of the data, the sentence in (15a) is illusive. First, it is generally acceptable only when the manner adverb *jingjingde* 'quietly' bears some stress. Secondly, five out of the six speakers we consulted with all put a pause in between the subject and the manner adverb in addition to putting a stress on the adverb. This suggests that both the subject and the adverb have moved to a higher position, possibly, the CP. Xydopoulos (1995) has a similar observation while discussing manner adverbs in Modern Greek (hence, MG). According to Xydopoulos, there are four possible positions for manner adverbs in MG: (a) post-object, (b) post verbal, (c) pre-subject, and (d) post-subject positions. In positions (a) and (b), the typical positioning of manner adverbs, manner adverbs are argued to adjoin to the VP. (16) is an example from Xydopoulos (1995):

(16) Nikos   ksevidhose (***adheksia***) to kapaki   ***adheksia***
     the-Nikos-NOM unscrewed clumsily   the-tap-ACC clumsily
     'Nikos unscrewed the tap clumsily'

  On the contrary, positions (c) and (d) are argued to be the non-typical positioning of manner adverbs and they are available only after movement, given the prosodic effects. (17) and (18) are two examples. The adverb *eksipna* 'cleverly' in (17) appears before the subject. However, it has to be followed by a pause and therefore, Xydopoulos argues that the adverb has moved to the topic

position. Similarly, the sentence in (18) shows two important things. First, that an adverb to appear after the subject must obligatorily bear focal stress; second, that the subject is followed by a pause. It is then argued that the subject is a topic and the adverb has moved to the Focus Phrase.

(17) *Eksipna* *(,) o Janis   elise   tin askisi
     cleverly   the-John-NOM solved-3S the-exercise-ACC
     'Cleverly John solved the problem'

(18) Janis *(,)   *EKSIPNA/*eksipna* elise   tin askisi
     the-John-NOM   cleverly   PAST-solve-3S the-exercise-ACC
     'John cleverly solved the problem'

The sentence in (15a) is like the one in (18). Since the subject is followed by a pause, and the adverb bears a stress, we conclude that the subject in (15a) has moves to Topic Phrase and the adverb to Focus Phrase. Therefore, it does not count as a counter-example to our analysis of *zai*.

Another problem that needs to be addressed is the interaction between a *zai*-phrase and a verb with an aspectual affix in the same sentence. The sentences in (19) are two examples. In (19a) the verb *kan* 'to read' is suffixed with the perfective verb-*le*; that is, the aspectual feature of the reading-event is assigned by Inner Aspect Phrase between vP and VP with the value of [+complete]. Since the sentence does not have any progressive reading, the *zai*-phrase must be an adjunct. Also, according to Aikhenvald (2006), in order for two verbs to form a serial verb construction, the two verbs can only have one semantic specification for tense and aspect. Therefore, the particle *zai* in (19a) can never be a progressive marker because an event cannot be perfective and imperfective at the same time. It is then a prepositional phrase that adjoins to the verb phrase *kan-le yi ben shu* 'read one book'.

(19) a. Ta *zai* tushuguan kan-*le* yi ben shu
       he zai library   read-le one CL book
       'He read one book in the library.'

    b. *Ta *zai* kan-*le* yi ben shu
       he zai read-le one CL book
       Intended reading: he read one book (somewhere).

Like (19a), the reading-event in (19b) is perfective due to verb-*le*. The *zai*-phrase therefore, can only be an adjunct. However, (19b) is still ungrammatical. Recall that we have argued that *zai* can take a null place which indicates the arbitrary/non-specified place where the event takes place. The ungrammaticality is mysterious under the assumption that the reading event must have taken place

at some location. Why can the *zai*-phrase in (19b) not function as a prepositional phrase that indicates the unspecified/non-specific place where the event took place? We would like to propose that in order for the *zai*-phrase to function as an adjunct, *zai* must have an overt location as its complement. That is to say, we have the following constraint on locative adjuncts as in (20):

(20)

```
            *XP
           /    \
        PP        XP
       /  \
     zai    Ø (LOCATION)
```
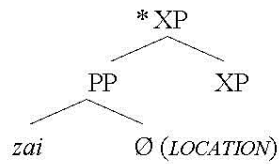
This constraint explains why (19a) is grammatical due to the fact that *zai* has an overt complement; (19b) is ungrammatical due to *zai*'s lack of an overt complement. The above analysis predicts the grammaticality of sentences containing both *zai* and the other imperfective particle, the durative *–zhe*. (21) gives an example. The durative-*zhe* indicates the duration of the bicycle-riding event and is imperfective. On the other hand, the particle *zai* moves to Outer Aspect with the feature [+progressive]; it is also imperfective. Since both verbs in (21) encode the imperfective feature, it is grammatical.

(21) Ta *zai* gaoxingde qi-*zhe* jiaotache ne
      he zai happily   ride-zhe bicycle SFP
      'He is happily riding the bicycle.

5. Summary and Conclusion

In sum, in this paper we have not only discussed the semantic contribution of the particle *zai* but its syntactic distributions. As a progressive marker, *zai* focuses on the ongoing process of the event it interacts with. Syntactically, we have provided a unified account of the distribution of *zai*. We first argue that *zai* in the three patterns of its syntactic placement discussed by Chao (1968) is base-generated as the head of a PP. Its main function is to introduce the *location*. We then follow Chao's (1968) study and argue that sentences containing a *zai*-phrase and another verb form a *serial verb construction*. However, we differ in that we argue that the argument of the particle *zai* in a sentence containing the form [*zai* + *verb*] is not the deictic pronoun *nar* 'there' but a phonologically null noun, *LOCATION*. This noun indicates the unspecified or arbitrary location where an event takes place. Finally, based on the close relation between locative

expressions and progressive aspect discussed by Comrie (1976) and Bybee *et al*. (1994), we argue that a progressive reading of a sentence comes from the preposition *zai* via a series of head-movements. This argument moves a step forward on syntax to the close semantic relationship between locative expressions and progressive aspect.

One of the consequences of our proposal is that verb movement out of vP is in fact possible in overt syntax in Chinese. However, it is limited to aspectual marking. In other words, differently from French, the verb only moves to Aspect Phrase but not Tense Phrase in Mandarin Chinese.

Notes

[1] In general, there are two negative morphemes in Chinese: *mei(you)* and *bu*. An approximation of the difference is that *bu* is used in clauses denoting states and *mei(you)* is used in clauses denoting bounded and episodic events (Hagstrom 2006).

[2] We slightly modified Chen's example in (7). The sentence in (i) is the original example in which the particle LE is included. To exclude the contradiction of the sentence caused by the progressive *zai* and the perfective LE, we removed the particle LE in (7). However, the modification does not change the fact that the sentence is ungrammatical with the pronoun *nar* 'there'.

    i.   Tianse   *zai* (*nar) bian   le.
        Sky-color zai (there) change LE
        'The sky is changing color. (The sky is lowering.)'

[3] We follow Huang (1982) and Sybesma (2007) and assume that Chinese does have TP; however, see Lin (2010) for a different point of view.

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Alignment and Adjacency in Mandarin Quadrisyllabic Onomatopoeia
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1. Introduction

In this paper, I will employ Optimality Theory (Prince & Smolensky 1993a, McCarthy & Prince 2004a) to analyze the alignment and adjacency when AB Mandarin disyllabic onomatopoeias extend into ABAB and AABB Mandarin quadrasyllabic onomatopoeias. Four factors have motivated this study. First, when AB Mandarin onomatopoeia derives into quadrisyllabic ones, the reduplicant always be aligned at certain edge. Second, when undergoes the reduplication, the reduplicant always adjacent to the base. Third, the output form will determine the direction of alignment. Finally, the output form also affects the size of reduplicant. Therefore I would like to assume that the alignment and adjacency play an important role on quadarisyllabic Mandarin onomatopoeia derivation. AB style disyllabic Mandarin onomatopoeia will be taken as input of quadrisyllabic ones. One reason for this is the phonological structure of quadrasyllabic Mandarin onomatopoeias, which always both duplicate and reiterate their AB style counterparts. The other reason is that a sound of quadrasyllabic Mandarin onomatopoeia is always richer in expression than the disyllabic one.

   Under the philosophy of OT, UG consists of universal constraints, which are ranked language-specifically. Constraints ranked lower may be violated in order to satisfy those ranked higher. In this paper, I posit two set of alignment and adjacency constraints respectively to account for the alignment and adjacency tendency in quadrisyllabic Mandarin onomatopoeia. Section 2 offers the literal review of reduplication in OT study. Section 3 and 4 provides the background and categories of AB Mandarin onomatopoeia. Section 5 given the information of quadrisyllabic Mandarin onomatopoeia. Section 6 set the constraints and section 7 offers the OT analysis of quadrisyllabic Mandarin onomatopoeia. Section 8 is discussion and conclusion.

2. Reduplication in The Study of OT

2.1 Reduplication

From a purely morphological point of view, reduplication is simply a kind of affixation, both in its morphosyntactic contribution and in its linear

position with respect to the stem. But from phonological viewpoint, segment copied from the stem undergoes reduplication. Reduplication therefore is a phenomenon involving phonological identity between reduplicant and base.

When segmental and prosodic identity of reduplicant and base is involves coping of a complete word, it is total reduplication. The reduplication process that copy only part of the segment of the base is known as partial reduplication. The size of the reduplicant in partial reduplication varies between languages. In case of modern Mandarin onomatopoeia in this presentation is segment size and foot size.

According to Kager(1999), there are three cross-linguistic in reduplication which are quoted in the following part. First one is shape invariance; reduplication tends to be defined in prosodic units independent of the base. Second one is unmarkedness; reduplicants tend to have phonologically unmarked structures vis-à-vis the phonotactics of the language. Third one is identity; reduplication tends to preserve full phonological identity with the base.

2.2 OT and reduplication

The 'Correspondence Theory of Reduplication' by MaCarthy & Prince claimed that reduplication patterns arise by interaction of three constraint types. First, well–formedness constraints, encoding markedness principles. Secondary, faithfulness constraints, they require lexical forms and surface forms to be identical. Third, base-reduplicant-identity constraints requiring identity between the reduplicant and its base. By ranking these three types of constraints, Correspondence Theory aims to explain the broad typological difference and similarities among patterns of reduplication in world's language, as well as the specific patterns of individual language.

In figure 1, the input of reduplication consists of a segmentally empty affix which is abbreviated as *Af* RED or RED, plus the stem to which the affix adjoins. Input faithfulness constraints require that the stem's input specifications be preserved in the output—the 'base' of the base-reduplicant combination. Base-reduplicant identity constraints require that both parts of this output base-reduplicant combination be identical in some respect.

Figure 1   The Basic Model

Input: /*Af* $_{RED}$ + Stem/

$\Updownarrow$ *IO-Faithfulness*
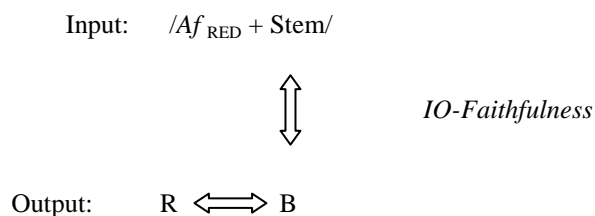
Output: R $\Longleftrightarrow$ B

Besides, well-formedness constraints require the output meet certain unmarked structure. Alignment constraints require the specified edge of reduplicant coincides with the specified edge of the prosodic word.

3. Reduplication in Mandarin Chinese

Chinese has been refers to as an isolating language. Because of this simplicity in word structure of Mandarin, from a phonological viewpoint, the reduplication process is segmental content is copied from the base form as well.

Total reduplication in Mandarin can be easily found in almost all parts of speech. Reduplication of nouns like /papa/(*father*), /mama/(*mother*), most of them are kinship terms. Reduplication of verbs, for example, /shoushou/(*say a little*), /zhuyizhuyi/(*pay a little attention*). Reduplication of adjectives e.g. /honghong de/(*really red*), /chengchengshishi/(*very honest*). Reduplication of adverbs, for instance, /ta man-man-de gun/(*3sg roll slowly*).

Reduplication forms also are very common in Mandarin onomatopoeia. Except for monosyllabic Mandarin onomatopoeia, there are lots of disyllabic, trisyllabic and quadrisyllabic Mandarin onomatopoeia are reduplication form.

Disyllabic Mandarin onomatopoeia as /kuku/(continuant sounds of birds), /ʂaʂa/(sounds of wind flows). Trisyllabic Mandarin onomatopoeia like /tiŋtiŋtaŋ/(*continuant sounds of bell*), /tiŋliŋliŋ/(*continuant sounds of phone ringing*). Quadrisyllabic Mandarin onomatopoeia will be mentioned at chapter 5.

4. AB Disyllabic Mandarin Onomatopoeia

There are five types of AB Mandarin onomatopoeia, including two monosyllabic inputs AB Mandarin onomatopoeia and three disyllabic input ones, as given in (1). They are be further separated by the structure and feature of onset. Two monosyllabic are Consonant+/*l*/ and Same onset collocation types. Consonant+/*l*/ types are AB Mandarin onomatopoeias whose onsets of second syllable are always /*l*/. Same onset collocation types are two onsets AB Mandarin onomatopoeias are the same. Three disyllabic are One onset is alveo-palatal fricative, stop+stop and Obstruent +affricate/fricative. One onset is alveo-palatal fricative types are one onset of AB Mandarin onomatopoeia are alveo-palatal fricatives. Stop+stop types are AB Mandarin onomatopoeia whose onsets are both stops. The Obstruent +affricate/fricatives are AB Mandarin onomatopoeia whose onset of first syllable are obstruent and onset of second syllable are affricate or fricative.

(1) AB style disyllabic Mandarin Onomatopoeia

	Monosyllabic input	**Disyllabic input**
AB	1. Consonant+/*l*/ : pʰla → pʰa.la (*sound of something falling*)	1. One onset is alveo-palatal fricative: xatsʰjow → xa.tɕʰjow (*sound of sneezing*)
	2. Same onset collocation:	2. stop+stop : kutu → ku.tu(*sound of drinking*)

	ta → ti.ta (*sound of raining*)	3. Obstruent +affricate/fricative: kutsi → ku.tɕi (*sound of whispering*)

The quadrisyllabic Mandarin onomatopoeia is derived from five kinds of AB style Mandarin onomatopoeia. AB style Mandarin onomatopoeias will undergo two different total reduplications and become AABB and ABAB style quadrisyllabic onomatopoeias.

4. Claim for AB Mandarin Onomatopoeia

After the information we illustrated last chapter, AB style Mandarin onomatopoeia has its own origin and we will state as below.

4.1 Monosyllabic input- consonant+/*l*/ and same onset collocation

When onomatopoeia's structure of onset is consonant and /l/, the input will be which has consonant cluster one /Cl/. Since we believe that consonant and /l/ structure is a residual of ancient Chinese which obey Sonority Sequencing Principle honestly.
Modern Mandarin Chinese cannot accept a consonant-clustered onset and copy the nucleus forwards, and then derive a successful output. When AB style onomatopoeia's onset is same onset collocation, we will take a successful monosyllabic onomatopoeia as its input. The monosyllabic input undergoes total reduplication and vowel markedness constraint then derives a successful output.

4.2 Disyllabic input- one onset is alveo-palatal fricative, stop+stop and obstruent +affricate/fricative

In the category of disyllabic input, we take early modern Chinese sound system's phoneme as input phoneme items. Go through the sound change between early modern Chinese and modern Chinese, the phonological structure of modern Mandarin onomatopoeia also must undergo negotiation.

4.3 Three category of AB style Mandarin Onomatopoeia

For the convenience of further analysis, I'd like to simplify five categories of AB Mandarin onomatopoeia into three categories. Monosyllabic will be taken as two groups respectively and disyllabic input Mandarin onomatopoeia as one group. First is Consonant +/l/ group, e.g. /pʰala/. Then is Same onset collocation group, e.g. /tita/. Finally is Disyllabic input Mandarin onomatopoeia group, e.g. /xatɕʰjow/, /kutu/ and / kutɕi/.

5. ABAB and AABB Mandarin Onomatopoeia

When AB Mandarin onomatopoeias undergo reduplication and become

ABAB and AABB Mandarin onomatopoeias. For example, /pʰala/ will extend into /pʰalapʰala/ (*sound of many things falling*). And /tita/ becomes /tititata/ (*sound of heavy raining*). /xatɕʰjow/ will derives into / xatɕʰjow xatɕʰjow /(*sound of serial sneezing*).We can get /kutukutu/(*sound of quaffing*) comes from /kutu/ . Reduplication of / kutɕi/ is / kutɕi kutɕi / (*sound of continuant whispering*). We can found out that quadrisyllabic Mandarin onomatopoeia indeed show richer sound than their AB form input. They also honestly present the total reduplicated form of AB input. However, the reason that why the same AB input will derives into different quadrisyllabic outputs is still unknown and unclear. And by OT approach we predict it will provide a persuasive explanation.

6. Constraints

6.1   Generalized alignment constraint

This edge-based theory of the syntax-phonology interface was adopted into OT by McCarthy and Prince (1993a), who claim that the prosody-morphology interface should be defined exclusively in terms of alignment constraints.

   Alignment constraints not only serve to match edges of morphological and prosodic categories, but also edges of phonological constituents like syllable, foot, prosodic word. In order to fulfill all the diverse functions, alignment have a very general format MaCarthy and Prince (1993a) named 'Generalized Alignment' as figure 2.

Figure 2. Generalized Alignment

Align (Cat1, Edge1, Cat2, Edge2) =def

$\forall$ Cat1 $\exists$ Cat2 such that Edge1 of Cat1 and Edge2 of Cat2 coincide

Where Cat1, Cat2 $\in$ ProsCat $\cup$ GramCat

Edge1, Edge2 $\in$ {Right, Left}

This constraint format has following character. In the first place is categories may appear in alignment constraints. Next is the choice of the edges. The third one is the order in which the categories appear in the constraint. In the end is how to evaluate violation of alignment constraints. For the need to predict the right form of quadrisyllabic Mandarin onomatopoeia, we set two alignment constraints below.

   (2)   ALIGN(RED, PRWD)-LEFT: assign one violation mark for every reduplicant of left edge not coincides with left edge of prosodic word.
   (3)   ALIGN(RED, PRWD)-RIGHT: assign one violation mark for every reduplicant of right edge not coincides with right edge of

prosodic word.

Constraints like these lies in generalized alignment are observed in the triggering of left or right edge coincidence of quadrisyllabic Mandarin onomatopoeia reduplication.

6.2 Markedness constraint

Marantz claimed Marantz's generalization (1982) and noted several tendencies of reduplication. Except for the statement of directionality, the second component is locality. Locality Generalization: Reduplications tend to be adjacent to their correspondence. To this tendency, Lunden (2004) proposed the ADJACENCYBR constraint family. These constraints motivate and predict locality generalization. For the need to predict the right form of quadrisyllabic Mandarin onomatopoeia, we give two adjacency constraints below.

    (4)   ADJACENCYBR-BY-FOOT: assign one violation mark for every foot in reduplicant is not next to its correspondent base.
    (5)   ADJACENCYBR-BY-σ: assign one violation mark for every syllable in reduplicant is not next to its correspondent base.

In quadrisyllabic Mandarin onomatopoeia reduplication, the size and the location are both motivation in the locality generalization.

7. Analysis of Quadrisyllabic Mandarin Onomatopoeia

In this section, we will use alignment and adjacency constraints (2), (3), (4) and (5) to analysis quadrisyllabic Mandarin onomatopoeia. By various ranking of constraints, we can found out the interaction of the same group constraint and the same group inputs will show the different outputs.

7.1 ABAB style Mandarin onomatopoeia

If we take ABAB style Mandarin onomatopoeia as a predicting output. Since the unmarked direction of reduplication is right direction, in this analysis we assume that ALIGN(RED, PRWD)-RIGHT dominate ALIGN(RED, PRWD)-LEFT. For matching the ABAB quadrisyllabic output form, ADJACENCYBR-BY-FOOT dominate ADJACENCYBR-BY-σ.

    (6) ABAB Mandarin onomatopoeia Constraint Ranking: ALIGN(R, PRWD)-RT, AD-BY-FOOT >> AD-BY-σ, ALIGN(R, PRWD)-LT

Consider the ranking in (6), analysis of three AB Mandarin onomatopoeia input group will show below.

(7) Consonant +/l/ group, /pʰala /.

/(pʰala)+ RED /	ALIGN(R, PRWD)-RT	AD-BY-FOOT	AD-BY-σ	ALIGN(R, PRWD)-LT
→a. pʰala pʰala			*	*
b.pʰala pʰala	*		*	
c. pʰalala		*		*
d. pʰapʰalala	*	*		*
e. pʰalalala		*	*	*

In tableau (7), since the reduplicant/ pʰala / shall be aligned to the right edge of output form, ALIGN(RED, PRWD)-RIGHT constaint have to dominate ALIGN(RED, PRWD)-LEFT constraint. That is the reason why candidate b will be ruled out. Candidate (b) align the reduplicant / pʰala / to the left edge of output form and violate the dominated constraint ALIGN(RED, PRWD)-RIGHT.

Although candidate (c) doesn't violate the dominated constraint ALIGN(RED, PRWD)-RIGHT, but it violate another dominated constraint ADJACENCYBR-BY-FOOT. Candidate (c) cannot fit the need of quadrisyllabic output form and be ruled out. Candidate (d) seems as a successful quadrisyllabic Mandarin onomatopoeia, but the reduplicant / pʰala / still violate ADJACENCYBR-BY-FOOT. The reduplicant of candidate (d) is not a foot size but is separated a syllable size and will be ruled out. Candidate (e) also violates dominated constraint ADJACENCYBR-BY-FOOT, while the output is a perfect quadrisyllabic form. Reduplicant of candidate (e) /la/ is a syllable size and will be ruled out. So candidate (a) /pʰala pʰala/ is the optimal candidate.

(8) Same onset collocation, /tita/

/(tita)+ RED /	ALIGN(R, PRWD)-RT	AD-BY-FOOT	AD-BY-σ	ALIGN(R, PRWD)-LT
→a. titatita			*	*
b. titatita	*		*	
c. titata		*		*
d. tititata	*	*		*
e. titatata		*	*	*

In tableau (8), we take AB Mandarin onomatopoeia which at left edge of output as base form.

Since the reduplicant /tita/ shall be aligned to the right edge of output form, ALIGN(RED, PRWD)-RIGHT have to dominate ALIGN(RED, PRWD)-LEFT.

That is the reason why candidate (b) will be ruled out. Candidate (b) align the reduplicant /tita / to the left edge of output form and violate the dominated constraint ALIGN(RED, PRWD)-RIGHT.

Although candidate (c) doesn't violate the dominated constraint ALIGN(RED, PRWD)-RIGHT, but it violate another dominated constraint ADJACENCYBR-BY-FOOT. Candidate (c) cannot fit the need of quadrisyllabic output form and be ruled out. Candidate (d) seems as a successful quadrisyllabic Mandarin onomatopoeia, but the reduplicant / tita / still violate ADJACENCYBR-BY-FOOT. The reduplicant of candidate (d) is not a foot size but is separated a syllable size and will be ruled out. Candidate (e) also violates dominated constraint ADJACENCYBR-BY-FOOT, while the output is a perfect quadrisyllabic form. Reduplicant of candidate (e) /ta/ is a syllable size and will be ruled out. So candidate (a) / titatita / is the optimal candidate.

(9)   Disyllabic input Mandarin onomatopoeia, / kutɕi /

/(kutɕi)+ RED /	ALIGN(R, PRWD)-RT	AD-BY-FOOT	AD-BY-σ	ALIGN(R, PRWD)-LT
→a. kutɕikutɕi			*	*
b. kutɕikutɕi	*		*	
c. kutɕitɕi		*		*
d. kukutɕitɕi	*	*		*
e. kutɕitɕitɕi		*	*	*

In tableau (9), we take AB style Mandarin onomatopoeia which at left edge of output as base form.

Since the reduplicant/kutɕi / shall be aligned to the right edge of output form, ALIGN(RED, PRWD)-RIGHT constaint have to dominate ALIGN(RED, PRWD)-LEFT constraint. That is the reason why candidate b will be ruled out. Candidate (b) align the reduplicant /kutɕi / to the left edge of output form and violate the dominated constraint ALIGN(RED, PRWD)-RIGHT.

Although candidate (c) doesn't violate the dominated constraint ALIGN(RED, PRWD)-RIGHT, but it violate another dominated constraint ADJACENCYBR-BY-FOOT. Candidate (c) cannot fit the need of quadrisyllabic output form and be ruled out. Candidate (d) seems as a successful quadrisyllabic Mandarin onomatopoeia, but the reduplicant / kutɕi / still violate ADJACENCYBR-BY-FOOT. The reduplicant of candidate (d) is not a foot size but is separated a syllable size and will be ruled out. Candidate (e) also violates dominated constraint ADJACENCYBR-BY-FOOT, while the output is a perfect quadrisyllabic form. Reduplicant of candidate (e) /tɕi/ is a syllable size and will be ruled out. So candidate (a) / kutɕikutɕi / is the optimal candidate.

7.2 AABB style Mandarin onomatopoeia

Input forms of AABB style Mandarin onomatopoeia are identical. Different from ABAB style Mandarin onomatopoeia, AABB style ones undergo other derivational progress and that is the reason the same input will generate various output forms.

We will use the same example just mentioned at section 5.1 to show how different between ABAB style and AABB style Mandarin onomatopoeia.
In AABB style quadrisyllabic Mandarin onomatopoeia, the base and the reduplicant is hard to mark since there is several alternatives. This situation is similar to Mandarin content word. Lunden (2004) point out that all the possibilities have in common that each syllable of the reduplicant is adjacent to their individual correspondent base.

(10) AABB style Mandarin onomatopoeia Constraint ranking :ALIGN(R, PRWD)-RT, ALIGN(R, PRWD)-LT, AD-BY-σ >> AD-BY-FOOT

Base on the constraint ranking in (11), Analysis of three AB style Mandarin onomatopoeia input group will show below.

(11) Consonant +/l/ group, /p^{h}ala /.

/(p^{h}ala)+ RED /	ALIGN(R, PRWD)-RT	ALIGN(R, PRWD)-LT	AD-BY-σ	AD-BY-FOOT
→a. p^{h}ap^{h}ala̲la̲ p^{h}ap^{h}ala̲la̲				*
b. p^{h}ala p^{h}ala		*	**	
c. lap^{h}ala̲p^{h}a	*	*	**	*
d. lap^{h}ala̲la̲			*	*

In tableau (11), /p^{h}a/ and /la/ will be reduplicant respectively. So ADJACENCYBR-BY-σ is dominated constraint. Candidate (b) take foot-size /p^{h}ala / as reduplicant and violates dominated constraint ADJACENCYBR-BY-σ , candidate (b) will be ruled out.

In addition, /p^{h}a/ and /la/ are reduplicants will reduplicate to opposite direction. Candidate (b) only reduplicate to right direction violates other dominated constraint ALIGN(RED, PRWD)-LEFT again and has no chance to be optimal candidate. Candidate (c) did reduplicate /p^{h}a/ and /la/ respectively. However, the reduplicant is not adjacent to its correspondent base and violates dominated constraint. Then candidate (c) is ruled out. Candidate (d) only takes /la/ as the reduplicant. Then /la/ be aligned to the left edge of output. Because of that candidate d violates the dominated constraint and be ruled out.

Why the optimal candidate has two forms is because that even we set the inner /p^{h}a/ and /la/ as base, outer /p^{h}a/ and /la/ or in opposite way, the output form always will be a successful AABB style quadrisyllabic Mandarin onomatopoeia which won't violate dominated constraint like ADJACENCYBR-BY- σ , ALIGN(RED, PRWD)-LEFT and ALIGN(RED, PRWD)-RIGHT.

(12) Same onset collocation group, /tita/

/(tita)+ RED /	ALIGN(R, PRWD)-RT	ALIGN(R, PRWD)-LT	AD-BY-σ	AD-BY-FOOT
→a.titi̲ta̲ta ti̲tita̲ta̲				*

			*	**	
b.	ti<u>ta</u>tita		*	**	
c.	ta<u>ti</u>tati	*	*	**	*
d.	ta<u>ti</u>tata			*	*

In tableau (12), /ti/ and /ta/ will be reduplicant respectively. So ADJACENCYBR-BY-σ is dominated constraint. Candidate (b) take foot-size /tita / as reduplicant and violates dominated constraint ADJACENCYBR-BY-σ, candidate (b) will be ruled out.

In addition, /ti/ and /ta/ are reduplicants will reduplicate to opposite direction. Candidate (b) only reduplicate to right direction violates other dominated constraint ALIGN(RED, PRWD)-LEFT again and has no chance to be optimal candidate. Candidate (c) did reduplicate /ti/ and /ta/ respectively. However, the reduplicant is not adjacent to its correspondent base and violates dominated constraint. Then candidate (c) is ruled out. Candidate (d) only takes /ta/ as the reduplicant, then aligns /ta/ to the left edge of output. Because of that candidate (d) violates the dominated constraint and be ruled out.

Why the optimal candidate has two forms is because that even we set the inner /ti/ and /ta/ as base, outer /ti/ and /ta/ or in opposite way, the output form always will be a successful AABB style quadrisyllabic Mandarin onomatopoeia which won't violate dominated constraint like ADJACENCYBR-BY-σ, ALIGN(RED, PRWD)-LEFT and ALIGN(RED, PRWD)-RIGHT.

(13)   Disyllabic inputs Mandarin onomatopoeia group, /kutɕi/

/(kutɕi)+ RED /	ALIGN(R, PRWD)-RT	ALIGN(R, PRWD)-LT	AD-BY-σ	AD-BY-FOOT
→a. ku<u>kutɕi</u>tɕi <u>kukutɕitɕi</u>				*
b. <u>kutɕi</u>kutɕi		*	**	
c. tɕi<u>kutɕi</u>ku	*	*	**	*
d. tɕi<u>kutɕi</u>tɕi			*	*

In tableau (13), /ku/ and /tɕi/ will be reduplicant respectively. So ADJACENCYBR-BY-σ is dominated constraint. Candidate (b) take foot-size / kutɕi / as reduplicant and violates dominated constraint ADJACENCYBR-BY-σ, candidate (b) will be ruled out.

In addition, /ku/ and /tɕi/ are reduplicants will reduplicate to opposite direction. Candidate (b) only reduplicate to right direction violates other dominated constraint ALIGN(RED, PRWD)-LEFT again and has no chance to be optimal candidate. Candidate (c) did reduplicate /ku/ and /tɕi/ respectively. However, the reduplicant is not adjacent to its correspondent base and violates dominated constraint. Then candidate (c) is ruled out. Candidate d only takes /tɕi/ as the reduplicant. Then /tɕi/ is aligned to the left edge of output. Because of that candidate (d) violates the dominated constraint and be ruled out.

Why the optimal candidate has two forms is because that even we set the inner /ku/ and /tɕi/ as base, outer /ku/ and /tɕi/ or in opposite way, the output form always will be a successful AABB style quadrisyllabic Mandarin

onomatopoeia which won't violate dominated constraint like ADJACENCYBR-BY- σ , ALIGN(RED, PRWD)-LEFT and ALIGN(RED, PRWD)-RIGHT.

8 Conclusion

At section 7 the analysis of ABAB and AABB quadrisyllabic Mandarin onomatopoeia, we can see the interaction constraints and various ranking of constraint will generate different output form when their input are the same.
In ABAB Mandarin onomatopoeia, the reduplicant is at right edge of output form and always is foot size. So must be ALIGN(R, PRWD)-RT, AD-BY-FOOT dominated constraint to choose the optimal candidate. When discuss about AABB Mandarin onomatopoeia, there are several problem still there. Except for same onset collocation group, other AB Mandarin onomatopoeia undergoes the derivation of AABB Mandarin onomatopoeia will be ungrammatical words.

The constraint ranking for AABB Mandarin onomatopoeia we analyzed above may just can fit to AB style Mandarin onomatopoeia which in the same onset collocation. In other words, Consonant + /l/ and disyllabic input AB style won't generate AABB quadrisyllabic onomatopoeia. The distinguishment for base and reduplicant of AABB Mandarin onomatopoeia are remaining problem. Splitting up or infixing the reduplicant of AABB Mandarin onomatopoeia, we founded out that dominated constraints ALIGN(R, PRWD)-RT, ALIGN(R, PRWD)-LT and AD-BY- σ are all satisfied. We may need further evidence to support either the reduplicant shall be infix or split- up. We can refer to the reduplication process of Mandarin content words and take it as the inspiration for Mandarin onomatopoeia.
After all, the various ranking of alignment constraints and adjacency constraint really generate successful quadrisyllabic Mandarin onomatopoeia. The structure of Mandarin onomatopoeia is not by random but has its own principle.

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Pronoun-Antecedent Relations from Last Resort Movement

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1. Introduction

This paper develops a movement account of pronoun-antecedent relations, which have traditionally been accounted for by Binding Theory (Chomsky 1981, Chomsky 1986), exemplified by the famous Conditions A-C (1).

(1) (a) An anaphor must be bound in a local domain.
    (b) A pronoun must be free in a local domain.
    (c) An r-expression must be free. (Chomsky 1995:96)

Within the Minimalist Program (1995), in order to achieve a more adequate account of pronoun-antecedent relations and explain away the Binding Conditions, there have been some attempts to formulate Binding Theory in terms of movement (cf. Hornstein 2001, Kayne 2002, Zwart 2002, Heinat 2003, Heinat 2006). This paper builds on these analyses, particularly on the work by Kayne (2002).

Kayne (2002) argues that a pronoun and antecedent are base generated together as part of a doubling constituent. Kayne proposes that a pronominal element and an antecedent originate within a doubling constituent of the form [Spec Head], such as '[John he]', where the Spec is the antecedent and the head is the pronominal. The Spec can move out of a doubling constituent, but the head cannot. The head of the doubling constituent is licensed in its final surface position and thus has no need to move, whereas the Spec needs to move to obtain a theta-role and case. A crucial component of Kayne's analysis is that the Spec can only move out of a doubling constituent if the doubling constituent has undergone movement. In addition, a reflexive has a structure in which a doubling constituent moves, as in (2).

(2) [$_{DP}$ [John him] ~~[John him]~~ self]

These proposals derive some typical Condition A and B effects.

  Some Condition B effects are derived as follows. In (3a), with the derivation in (3b), the doubling constituent moves from its base position to [Spec, TP]. This frees the Spec 'John' for movement to theta-position. Note that 'he' remains free in the lower clause, thus satisfying Condition B.

(3) (a) John$_i$ thinks he$_i$ is smart. (Kayne 2002:146)
    (b) [$_{TP}$ John [$_{v*P}$ ~~John~~ thinks [$_{CP}$ [$_{TP}$ [~~John~~ he] is smart ~~[John he]~~]]]]

On the other hand, in (4), assuming the base structure in (4b), the doubling constituent has nowhere to move before the subject theta-position can be filled. Thus, the Spec cannot move out of the doubling constituent and the subject theta-role is not assigned.

(4) (a) *John$_i$ praises him$_i$. (Kayne 2002:146)
    (b) [$_{v*P}$ praises [John him]]

  This analysis also accounts for why an anaphor can be local to its antecedent, in accord with Condition A.^{i} In the derivation of (5a), as shown in (5b), the doubling constituent moves within the anaphor, since Kayne assumes that a reflexive has a position within it to which a doubling constituent moves (see (2) above). This movement somehow frees the Spec 'John' for movement to theta-position. Thus, the anaphor is bound locally.

(5) (a) John$_i$ praises himself$_i$.
    (b) [$_{TP}$ John [$_{v*P}$ ~~John~~ praises [$_{DP}$ [~~John~~ him] [~~John him~~ self]]]]

  Kayne's system, however, faces some problems. First of all, a crucial component of Kayne's analysis is the requirement that a doubling constituent move in order for the Spec to be extracted. This accounts for the well-formedness of (3) and (5), and the ill-formedness of (4). However, it is not clear why a doubling constituent must move in order for its Spec to move.

  In addition, there are some basic data that are problematic for Kayne's analysis.

  Kayne's analysis appears to predict the opposite grammaticality judgments for (6) and (7). Example (6a) is well-formed, indicating that the Spec 'John' has moved out of the doubling constituent. However, as shown in (6b), there does not appear to be any position that the doubling constituent can move to so that the Spec 'John' can be extracted.

(6) (a) John$_i$ thinks that Mary likes him$_i$.
    (b) [$_{v*P}$ … v* thinks [$_{CP}$ that Mary T [$_{v*P}$ ~~Mary~~ likes [John him]]]]

Consider (7). Kayne's analysis predicts that it should be possible for 'John' to move out of the doubling constituent and into theta-position, since the doubling constituent moves within the anaphor, as shown in (7b). But the ill-formedness suggests that this is not the case.

(7) (a) *John$_i$ thinks that Mary likes himself$_i$.
    (b) [$_{v*P}$ John v* thinks [$_{CP}$ that Mary T [$_{v*P}$ ~~Mary~~ likes [$_{DP}$ [~~John~~ him]   [~~John him~~ self]]]]]

A possible explanation for the ill-formedness of (7) is that 'Mary' blocks movement of 'John', but if that were the case, then it is not clear why 'Mary' would not block movement of 'John' in (6).

  Next, consider the ECM construction (8a). In the partial derivation (8b), the doubling constituent moves within the lower clause. This movement should free the Spec 'John' for movement to theta-position, thus predicting, contrary to fact, that (8a) should be well-formed.

(8) (a) *John$_i$ considers him$_i$ to be intelligent. (Kayne 2002:146)
    (b) [$_{v*P}$ John considers [~~John~~ him] [$_{T*P}$ ~~John him~~ to be [intelligent ~~John him~~]]]

Kayne's explanation for the ill-formedness of (8a) is as follows.

> ..."raising to object" must apply first and […] once it does [*John him*] is too high in the structure for there to be any available intermediate position above it, yet below the subject theta-position of *consider* (Kayne 2002:146)."

However, it is not clear why raising to the object position of an ECM verb, as well as raising to the subject position of the embedded clause, should not count as movement that frees the Spec of a doubling constituent.

  In this paper, we present a modified version of Kayne's doubling constituent proposal that relies on independently motivated elements of Phase Theory (Chomsky 2000, 2001, 2004) and that, without the stipulation that a doubling constituent move, predicts the data that Kayne's analysis can account for (3-5), as well as the data that are problematic for Kayne's analysis (6-8).

2. Proposals

We follow Kayne (2002) in assuming that a pronoun and antecedent originate as a doubling constituent, and we also follow Kayne's idea that constraints on movement out of a doubling constituent account for pronoun-antecedent facts. However, we differ from Kayne with respect to the structure that we propose for

the doubling constituent and with respect to how movement occurs out of a doubling constituent.

We assume a view of Phase Theory (Chomsky 2000, 2001, 2004) whereby a derivation is broken up into phases that are formed via selection and Merge of Lexical Items (LIs) from a numeration, which is broken up into subnumerations.

We propose the structures in (9a-b), where (9a) is a pronoun and antecedent and (9b) is an anaphor and antecedent.

(9) (a) $[_{DP}$ D $[_{NP}$ $[_{N}$he] $[_{DP}$ John]]]
    (b) $[_{D*P}$ $[_{D*}$self] $[_{NP}$ $[_{N}$him] $[_{DP}$John]]]

In (9a-b), the pronoun (e.g., 'he/him') is an N head with an R-expression DP complement (e.g., 'John'). We propose that the DP in an anaphor, (9b), is a (strong) phase D*P with the D* phase head 'self'. Morphological affixation between 'self' and 'him' results in 'himself' at Spell-Out. The DP in (9a) lacks 'self' and is not a (strong) phase.

In addition, we propose that the grammar makes available an operation of Last Resort (10), which follows the idea that certain operations can save a derivation as a Last Resort (cf. Chomsky 1995, Boskovic 2007).

(10) Last Resort: an element with an unvalued feature will raise out of a phrase that is about to be sent to Spell-Out and become inaccessible.

According to Last Resort (10), when an LI with an unvalued[ii] feature is contained within a phrase that is about to be sent to Spell-Out, that LI is reinserted into the current working Subnumeration, after which it can be selected and re-Merged into a derivation.

We also propose a revised view of the Phase Impenetrability Condition (PIC). In the view of the PIC expressed in Chomsky (2004), when a phase head is Merged, the complement of a lower phase head is sent to Spell-Out. In our view, when a phase head is Merged, an entire lower phase (not just the complement of the phase head), if present, is sent to Spell-Out. The Last Resort process does away with the need for the edge of a phase to remain accessible to higher operations.

Last Resort, combined with this revised view of the PIC, accounts for the possibility of movement in the following way. In (11), assume that X* and Y* are strong phase heads.

(11) $[_{X*}$ α $_{[F:X]}$ X* ...$[_{Y*}$ Y*...α $_{[F:\_]}$ ...]]

When X* is Merged, the entire lower Y* phase is sent to Spell-Out. The LI α, because it contains an unvalued feature '[F:_]', undergoes the Last Resort process. It is reinserted into the current subnumeration, which is the

subnumeration that contained X*. Then α is selected and re-Merged into the derivation at the edge of the X* phrase.

As we demonstrate in the following section, this analysis predicts the relevant pronoun-antecedent data presented in Section 1.

3. Derivations

We assume that a derivation proceeds in phases, which are constructed via Merge of Lexical Items (LIs) that are selected from a numeration. In addition, a numeration is broken up into subnumerations; e.g., there is a v*P subnumeration and a separate subnumeration that contains T and C*. Phase heads are indicated with *; thus v*, C*, and D* are phase heads. We also assume that a subnumeration must be emptied before a derivation proceeds onto another subnumeration.[iii]

Our proposals account for the same data, presented in Section 1 and repeated below, that Kayne's analysis accounts for.

(3) (a) John$_i$ thinks he$_i$ is smart. (Kayne 2002:146)
(4) (a) *John$_i$ praises him$_i$. (Kayne 2002:146)
(5) (a) John$_i$ praises himself$_i$.

A partial derivation of (3a) is shown in (12a-c), beginning with the numeration (12a), which is broken up into subnumerations.

(12) (a) {C*, PRES, {v*, think, {C*, PRES, John$_1$, he$_1$, D, D, be, smart}}}
    (b) Merge v*:{v* v*{V [V think]{C* C*{T{D D {N [N he] {D D [N John]}}}{T [T PRES] {v [v be] {Adj [Adj smart] {D D {N [N he] {D D [N John]}}}}}}}}}}}
    (c) Last Resort: {D D [N John]}

LIs are selected from the numeration and Merged together. (12b) shows the derivation at the point at which the v* is Merged. Note that when the lower C* phrase is complete, it is not initially sent to Spell-Out, since we assume that Spell-Out does not apply until the higher phase head, in this case v*, is Merged (as discussed in Section 2 above). The Merged syntactic object has not yet been linearized and thus it is represented as a set with the label v* that contains other sets (a V set, etc.). As soon as v* is Merged, the lower C* phase is sent to Spell-Out. We assume that the doubling constituent originates as the complement of the predicate adjective and then raises to the embedded T edge to satisfy an EPP feature. The R-expression in the doubling constituent, 'John', has unvalued features – it lacks a theta-role and case. Therefore, it is subject to the Last Resort process (12c). It is reinserted into the higher v* subnumeration. Then it is selected and re-Merged at the v* phrase edge, where it gets its theta-role. From

this position it moves on to the edge of the T phrase to satisfy an EPP feature, resulting in the structure in (13). The vertical lines indicate phase edges, and the numbers under the pronoun and antecedent indicate coreference relations.

(13)
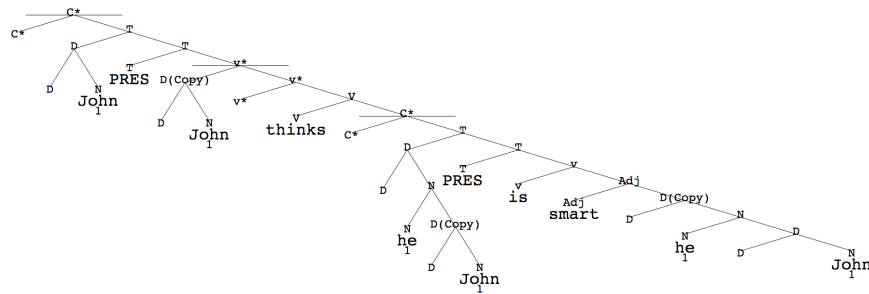
This analysis also accounts for the well-formed (5a), repeated below as (14a), which begins with the numeration in (14b).
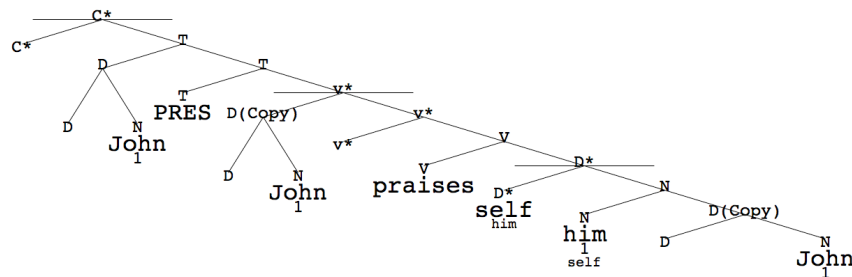
(14) (a) John$_i$ praises himself$_i$.
    (b) Numeration: {C*, PRES, {v*, {self*, John$_1$, he$_1$, D}, praise}}
    (c) Merge v*: {v* v* {V [V praise] {D* [D* self] {N [N he] {D D [N John]}}}}}
    (d) Last Resort: {D D [N John]}

Note that in this construction, the pronoun and anaphor originate within a D*P phase. Thus, when v* is Merged (14c), the D*P phase is sent to Spell-Out. Since 'John' lacks case and a theta-role, it undergoes the Last Resort process (14d) and is reinserted into the current subnumeration. Then 'John' is selected and re-Merged at the v* phrase edge, where it gets its theta-role. From this position, it moves on to the T edge, resulting in the structure in (15). Morphological merger between 'self' and 'him' results in 'himself'.

(15)

The ill-formed (4a), repeated below as (16a) is accounted for as follows.

(16) (a) *John$_i$ praises him$_i$. (Kayne 2002:146)
(b) Numeration: {C*, PRES, {v*, John$_1$, he$_1$, D , praise, D }}
(c) Merge v*: {v* v* {V [V praise] {D D   {N [N he] {D D [N John]}}}}}

Note what happens when v* is Merged, (16c). Since 'John' is not contained within a D*P phase, the Last Resort process cannot apply. Thus, the subject theta-role does not get assigned and the derivation crashes, as shown in (17).

(17)

This analysis also accounts for the data, presented in Section 1 and repeated below, that are problematic for Kayne (2002). Remember that Kayne's analysis doesn't account for where the doubling constituent can move to in (6a), and it predicts that (7a) and (8a) should be well-formed, since the doubling constituent has a place to move to before the relevant v* is Merged; i.e. the subject should be able to raise out of the doubling constituent.

(6a) John$_i$ thinks that Mary likes him$_i$.
(7a) *John$_i$ thinks that Mary likes himself$_i$.
(8a) *John$_i$ considers him$_i$ to be intelligent. (Kayne 2002:146)

 The derivation of (6a) proceeds as shown in (18), beginning with the numeration in (18a).

(18) (a) Numeration: {C*, PRES, {v*, think, {that*, PRES, {v*, D, Mary, like, John$_1$, he$_1$, D , D}}}}
(b) Merge C*: {C* [C* that] {T {D D [N Mary]}, {T [T PRES] {v* {D(Copy) D [N Mary]}{v* v* {V [V like] {D D {N [N him] {D D [N John]}}}}}}}}}
(c) Last Resort: {D D [N John]}

(d) Merge v*: {v* v* {V [V think] {C* {D D [N John]} {C* [C* that] {T {D D [N Mary]} {T [T PRES] [v* [D(Copy) D [N Mary]] [v* v* [V [V likes] [D D [N [N him] [D(Copy) D [N John]]]]]]]}}}}}}

(e) Last Resort: {D D [N John]}

At the point at which the lower C* 'that' is Merged (18b), the embedded v* phrase is sent to Spell-Out. 'John' which contains unvalued features, since it lacks case and a theta-role, undergoes the Last Resort process and is reinserted into the current subnumeration (18c). Then 'John' is selected and re-Merged at the C* edge. We assume that this results from a requirement that a subnumeration be emptied. The DP 'Mary' does not cause a blocking effect since there is no movement of 'John' involved; 'John' is picked out of the subnumeration. When the next higher v* head is Merged (18d), the lower C* phase will be sent to Spell-Out. Since 'John' still contains unvalued features, it is again reinserted into the current subnumeration. Then it is selected and re-Merged in theta-position at the v* edge, from where it later moves to the T edge to satisfy an EPP feature. In this manner, as shown in (19), successive applications of Last Resort account for the well-formedness of this construction.

(19)
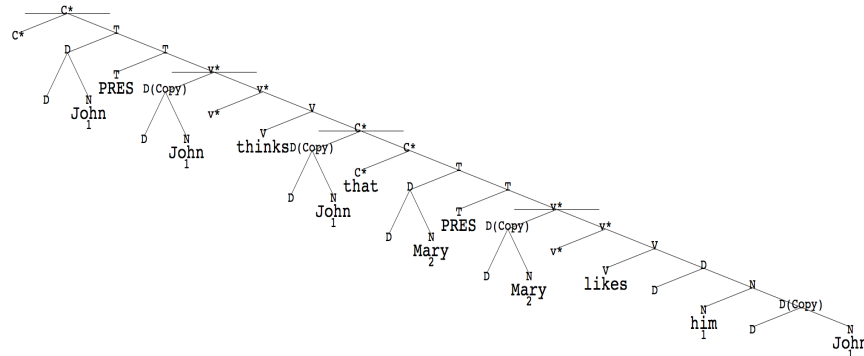
The ill-formed (7a), repeated below as (20a) is also accounted for.

(20) (a) *John$_i$ thinks that Mary likes himself$_i$.
   (b) Numeration: {C*, PRES, {v*, think, {that*, PRES, {v*, {D, Mary}, like, {self*, {John $_1$, he $_1$, D }}}}}}
   (c) Merge v*: {v* v*{V [V like] {D* [D* self] {N [N he] {D D [N John]}}}}}

When v* is Merged (20c), 'John', which is contained within a lower D* phase, undergoes the Last Resort process and is reinserted into the current subnumeration. Then it is selected and re-Merged at the v* edge, due to the

requirement that a subnumeration be emptied. When T is Merged, the EPP feature on T attracts 'John' instead of 'Mary', since 'John' is the closest DP, thus resulting in (21). This creates a blocking effect (the wrong subject is attracted to the T edge of the embedded clause), eventually causing the derivation to crash.[iv]

(21)
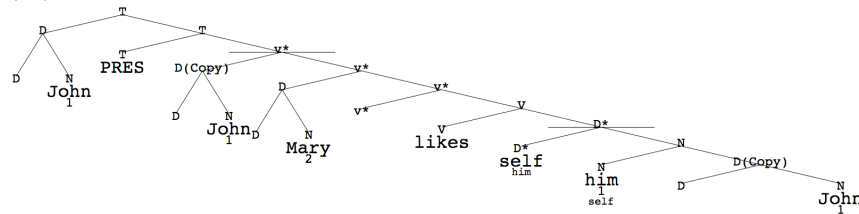
We next turn to the ill-formed ECM construction (8a), repeated below as (22a).

(22) (a) *John$_i$ considers him$_i$ to be intelligent. (Kayne 2002:146)
    (b) Numeration: {C*, PRES, {v*, consider, John$_1$, he$_1$, D, D, to, be, intelligent}}
    (c) Merge v*: {v* v* {V [V consider] {T {D D {N [N he {D D [N John]}]} {T [T to] {v [v be] {Adj [Adj intelligent] {D(Copy) D {N [N he] {D D } [N John]}}}}}}}}}}

Assuming that the complement of an ECM verb lacks a CP (Chomsky 1981), at the point at which v* is Merged (22c), 'John' is not contained within a phase that needs to be sent to Spell-Out. Therefore, it is unable to undergo the Last Resort process. 'John' cannot be Merged into subject theta-position at the v* edge and the derivation crashes, as shown in (23).

(23)
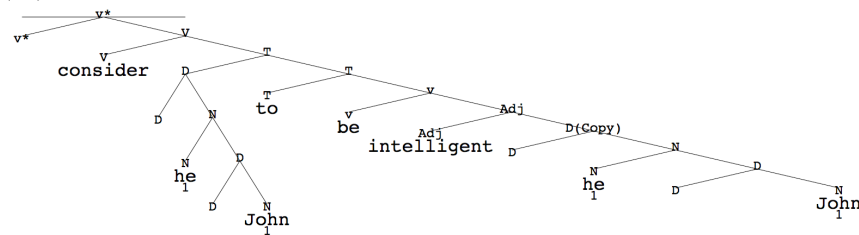
  Lastly, our analysis also predicts that an anaphor can occur as the subject of a complement clause of an ECM verb, as in (24).[v]

(24) (a) John$_i$ considers himself$_i$ to be intelligent.
    (b) {C*, PRES, {v*, consider, {self*, John$_1$, he$_1$, D}, to, be, intelligent}}
    (c) Merge v*: {v* v* {V [V consider] {T {D* [D* self] {N [N he] {D [D] [N John]}}} {T [T to] {v [v be] {Adj [Adj intelligent] {D*(Copy) [D* self] {N [N he] {D D [N John]}}}}}}}}}
    (d) Last Resort: {D D [N John]}

At the point at which v* is Merged (24c), 'John' is contained within a D*P phase, which has moved to subject position of the embedded clause. The D*P is sent to Spell-Out. 'John', which lacks a theta-role and case, undergoes the Last Resort process and is reinserted into the current subnumeration. Then it is selected and Merged at the v* edge, and the derivation converges, as shown in (25).

(25)
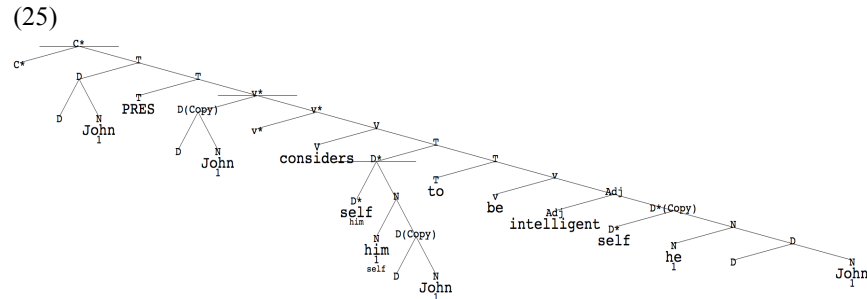
  In this manner, our analysis predicts a variety of pronoun-antecedent data.

4. Conclusion

In conclusion, this analysis accounts for more data than Kayne (2002) with fewer stipulations. A wide variety of coreference facts result from base generation of a pronoun and antecedent within a DP/D*P, and the possibility of Last Resort movement (that can carry an R-expression into theta-position) as determined within the limits of Phase Theory. This view of Last Resort can also account for other coreference facts; we have applied this analysis to English picture DP constructions (Ginsburg & Fong 2011). We leave for future research further examination of the structure of the proposed doubling constituent as well as examination of how these proposals fair on a wider set of data from a variety of languages.

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[i] Note that while Kayne's analysis accounts for the possibility of local binding of an anaphor, it does not appear to account for why an anaphor must (usually) be locally bound.
[ii] We use the term 'unvalued' here for the sake of simplicity, leaving aside the issue of whether or

not the feature is uninterpretable, unvalued, or a combination of both.

[iii] The derivations presented in this section were modeled via a computer program that implements the proposals presented in this paper. This program automatically constructs derivations from underlying numerations. The tree diagrams presented in this paper were automatically constructed with this computer program.

[iv] The exact nature of this blocking effect requires further examination. When C* is Merged, 'Mary' will undergo the Last Resort operation and be re-Merged at the C* edge. Then when the matrix v* is Merged, the lower C* phase will contain two elements with unvalued features: 'John' lacks a theta-role and 'Mary' lacks case. Thus, both DPs should undergo the Last Resort process. If 'Mary' is Merged in the v* edge, it will get a second theta-role and this could cause the derivation to crash (i). If 'John' is Merged in theta-position, and 'Mary' is adjoined, the derivation would result in (ii) which would result in incorrect word order and which also might be ruled out due to an ill-formed semantic interpretation.

(i) $[_{v*}$ Mary$_2$ v* thinks $[_{C*}$ ~~Mary$_2$~~ that John$_1$ T $[_{v*}$ ~~John$_1$~~ ~~Mary$_2$~~ v* likes $[_{D*}$ self him$_1$ ~~John$_1$~~$]]]]$

(ii) $[_T$ Mary$_2$ T $[_{v*}$ ~~Mary$_2$~~ John$_1$ v* thinks $[_{C*}$ ~~Mary$_2$~~ that ~~John$_1$~~ T $[_{v*}$ ~~John$_1$~~ ~~Mary$_2$~~ v* likes $[_{D*}$ self him$_1$ ~~John$_1$~~$]]]]]$

There also exists another possibility. Assume that a DP has no inherent need to obtain a theta-role. Rather, a theta-role is a feature that is checked on a verbal element (cf. Hornstein 1999, Di Sciullo & Isac 2008). For example, a theta-role could simply be the checking of an unvalued/uninterpretable D feature on V by an interpretable/valued D feature on a D. In this case, the derivation may proceed as in (iiia). At the point at which the matrix v* is Merged, 'Mary' lacks case. 'John' has already received Case, and thus has no unvalued features (assuming that it does not need a theta-role). Thus, 'Mary' undergoes the Last Resort process and is re-Merged at the v* edge. Note that (iiia) then produces a construction that does not correspond to the desired word order in (20a), but rather to (iiib). It is possible that (iiia) can be ruled out in terms of an invalid semantic interpretation, the nature of which we leave for further examination. It may also be ruled out by economy constraints, since (iiib) should have a different underlying derivation. According to our analysis, the more economical derivation of (iiib) would proceed as in (iiic), with the initial Merge of 'Mary' occurring in the matrix clause.

(iii) (a) $[_T$ Mary$_2$ T $[_{v*}$ ~~Mary$_2$~~ v* thinks $[_{C*}$ ~~Mary$_2$~~ that ~~John$_1$~~ T $[_{v*}$ ~~John$_1$~~ ~~Mary$_2$~~ v* likes $[_{D*}$ self him$_1$ ~~John$_1$~~$]]]]]$

(b) Mary thinks that John$_1$ likes himself$_1$.

(c) $[_T$ Mary$_2$ T $[_{v*}$ ~~Mary$_2$~~ v* thinks $[_{C*}$ that John$_1$ T $[_{v*}$ ~~John$_1$~~ v* likes $[_{D*}$ self him$_1$ ~~John$_1$~~$]]]]]$

[v] Note that this example does not pose a problem for Kayne's analysis since the doubling constituent is able to move in a timely enough manner to allow extraction of the Spec.

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