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Graft as Merge

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0. Introduction

In a shift from the Minimalist Program (Chomsky 1995) to biolinguistics inspired by Jenkins (2000) and a seminal work by Hauser, Chomsky and Fitch (2002), and a series of much recent work by Chomsky (Cf. 2007a, 2007b, 2007c, 2010), Berwick and Chomsky (2011), much attention has been paid to the origin, evolution and development of the Faculty of Language in Narrow Sense (FLN) (Hauser, Chomsky and Fitch 2002). A research program of the Minimalist Program is now a subfield of biolinguistics as is termed the Biolinguistic Minimalism (BM) by Narita and Fujita (2010) to seek optimality and perfection in the linguistic system. In the BM, the Faculty of Language (UG) consists of only two operations, i.e. Merge and Recursion, which would be unique to human species. Linguistic structures are constructed by the recursive application of Merge, therefore, it is not really impossible to posit that ultimately there is a sole operation: (Recursive) Merge in the Faculty of (Human) Language. In the Biolinguistic Program (BP), Chomsky does not imply the UG inclusive of parameters. It however does not mean that the model of UG inclusive of parameters is dispensed with.

In this paper, we will consider the operation: Merge, which constitutes the External Merge and the Internal Merge, and argue that there exists the third kind of Merge making use of the Internal and External Merge called Graft advocated by Riemsdijk (1998, 2000, 2001, 2004, 2006). Then, we will concern with Head Internal Relative Clauses (HIRCs) and argue that HIRCs turn out to be Grafts by observing HIRCs in Japanese in terms of the Graft analysis.

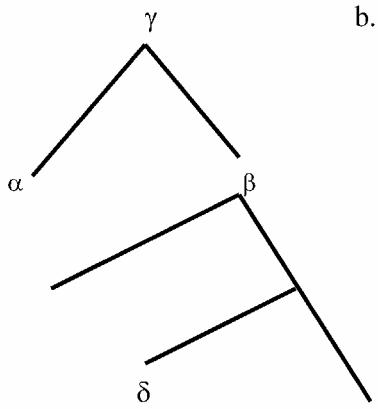
1. Grafts

Let us first overview the idea of Grafts.

Riemsdijk (2006) argues that the existence of Grafts follows directly from the two types of Merge, internal and external, as postulated in Chomsky (2000a,b,2004a,b, 2005). (Recursive) Merge is an outstanding property of the Faculty of Human Language.[1] The operation: Merge takes two elements, let us call them α and β and combines them together. This manipulation is what Chomsky calls External Merge. Suppose that is determined to be a Head, then, we have {α {α, β}}, a projection of α. On the other hand, if we take β to be a Head, then, we get {β {α, β}}, a projection of β. Note that the head initial vs. head final in word order follow from the choice of either α or β as a Head.[2] Merge recursively applies to any two elements to form a larger unit. Another type of Merge would take an element in a syntactic tree formed by the previous

Merge and a new element, and put them together. This is an instance of Internal Merge, whose operation constitutes displacement. The difference between Internal Merge and External Merge will be illustrated in (1).

(1) a.



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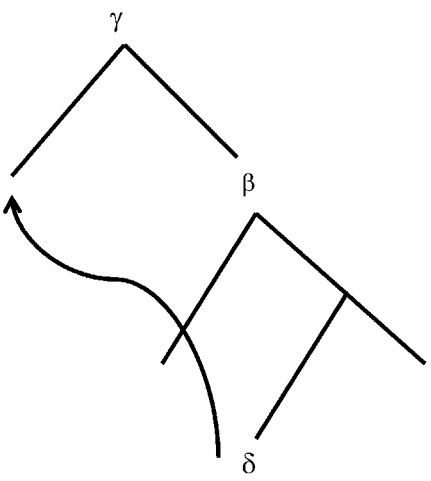
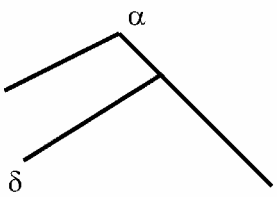
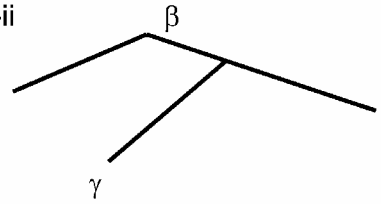


(1a) is an example of External Merge while (1b), an instance of Internal Merge. Let us now consider the following trees:

(2) a-i



a-ii



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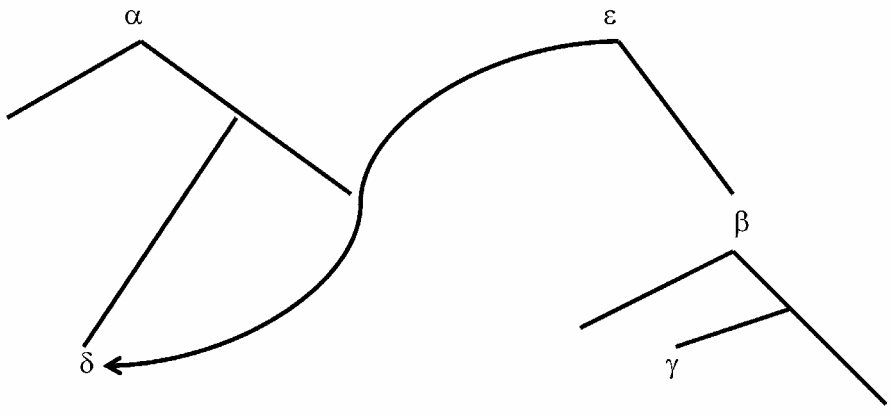


Take δ and ε put them together by Merge in (2a). As a result, we have (2b), which is what Riemsdijk calls a Graft. δ is the shared element in the tree ε. It is dominated ε by and is a sister of β. At the same time, δ maintains the structural relations it had in its own tree α. The operation as illustrated above is called Graft which possesses a dual nature of External Merge as well as Internal Merge.[3]

2. On the Graft Theory and the Head Internal Relative Clauses

In the previous section, we have considered the basic idea of Grafts. Here, we will consider Japanese relative clauses as an evidence of Grafts.

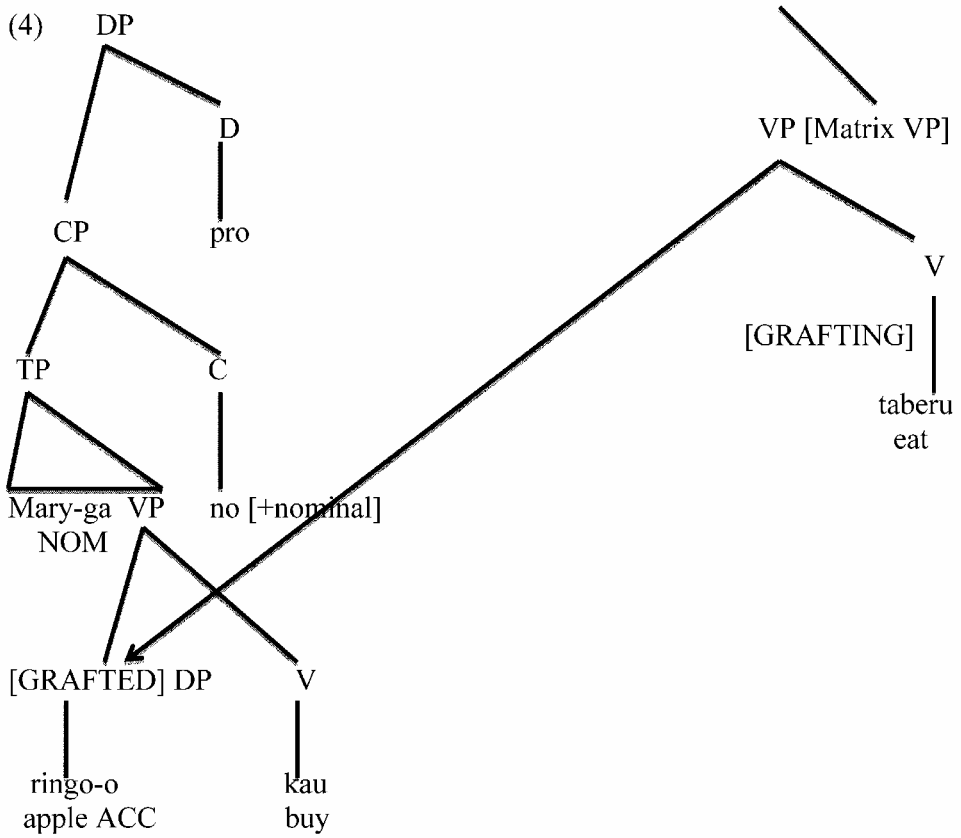
Let us first assume that Japanese relative clauses are TPs not CPs, then, it is a consequence of a matter of phases. In English RCs, CP follows the Head (the antecedent), then, CP is a phase and only the edge of CP is available for further operations. RC in Japanese, however, is best analyzed as TP following the head in numbers of reasons such as no overt wh pronouns, thus, no island violation such as a classical subjacency condition. The argument that the relative clauses in Japanese are TPs not CPs is taken up in the literature such as Kuroda (2005a,b), Murasugi (1994, 2000a, 2000b), and note also that structurally similar relative clauses in Korean are TPs not CPs argued in Jo (2002). Thus, we could say that relativization in natural languages is (minimally) parameterized in such a way that the head selects either CP or TP as its complement in relative clauses.

Noun Phrases in Japanese are problematic in some respects. It is proposed that Japanese lacks of the overt determiner system, thus, nominal projection may not include D[4]. Note that NP in Japanese has an overt Case marker, hence, it is proposed that a Functional Category, K whose maximal projection is KP. In other proposal, Japanese indeed has DP where Case is assigned to D of DP. We will not get into this argument here.

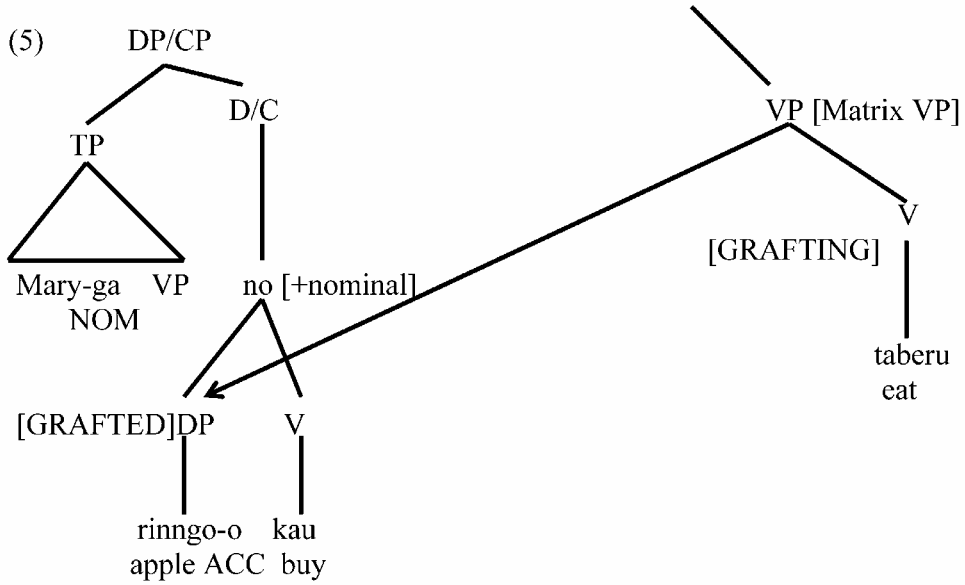
Let us consider the following example:

(3) Tom-ga [Mary-ga ringo-o katta] no]-o
Nom Nom apple Acc buy+Past NO Acc
tabe-ta
eat+Past
"Tom ate an apple which Mary bought."

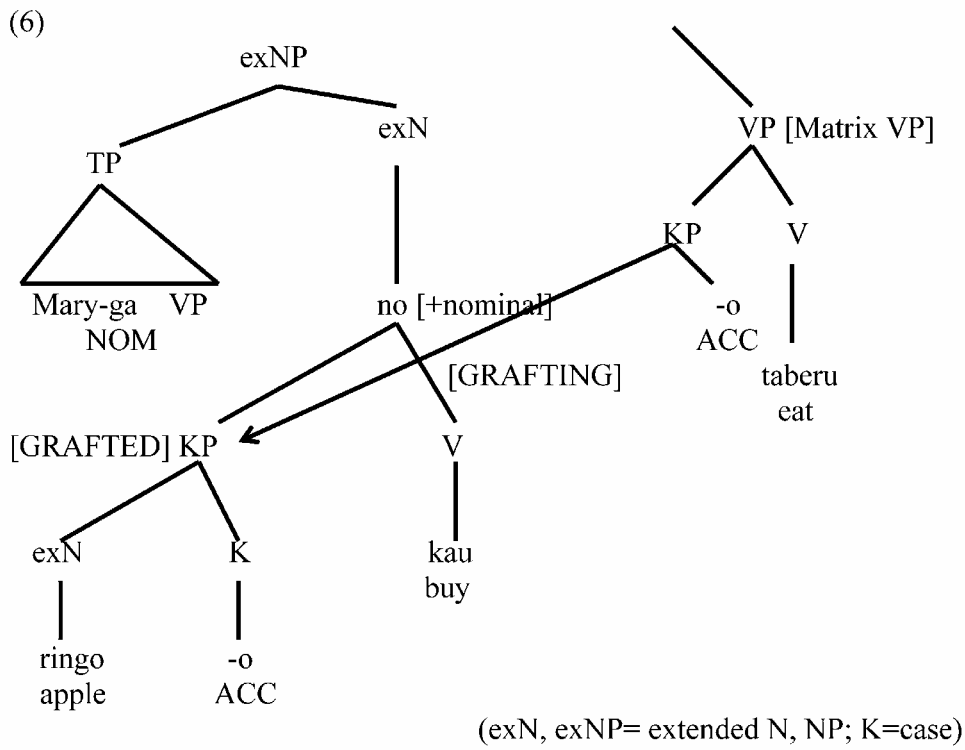
This example is a typical head internal relative clause (HIRC), which is one option for relativization in Japanese. The HIRC can be observed across languages widely.[5] Note that the unmarked option in Japanese is the instance of the Head External and Head Final relative clauses. However, HIRC is frequently used in both colloquial as well as written Japanese. Suppose that Japanese has DP and CP just like English, we will have a structure as in (4) for sentence (3).



If we take a position of the proposal that Japanese relative clauses are TPs not CPs, and there are DPs, then, we will get the following Grafted tree. Note that tree (5) follows from the idea discussed in Imai (2012) that haplology superimposes one projection on the other one.



Suppose that Japanese does not have DPs, but has a Functional category of KP, i.e. Case Phrase, which is overtly pronounced. Furthermore, noun phases are assumed to be extended NPs in Japanese,[6] then we will have (6).



At this point, it is hard to determine which analysis is tenable for nominal expressions in Japanese, thus, we will leave open for a further discussion. We can only say that HIRC structures in Japanese can be explained by Graft. So is assumed in other languages with HIRCs.

It is proposed that the Grafting structure is created in one dimension, while a structure including the Grafted category is created in another dimension. In other words, we can say that linguistic trees in mental computation are three-dimensional advocated by Riemsdijk. Note that Chomsky (2004a) in *the Generative Enterprise Revisited* posits that there are three-dimensional trees. Baker (2001), and recently Klosek (2011) also pursue the idea of tree-dimensional trees[7], for which we have supported in Imai (2013).

3. Merger and Acquisition (M&A)

In this section, we will observe the unique operation in FL, *Merge* and its application for how categories created by Merge get a label. Note that labels are relevant only at interface, assuming bare phrase structures in FLN (Chomsky 1995, Boeckx 2008).

FL would operate with the economy and optimal principles, then, operation *Merge* enters into the computational system, C_{HL}. Imai (2000) argues that as is assumed by Chomsky, the most fundamental operation for language processing in broad language systems is the operation, *Merge*, which selects two syntactic objects (α,β) and form K (α.β) from them. Imai (2000) proposes that the relationship between the two elected objects (a merger and a mergee) can be specified as in (7):

(7) a. Suppose A is a merger and B is a mergee, then, A merges with B resulting in C in such a way that B is included in A. In this case, B is part of A retaining some characteristics of B. Hence, C is merger-oriented. ➡ {C {A, B}}, C=A.

b. Suppose A is a merger and B is a mergee then, A merges with B resulting in C in such a way that A is included in B. in this case, A is a part of B retaining some characteristics of A. Hence, C is mergee-oriented. ➡ {C {A, B}},C=B

c. Suppose A is a merger and B is a mergee, then A merges with B resulting in C in such a way that A and B are indistinctly amalgamated. In this case, C is an entirely new entity consisting of A and B. ➡ {C {A, B}}, C = (A, B).

d. Suppose A is a merger and B is a mergee, then, A merges with B resulting in C in such a way that A is not included in B and B is not included in A, either. In this case, C is neutral. ➡ {C {A, B}}, C = Φ

The four types of *Merge* can be defined in terms of Acquisition.

(8) i. A acquires B and becomes C. (We call it the Progressive Merge.)

ii. B acquires A and becomes C. (We call it he Regressive Merge.)

iii. A and B acquire each other. The autonomy of each disappears. (We call it the Amalgamated Merge.)

iv. A does not acquire B and conversely B does not acquire A. The autonomy of each is respected. In other words, A and B are adjacent each other. (We call it the Neutralized Merge.)

It follows that the Operation, *Merge* is a universal operation with options mentioned above depending on a language to which the choice of items might be attributed. The consequence with (8i-ii) is that we no longer need the head parameter any more.

Rizzi (2012) following Chomsky (2013), discusses labeling of the category created by Merge. Chomsky (2013) argues how categories created by Merge get a label by postulating the labeling algorithm as follows:

(9) The Labeling Algorithm:
The category created by Merge inherits the label of the closest head.

(10) Nodes must have a label to be properly interpreted: the interpretive systems must know what kind of object they are interpreting.

(10) is different from the previous model in which labeling was thought to be prerequisite for further applications of Merge. The new view makes Merge apply to unlabeled structures. Labeling is necessary only at interface.

We have three cases to be considered as to Merge:

(11) a. Head - Head Merge
b. Head - Phrase Merge
c. Phrase - Phrase Merge

Rizzi (2012) defines the closeness of a head in terms of c-command as follows:

(12) H_1 is the closest head to α. iff
i. α. contains H_1, and
ii. there is no H_2 such that i. α. c-commands H_2 and
ii. H_2 c-commands H_1.

We apply (8iii) for (11a) to account for the root and functional category. (8i-ii) account for (11b), which is subject to a natural language. We apply (8iv) for (11c) to form an unlabeled structure. As (8iii) is mysterious and somewhat complicated, we will put it aside here.

4. Concluding Remarks

What we have so far observed is that the peculiar structure of Head Internal Relative Clauses can be analyzed by Grafts advocated by Riemsdijk. Even though HIRCs look complicated structures, they can be constructed by making use of the operation: Merge. We have so far three kinds of operations of Merge, which are External Merge, Internal Merge and Graft (a dual nature of Internal and External Merge). By observing HIRCs in Japanese, we reached the conclusion that the rules of the Faculty of Language are so simple, but they manifest rich variations in human languages. We hope that we will find some clues in the mystery of nature, origins and evolution of human language unique to human species in the biolinguistic program.

Notes

1. See Hauser, Chomsky and Fitch (2002).

2. The consequence of this fact leads us to dispensing with the head parameter, thought to determine the order of the head in languages. There are two kinds of languages, either head initial or head final languages.

3. Vries (2005) and Citko (2005) independently propose similar accounts as Riemsdijk's Graft. The former proposes interaboreal movement and multidominance, which Vries accounts for unifying two as External Remerge, and the latter advocates parallel Merge, combining the properties of External Merge and Internal Merge.

4. See Fukui and Takano (2000), Fukui and Sakai (2003), and Fukui (2006) on this view on non-DP in Japanese.

5. Head Internal Relative Clauses are observed in a wide variety of languages across different language families; Old and Modern Japanese, Korean, Tongus languages in the Atlantic family such as Udihe, Tibeto- Burman languages such as Meithei, Tenyidie, Austronesian languages such as Riau Indonesian, Tukang Besi, etc. (Hiraiwa 2003). See also Aldridge (2002, 2003), Grousu and Landman (1998), , Jo (2002), Keenan and Comrie (1977), Kim (2005). See Imai (2012), Kuroda (1992a,b), 2005a,b), Shimoyama (1999), Yoshida and Sano (2001), Watanabe (2004) for the HIRC in Japanese.

6. Treatment of Case is problematic in any model in the past generative grammar in that at which level of representation the Case is assigned. In a widely accepted view, the case assignment is executed at S-structure in the Principles-and-Parameters model. In the Minimalist Program, Case is assumed to be assigns at Spell-Out.

7. Baker (2001) argues that concerning with the three-dimensional trees, tree diagrams are really Alexander Calder mobiles, with the lines made of strong wire and words made out of metal sheets. (p.76). If we paraphrase Baker's metaphor, it is realized that all languages have exactly the same design. The difference among languages is that every node swirls around in one language version relative to its position in another language sentence. Klosek (2011) proposes a radical view on three-dimensional tree diagrams. Klosek argues that by representing syntactic structures three-dimensionally, it will be possible to dispense with all movements, reduce complexity and make universal syntactic representation possible in languages. See Imai (2013).

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