On Restrictive Relative Clauses in English

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1. Introduction

Relative clauses (henceforth, RCs) have been a spotlighted issue since the beginning of generative grammar. Many researchers have tried to explain their properties and proposed various derivations for RCs, but we do not have a definitive answer yet. In this paper, I focus on restrictive relative clauses (henceforth, RRCs)[1] in English and explicate their syntactic properties.

Firstly, I introduce three fundamental properties. First, the semantic function of RRCs is to modify a nominal phrase. In (1), both RRCs offer information about the preceding nominal *a book*. I call this nominal the *relative head*. Relative heads canonically precede RCs in English.

(1) a. I found a book which you can read *e*.   (Chomsky (1977: 98))

   b. I found a book that you can read *e*.   (*ibid.*)

The second property is that RRCs have a gap (shown as *e*), where their relative heads are semantically interpreted. In (1), the relative head *a book* is interpreted as the complement of the verb *read*. Third, relative pronouns have a Case in RRCs, and there are cases in which the Case of a relative head and that of a relative pronoun do not accord. In (2), the relative pronoun *whose* has genitive Case, although the relative head *the man* has nominative Case.

(2)   The man whose mother I met yesterday is a French speaker.

(Fabb (1990: 65))

English has two *relativizers*, which introduce RRCs. Namely, *wh* pronouns and the complementizer *that*. These are distinct categories, since in some varieties

in English, both relativizers can co-occur, and they do not show complementary distribution.

(3)   it's down to the community in *which that* the people live.

<div align="right">(Gelderen (2013: 59), slightly modified)</div>

The structure of the paper is as follows. I outline detailed properties of RRCs in Section 2, and examine previous analyses of these properties in Section 3. Then, I will provide an alternative analysis, giving accounts for complicated properties of RRCs in Section 4. Section 5 is the conclusion.

2.   Controversies on RRCs

2.1   Reconstruction

In this section, I outline some properties of RRCs, mainly focusing on various reconstruction phenomena. To be more precise, I will introduce examples indicating that the reconstruction effect does not occur in *wh* RRCs, but in *that* RRCs.

2.1.1 Idiom Expressions

(4)   a. ??The headway which Mel made was impressive.

<div align="right">(Aoun and Li (2003: 110))</div>

    b.   The headway that Mel made was impressive.   (*ibid.*)

The contrast in (4) shows that when a relative head is a part of an idiom chunk (here, *make headway*), *that* RRCs are selected, since only *that* RRCs allow the reconstruction of their relative heads. *Wh* RRCs, on the other hand, do not show the reconstruction effect, and we fail to interpret a string of expression as one idiom chunk in (4a).

2.1.2 Binding Condition

(5)   a. *?The picture of himself$_i$ which John$_i$ painted in art class is impressive.

<div align="right">(*ibid.*: 111, slightly modified)</div>

    b.   The picture of himself$_i$ (that) John$_i$ painted in art class is impressive.

<div align="right">(*ibid.*, slightly modified)</div>

c.   The relative of John$_i$ that he$_i$ likes lives far away.

<div align="right">(Sauerland (2003: 208), slightly modified)</div>

d. *Which picture of John$_i$ does he$_i$ like?   (*ibid.*, slightly modified)

e.   Pictures of John$_i$ which he$_i$ displays prominently are likely to be attractive

ones.   (*ibid.*, slightly modified)

In (5a), it is not possible to reconstruct the relative head *the picture of himself*, since the relativizer is *which*. Therefore, the anaphor *himself* is not bound by its antecedent *John* in its minimal domain, and because of the violation of Binding Condition A, (5a) is ungrammatical. In (5b), the relativizer *that* shows the reconstruction effect, and *himself* is properly bound by its antecedent *John*. Then, (5b) satisfies Binding Condition A, and this is fully grammatical. However, in (5c), if the relativizer *that* forces the reconstruction of *the relative of John*, this sentence violates Binding Condition C, and it seems that *he* cannot refer to *John*, contrary to fact. Thus, in this case, the reconstruction should not occur. In (5d), a sentence with a *wh* interrogative, clearly the *wh* element *which* moves to the initial position, pied-piping the R expression *John*. Therefore, this is ungrammatical because of Binding Condition C, as a result of the reconstruction. As distinct from *wh* interrogatives, we observed that *wh* RRCs do not show reconstruction effects in example (4a). Then, in (5e), it is predicted that there is no violation of Binding Condition C. This is borne out by the fact.

In short, there are no reconstruction effects in *wh* RRCs uniformly. However, in *that* RRCs, we can observe reconstruction effects in some cases, but in other cases we cannot.[2]

2.1.3 Definiteness Effect

The next issue of reconstruction concerns the *there* construction. If RRCs are involved with the *there* construction, *that* RRCs are selected.

(6) a.   The men that/*whom there were *t* in the garden were all diplomats.

<div align="right">(Inada (2007: 28))</div>

b. *There were the men in the garden.

As shown by the well-known example (6b), *there* constructions show the definiteness effect, and the logical subject in *there* constructions is required to be indefinite. Thus, in (6a), if the relative head *the men* is reconstructed into its trace position, it becomes ungrammatical. Here, it seems like an apparent contradiction that *wh* RRCs are ungrammatical while *that* RRCs are grammatical. This is because *wh* RRCs do not allow the reconstruction of relative heads, and *that* RRCs do.

2.2   Other Problems

In this section, we'll discuss properties other than reconstruction effects, that is, the syntactic position of RRCs.

It is controversial whether an RRC is the complement or an adjunct of a relative head. Kayne (1994), Bianchi (1999, 2000), and Aoun and Li (2003) argue for the former. Bhatt (2002), Henderson (2007), and Hunter and Franks (2014) support the latter position. In this regard, there are contrastive data between NP complement clauses and RRCs.

(7)   a.   *Which claim that John$_i$ was asleep was he$_i$ willing to discuss?

(Chomsky (1995: 204), slightly modified)

      b.   Which claim that John$_i$ made was he$_i$ willing to discuss?

(*ibid.*, slightly modified)

In (7a), the *that* clause functions as the complement of the nominal phrase, explaining the contents of *claim*. In (7b), *that* is a relativizer. In this case, only (7a) is ungrammatical. To capture this difference, I interpret RRCs as adjuncts here. See section 4.3.1 for a detailed discussion.

Another piece of evidence for the adjunct status of RRCs is from one-substitution. See (8) - (10).

(8)   Which [student of Physics]? That one?   (Radford (1988: 187))

(9)   *The [student] of chemistry was older than the one of Physics.

(Lightfoot (1982: 54))

(10)   [a man that can fix his own car] is better off than [one that can't].
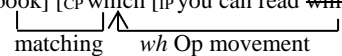
(Stroik (1994: 51))

The difference of acceptability between (8) and (9) shows that *one* cannot substitute for *student* only, and must substitute for its complement too. Thus, the interpretation of *one* in (8) is not *student* but *student of Physics*. (9) is ungrammatical because *one* does not substitutes for *student of chemistry*. Now, see (10). In this case, *one* takes *a man* only as its antecedent. This contrast also indicates the RRC is not a complement, but an adjunct.
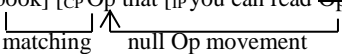
3. Previous Research
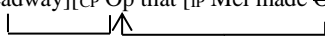
Here, I will overview the previous research on RRCs.

3.1 Matching Analysis (Chomsky (1977))

Chomsky (1977) observes parallel properties between *wh* interrogatives and RRCs, and he suggests that *wh* operator movement should be involved in the derivation of RRCs. In this analysis, a relative head is base generated in the Spell-Out position and the *wh* operator or null operator moves from the initial position to the spec of CP in RRC. Then, a correlation between the relative head and the moved operator is made by the *matching* operation.

(11)   [DP a [NP book] [CP which [IP you can read ~~which~~]]]

              matching   *wh* Op movement

(12)   [DP a [NP book] [CP Op that [IP you can read ~~Op~~]]]

              matching   null Op movement

This analysis, however, fails to interpret idiom chunks. (13a) is repeated from (4b).

(13) a.   The headway that Mel made was impressive.

    b.   [CP[TP[DP The [NP headway][CP Op that [IP Mel made ~~Op~~]]] was impressive]]

If (13a) is derived as (13b), a string of *made headway* cannot come out and this does not work as an idiom chunk. Moreover, all the other phenomena associated with reconstructions cannot be treated in this analysis.

3.2   Raising Analysis (Kayne (1994), Bianchi (1999, 2000), Donati and Cecchetto (2011), Cecchetto and Donati (2015)

Kayne (1994) proposes an analysis that a relative head itself moves from inside of an RRC, in order to capture reconstruction effects. In this analysis, the relative head is base generated in the initial position in the RRC. Then, it moves to the Spell-Out position from there via successive cyclic movement.

(14)   [$_{DP}$ a [$_{NP}$ book] [$_{CP}$[which ~~book~~] [$_{TP}$ you can read ~~which book~~]]]
        movement of *book*   movement of *which book*

(15)   [$_{DP}$ a [$_{NP}$ book] [$_{CP}$[Op ~~book~~] that [$_{TP}$ you can read ~~Op book~~]]]
        movement of *book*   movement of *Op book*

We can interpret idiom chunks correctly in this structure, since there is a copy in the initial position in the RRC. (16) is repeated from (4b).

(16) a.   The headway that Mel made was impressive.

    b.   [$_{CP}$[$_{TP}$[$_{DP}$ The [$_{NP}$ headway][$_{CP}$[Op ~~headway~~] that [$_{TP}$ we made ~~Op headway~~]] was satisfactory]]

The derivation of (16) allows the reconstruction of the relative head *headway* and the idiom chunk *made headway* is interpreted right way.

Bianchi (1999, 2000) sophisticates Kayne's structure. She represents the structure adopting the cartography approach by Rizzi (1997). Moreover, she introduces null D$_{rel}$ in *that* RRCs, and suggests that it should incorporate into external D. The derivation is as follows.

(17) a.   [$_{DP}$ D$_{rel}$+a [$_{ForceP}$ [$_{DP}$ ~~D$_{rel}$~~ book] [$_{Force}$ that [you can read ~~D$_{rel}$ book~~]]]]
        incorporation of *D$_{rel}$*   movement of *D$_{rel}$+book*

    b.   [$_{DP}$ a [$_{ForceP}$ [$_{NP}$ book] [Force^0 [$_{TopP}$ [$_{DP}$ which ~~book~~] [$_{Top}$ Top^0 [$_{IP}$ Bill liked
        movement of *book*   movement of *which book*
        ~~which book~~]]]]]]

The derivation proposed by Donati and Cecchetto (2011) is like Kayne's analysis, but they suggest that the motivation for movement of a relative head should be due to the selection of D.

(18)   [DP a [NP book [CP [which book] you can read [which book]]]]

                    extraction of *book*   movement of *which book*

In (18), the derivation proceeds in a bottom-up fashion, and when D *a* merges with CP, D extracts the relative head, because D selects NP canonically.

In their up-to-date work, Cecchetto and Donati (2015), they argue that when a lexical item is merged with some projection, it is *relabeled* by the item. In (18), when CP is merged with the extracted NP *book*, the label of whole structure turns from CP to NP.

However, this raising analysis cannot explain the asymmetry between *that* RRCs and *wh* RRCs with respect to the reconstruction. (19) is repeated from (4).

(19) a. ??The headway which Mel made was impressive.

     b.   The headway that Mel made was impressive.

In raising analysis, in *wh* RRCs the relative head moves leaving its copy, as in the case of *that* RRCs. Then, this analysis wrongly predicts that *wh* RRCs can also allow the reconstruction of the relative head. Moreover, since Kayne (1994) and Bianchi (1999, 2000) treat RRCs as the complement of the relative head, it is unclear how they explain the examples in (7) - (10).[3] Although Donati and Cecchetto (2011) and Cecchetto and Donati (2015) treat RRCs as adjuncts, they ignore the contrast between Binding Condition A and C shown in (5). With regard to this point, their approach is also problematic.

3.3   Relative Deletion Analysis (Sauerland (2003))

Sauerland (2003) proposes an alternative analysis, suggesting that neither the matching analysis nor the raising analysis should be rejected entirely. In his analysis, a relative head is base generated in the Spell-Out position as in the matching analysis, and the corresponding object to the relative head moves from its initial position in the RRC to the spec of CP as in the raising analysis. Then, the relative head in the Spell-Out position and the moved element in the spec of CP in RRCs are matched in terms of semantic identification. Finally, the Relative

Deletion operation is applied obligatorily. Consequently, the relative head remains only in the Spell-Out position. The concrete derivation is as follows.

(20) a.　the book which Susi likes

　　 b.　[DP the [NP book [CP [which ~~book~~]] [IP Susi likes ~~which book~~]

　　　　　　　　　　└─────────┘ └───┘

　　　　　　　　relative deletion　movement of *which book*

However, in this analysis, *that* RRCs and *wh* RRCs are derived in a similar way, and it fails to explain the contrast of the reconstruction.

3.4　Hybrid Analysis (Aoun and Li (2003))

　　Aoun and Li (2003) suggest that *wh* RRCs should be derived via the matching analysis, and *that* RRCs should be derived via the raising analysis so that the contrast of reconstructions is captured. (21) and (22) are repeated from (4).

(21) a. ??The headway which Mel made was impressive.

　　 b.　[CP[IP[DP The [ForceP[NP headway][ForceP F_0 [TopP[DP which] [TopP Top_0 [IP Mel made ~~which~~]]]]]] was impressive]]

(22) a.　The headway that we made was satisfactory.

　　 b.　[CP[IP[DP The [ForceP[DP φ headway] [ForceP that [TopP[DP ~~φ headway~~][TopP Top_0 [IP we made ~~φ headway~~]]]]]] was satisfactory]]

They can also explain the contrast between *wh* RRCs and *that* RRCs when a relative head contains an anaphor. (23) and (24) are repeated from (5).

(23) a. *?The picture of himself$_i$ which John$_i$ painted in art class is impressive.

　　 b.　T[CP [IP [DP [The [ForceP [NP picture of himself$_i$] [Force' F^0 [TopP [DP which] [Top' Top^0 [IP John$_i$ painted ~~which~~ in art class]]]]]] is impressive]]]

(24) a.　The picture of himself$_i$ (that) John$_i$ painted in art class is impressive.

　　 b.　[CP [IP [DP The [ForceP [DP φ picture of himself$_i$] [Force' that [TopP [DP ~~φ picture of himself$_i$~~] [Top' Top^0 [IP John$_i$ painted ~~φ picture of himself$_i$~~ in art class]]]]] is impressive]]]

(23a) is ungrammatical because it is a *wh* RRC and the relative head itself does not move. Therefore, in the RRC, the copy of the relative head does not remain. As a result, it does not allow the reconstruction of the relative head and violates

Binding Condition A. (24a) can satisfy Binding Condition A, because the relative head moves from the initial position and the copy remains in the RRC.

This analysis, however, cannot explain the asymmetry of Binding Condition A and C. (25) is repeated from (5c).

(25) a.　　The relative of John$_i$ that he$_i$ likes lives far away.

　　 b.　　[$_{CP}$ [$_{IP}$ [$_{DP}$ The [$_{ForceP}$ [$_{DP}$ φ relative of John$_i$] [$_{Force'}$ that [$_{TopP}$ [$_{DP}$ ~~φ relative of John$_i$~~] [$_{Top'}$ Top^0 [$_{IP}$ he$_i$ likes ~~φ relative of John$_i$~~]]]] lives far away]]]

The hybrid analysis requires the relative head to move from the initial position to the Spell-Out position in *that* RRCs. In (22) and (24), for the case of idiom chunks and Binding Condition A, this analysis works correctly. However, if this analysis is applied to (25), the case of Binding Condition C, it violates Binding Condition C and should be ungrammatical, contrary to fact. As shown above, this analysis cannot explain the asymmetry in *that* RRCs. In the next section, I will propose an alternative analysis.
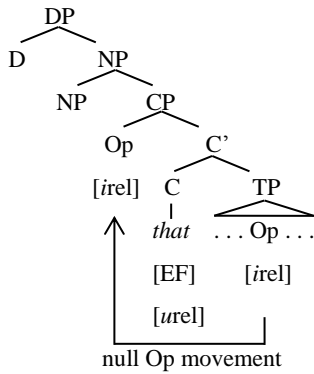
4.　　Proposal

Based on the matching analysis and the relative deletion analysis, I argue that both analyses are applicable with *that* RRCs while only the matching analysis is used in *wh* RRCs.

4.1　*That* RRCs
4.1.1　The First Derivation

In the first derivation, the relative head is base generated in the Spell-Out position. Following Chomsky (2008), I suggest that C should have the *Edge Feature* (EF) and attract relative operators to the spec of the RRC. In this derivation, C has an uninterpretable [rel] feature and the relative null operator has an interpretable [rel] feature. The role of the null operator is to render the RRC the modifying clause of the relative head NP by checking the uninterpretable [rel] feature of C, as is the case in *wh* interrogatives. The first derivation of *that* RRCs is shown below.
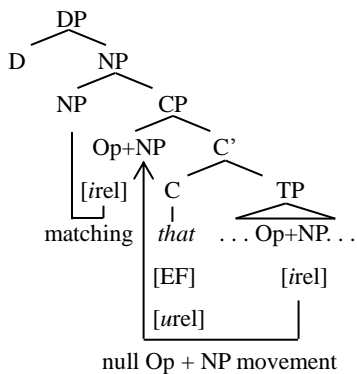
(26)

```
                    DP
                 /      \
               D          NP
                        /    \
                      NP       CP
                            /      \
                          Op        C'
                        [irel]    /    \
                               C         TP
                               |       /  \
                              that   ... Op ...
                              [EF]       [irel]
                              [urel]
```

null Op movement

4.1.2 The Second Derivation

The second derivation is that a corresponding NP with a relative head makes a successive cyclic movement with a null operator from the initial position to the spec of CP in the RRC. Concurrently, the relative head, which is identical to the corresponding NP, is base generated in the Spell-Out position. Then, the matching operation occurs between the relative head and the moved NP in the spec of CP in the RRC. This analysis is represented below.[4]

(27)

```
                    DP
                 /      \
               D          NP
                        /    \
                      NP       CP
                            /      \
                        Op+NP       C'
                        [irel]    /    \
            matching           C         TP
                              |       /  \
                             that   ... Op+NP...
                             [EF]       [irel]
                             [urel]
```

null Op + NP movement

In (27), matching operation between the relative head and the moved NP ensures that they are identical objects. The operation we need is for ensuring identification,

not deletion. Once two elements are identified, as with other movement, only the topmost element is spelled out overtly, and all the other NP in RRCs are allowed covert Spell-Out. Next, I will turn to the next subject, *wh* RRCs.

4.2 *Wh* RRCs

I propose the derivation of *wh* RRCs based on only the matching analysis. In *wh* RRCs, the relative head is base generated in the Spell-Out position, and only the *wh* operator moves like the first derivation of *that* RRCs and this *wh* operator has an interpretable [rel] feature in this case. Then, the interpretable [rel] feature of *wh* operator checks an uninterpretable [rel] feature of the head C of RRCs. The differences between *wh* RRCs and *that* RRCs are as follows. First, in *wh* RRCs, the head C of RRCs must be null; otherwise, the sentence would violate the Doubly Filled Comp Filter. This is advocated in Chomsky and Lasnik (1977) and prohibits an overt operator in the spec of overt C. On the other hand, in the case of *that* RRCs, *that* occupies the head C of CP. Second, the relative head is DP in *wh* RRCs and NP in *that* RRCs. The analysis of *wh* RRCs is shown below.

(28)
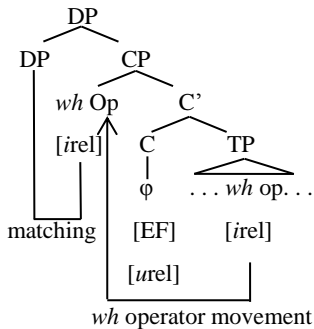
In *wh* RRCs, there is a restriction on the size of *wh* operators. Although the category mismatch between the relative head and the *wh* operator is permitted, pied-piping larger than PP is prohibited, as (29) – (34) show.[5]

(29)   She wanted to see the house where she had grown up.

(Huddleston and Pullum (2002: 1050))

(30)   the house in which I stayed

(31)   The man whose mother I met yesterday is a French speaker.

(32)   *The man some of whom I like arrived yesterday.   (Fabb (1990: 64))

(33)   *The man the mother of whom I met yesterday is a French speaker.   (*ibid.*)

(34)   *The LAGB which organization meets tomorrow is based here.   (*ibid.*: 72))

(29) is an example of a relative adverb and its category is different from that of the relative head. In spite of this category mismatching, the checking operation between the *wh* operator and C succeeds. Next, (30) and (31) are examples of pied-piping. In these cases, the interpretable [rel] feature in the *wh* operator can percolate into its maximal projection, in a parallel fashion with *wh* interrogatives. Therefore, when the *wh* operator moves to the spec of CP, the *wh* operator can check the uninterpretable [rel] feature of C. Next, (32) and (33) are excluded for the same reason, that is, the interpretable [rel] feature of the *wh* operator can percolate up to the PP projection *of whom*, but they cannot percolate up to the DP projection *some of whom* or *the mother of whom*. Now, I adopt the suggestion that not only CP or v*P, but also DP is a phase, following Svenonius (2004) and Hiraiwa (2005). Then when *some of whom* or *the mother of whom* is base generated as the complement of the verb, the DP phase is completed and the PP *of whom* is transferred. Finally, when the derivation reaches the point of the merger of C, the DP *some of whom* or *the mother of whom* moves to the spec of C and the RRC. However, since *of whom* has already been transferred by virtue of DP phase, the interpretable [rel] feature of the *wh* operator is not accessible. Consequently, the uninterpretable [rel] feature of C remains unvalued and the derivation crashes. Finally, in the case of (34), it seems that the interpretable [rel] feature of the *wh* operator can percolate into the maximal projection *which organization* and the checking operation succeeds. However, this case is excluded by the Binding Condition, following Fabb (1990). Since the *wh* operator matches DP, which has referentiality, we can assume both DP and the *wh* operator have this property in common. Then, in semantic interpretation, the *wh* operator can be replaced by pronouns or determiners, which also have referentiality. In (34), the relativizer

which can be replaced by the determiner *this* semantically, and the embedded RRC can be paraphrased as *this organization meets tomorrow*. Hence, *which organization* refers to the relative head *The LAGB*, and we can interpret it as an R expression. Since the *wh* operator is c-commanded by the relative head in RRCs, (34) is ungrammatical because of Binding Condition C.[6]

4.3   Review of the Problems

In this section, I will expound on various properties and problems introduced so far.

4.3.1 The Analysis in Terms of Derivation

(35) and (36) are repeated from (4), and (37) - (39) are from (5).

(35) a. ??The headway which Mel made was impressive.

  b.   [$_{CP}$[$_{TP}$[$_{DP}$[$_{DP}$ The headway][$_{CP}$ which [$_{C'}$ φ[$_{TP}$ Mel made ~~which~~]]]] was impressive]]

(36) a.   The headway that Mel made was impressive.

  b.   [$_{CP}$[$_{TP}$[$_{DP}$[$_{D}$The][$_{NP}$[$_{NP}$ headway][$_{CP}$ Op [$_{NP}$ ~~headway~~] [$_{C'}$ that [$_{TP}$ Mel made [$_{NP}$ ~~Op headway~~]]]]]]] was impressive]]

(37) a. *?The picture of himself$_i$ which John$_i$ painted in art class is impressive.

  b.   [$_{CP}$[$_{TP}$[$_{DP}$[$_{DP}$ The picture of himself][$_{CP}$ which [$_{C'}$ φ[$_{TP}$ John painted ~~which~~ in art class]]]] was impressive]]

(38) a.   The picture of himself$_i$ that John$_i$ painted in art class is impressive.

  b.   [$_{CP}$[$_{TP}$[$_{DP}$[$_{D}$ The][$_{NP}$[$_{NP}$ picture of himself][$_{CP}$ Op [$_{NP}$ ~~picture of himself~~] [$_{C'}$ that [$_{TP}$ John painted [$_{NP}$ ~~Op picture of himself~~] in art class]]]]]] was impressive]]

(39) a.   Pictures of John$_i$ which he$_i$ displays prominently are likely to be attractive ones.

  b.   [$_{CP}$ [$_{TP}$ [$_{DP}$ [$_{DP}$ [$_{NP}$ Pictures of John]] [$_{CP}$ which [$_{C'}$ φ[$_{TP}$ he displays ~~which~~]]]] prominently are likely to be attractive ones]]

The reconstruction of the relative head does not occur and the idiom chunk interpretation cannot be obtained in (35a), and Binding Condition A cannot be

satisfied in (37a), since these are *wh* RRCs and the object corresponding to the relative head does not exist in the initial position of movement. Consequently these are ungrammatical. Since there is no reconstruction, (39a) does not violate Binding Condition C. In (36) and (38) *that* RRCs take the option of their second derivation. When the object corresponding to the relative head moves from the inside of the RRC, two chains are formed. One is a movement chain between the initial position in the RRC and the spec of CP in the RRC, and the other is a matching chain between the relative head and the spec of CP in the RRC. Then, by means of NP in the spec of CP in the RRC, these two chains combine into one RRC chain. The relative head must be interpreted in the RRC by virtue of this RRC chain, and the clause satisfies the interpretation requirement of idiom chunk and Binding Condition A. Then we can capture reconstruction effects without postulating the existence of *ad hoc* operation such as relative deletion, unlike Sauerland (2003).

Consider next the asymmetry of Binding Condition A and C in *that* RRCs, which becomes a problem in the analysis of Aoun and Li (2003). (40) and (41) are repeated from (5).

(40) a. The picture of himself$_i$ that John$_i$ painted in art class is impressive.

b. [$_{CP}$[$_{TP}$[$_{DP}$[$_D$ The][$_{NP}$[$_{NP}$ picture of himself][$_{CP}$ Op [$_{NP}$ ~~picture of himself~~] [$_{C'}$ that [$_{TP}$ John painted [$_{NP}$ ~~Op picture of himself~~] in art class]]]]] was impressive]]

(41) a. The relative of John$_i$ that he$_i$ likes lives far away.

b. [$_{CP}$[$_{TP}$[$_{DP}$[$_D$ The][$_{NP}$[$_{NP}$ relative of John][$_{CP}$ Op [$_{NP}$ ~~relative of John~~] [$_{C'}$ that [$_{TP}$ he likes [$_{NP}$ ~~Op relative of John~~]]]]]] lives far away]]

c. [$_{CP}$[$_{TP}$[$_{DP}$[$_D$ The][$_{NP}$[$_{NP}$ relative of John] [$_{CP}$ Op [$_{C'}$ that [$_{TP}$ he likes ~~Op~~]]]]] lives far away]]

As discussed above, Binding Condition A is satisfied in the manner that the corresponding NP itself moves with a null operator. On the contrary, in the case of Binding Condition C, the movement of NP violates Binding Condition C in RRCs, as is shown in (41b). Therefore, what moves must be the null operator only. In (41c), there is no copy of the corresponding NP, and this derivation does not violate

Binding Condition C.

I have considered two derivations of *that* RRCs and shown that each derivation predicts the acceptability of our data correctly. However, these derivations are not exactly on even ground. Bhatt (2002) construes the following sentence as ungrammatical.

(42)   *The portrait of John$_i$ that he$_i$ painted is extremely unflattering.

(Bhatt (2002: 49), slightly modified)

(42) should be grammatical if the operator moves alone, as indicated by the second derivation. This fact shows that some speakers do not have the second derivation in *that* RRCs, and the first one is the default derivation in *that* RRCs.

There are circumstances where both derivations do not work out.

(43) a.   *the picture of Bill$_i$ that he$_i$ took   (Munn (1994: 402))

b.   [$_{DP}$[$_D$ the][$_{NP}$[$_{NP}$ picture of Bill$_i$][$_{CP}$ Op [$_{NP}$ ~~picture of Bill$_i$~~][$_{C'}$ that [$_{TP}$ he$_i$ took [$_{NP}$ ~~Op picture of Bill$_i$~~]]]]]]]

c.   [$_{DP}$[$_D$ the][$_{NP}$[$_{NP}$ picture of Bill$_i$][$_{CP}$ Op [$_{C'}$ that [$_{TP}$ he$_i$ took ~~Op~~]]]]]

(43a) is required to satisfy Binding Condition C and the idiom interpretation at the same time, but if the derivation proceeds like (43b) to satisfy the idiom interpretation, the string of *he took picture of Bill* violates Binding Condition C, and if (43c) is taken as satisfying Binding Condition C, it fails to interpret the idiom chunk *took picture*, since the reconstruction does not occur. Thus, satisfying one requirement causes this RRC to violate the other. Although *that* RRCs are certainly more flexible than *wh* RRCs, in such circumstances as (43), the derivation crashes.

So far, I have discussed the issues introduced in section 2.1. Now, I will discuss other remaining problems. The first issue is the syntactic position of RRCs. (44) and (45) are repeated from (7).

(44) a.   *Which claim that John$_i$ was asleep was he$_i$ willing to discuss?

b.   [$_{CP}$ [$_{DP}$ Which claim that John was asleep] [$_{TP}$ was he willing to discuss [~~which claim that John was asleep~~]]]

(45) a.   Which claim that John$_i$ made was he$_i$ willing to discuss?

b.   [$_{CP}$ [$_{TP}$ [$_{DP}$ Which claim [$_{CP}$ ~~Op claim~~ that John made ~~Op claim~~]] [was he

willing to discuss [~~which claim~~ [CP ~~Op claim that John made Op claim~~]]]]]?

c.   [CP [TP [DP Which claim [CP Op that John made ~~Op~~]] [was he willing to discuss [~~which claim~~ [CP ~~Op that John made Op~~]]]]]?

Since the *that* clause is the NP complement, (44a) violates Binding Condition C in the initial position of the *wh* phrase. The copy is shown in (44b). However, even where the *that* clause is an RRC, both (45b) and (45c) for (45a) also violate Binding Condition C, constructing the string of *he willing to discuss which claim that John made* in the RRC. To resolve this problem, I adopt *late Merge*, which is proposed by Lebeaux (1991), and adopted by Chomsky (1995), Hunter and Franks (2014) and others.

In order to capture the contrast between the complement and an adjunct like (44) and (45), Lebeaux (1991) suggests that although a complement must merge cyclically, an adjunct should be allowed to merge acyclically after *wh* movements occur. Under this assumption, the *that* RRC in (45a) can be added after *which claim* moves. The concrete derivation is as follows.

(46) i. Matrix Clause (MC) and RC are constructed separately

MC: [CP [TP he was willing to discuss which claim]]

RC: [CP Op claim/Op [C' that [TP John made ~~Op claim~~/Op]]]

ii. wh movement applies in MC

MC: [CP Which claim [CP [TP was he willing to discuss ~~which claim~~]]

RC: [CP Op claim/Op [C' that [TP John made ~~Op claim~~/Op]]]

iii. applying late merger of RC

[CP Which [NP [NP claim] [CP Op claim/Op [C' that [TP John made ~~Op claim~~/Op]]] [CP [TP was he willing to discuss ~~which claim~~]]

iv. RRC chain is formed by matching, and the topmost copy only is spelled out overtly

[CP Which [NP [NP claim] [CP ~~Op claim~~/Op [C' that [TP John made ~~Op claim~~/Op]]] [CP [TP was he willing to discuss ~~which claim~~]]

In the raising analysis proposed by Kayne (1994), this late Merge must be

incompatible, since in raising analysis, the relative head is base generated in RRCs, not in the matrix clause. However, the analysis proposed here, the matching analysis, and the relative deletion analysis in Sauerland (2003) are compatible with late Merge, since the relative head is base generated in the Spell-Out positon in matrix clause.

So far, I have focused on how RRCs are derived. Next, I focus on the size of the relative head and resolve the rest of the problems.

4.3.2   The Analysis in Terms of the Size of the Relative Head

Adopting the suggestion by Inada (2007) that *wh* RRCs and *that* RRCs adjoin to different places, I showed in (26), (27), and (28), the relative head of *wh* RRCs is the DP and that of *that* RRCs is the NP. This creates differences between them. In this section, I argue that *wh* operators have referentiality, and by virtue of this property, *wh* RRCs must adjoin to DP, which has also referentiality. Null operators in *that* RRCs have no referentiality, and therefore, they adjoin to the NP.

First, I discuss a problem concerned with definiteness effects. (47) is repeated from (6).

(47)   The men that/*whom there were t in the garden were all diplomats.

(Inada (2007: 28))

As discussed above, the *wh* operator in *wh* RRCs has referentiality. Therefore, the *wh* operator cannot be base generated in the *there* construction. On the other hand, in the case of *that* RRCs, the two derivations both can converge, since the moved element is a null operator or null operator + NP, which has no referentiality. For this reason, when definiteness effects appear in RRCs, *that* RRCs are selected.

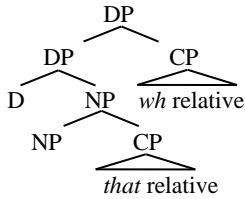For stacking, this explanation also works out. When *that* RRCs and *wh* RRCs are stacked, the former precedes the latter.

(48) a.   The man that fixed the sink whom John told us about is here.

b.   *The man whom John told us about that fixed the sink is here.   (*ibid.*: 30))

Since *that* RRCs adjoins to NP and *wh* RRCs to DP, the case in which two different types of RRCs co-occur is shown as (49).

(49)

```
              DP
           ╱      ╲
        DP          CP
      ╱    ╲      ╱  ╲
     D      NP   wh relative
          ╱   ╲
        NP      CP
              ╱  ╲
            that relative
```
<div align="right">(cf. ibid.: 31))</div>

The subject DP in (48a) is derived as follows. First, the *that* RRC adjoins to the NP *man* and constructs the larger NP *man that fixed the sink*. Then, D *the* merges with this NP, constructing the DP *the man that fixed the sink*, and finally, this DP is adjoined to by the *wh* RRC, and the DP *the man that fixed the sink whom John told about us* is constructed. When the *wh* RRC adjoins earlier and constructs DP *the man whom John told us about*, the *that* RRC adjoins acyclically to the NP *man* embedded in DP + the *wh* RRC, since the relative head of *that* RRCs is the NP and *that* RRCs cannot adjoin to the whole DP from the outside. In any case, the word order is fixed and sentences like (52b) are not generated.[7]

If *wh* operators in *wh* RRCs have referentiality, as I suggest, I can provide an explanation of the case of predicate nominals. Emonds (1985) suggests that in relativization of predicate nominals, only *that* RRCs are allowed.

(50)　　　They thought I was the person that she introduced you as.

<div align="right">(Emonds (1985: 272), partially modified)</div>

He says (50) becomes ungrammatical if *wh* operators are used instead of *that*.

In (50), the relative head *the person* works as a predicate nominal and expresses the property of someone. It is not a referential expression. In such a case, *that* RRCs are appropriate candidates, since the null operator in *that* RRCs has no referentiality, and fit in with the role of predicate nominals. By contrast, *wh* RRCs yield an inconsistent result. The predicate nominal *the person* is not a referential noun, and therefore, it is not compatible with *wh* operators, which have referentiality.

Other than the cases of predicate nominals, there are other cases where *that* RRCs are selected. Radden and Dirven (2007) note that when a relative head

contains *the only* or a superlative degree, *that* RRCs are used. They argue that "[t]he same applies to heads which are characterised as unique by *only* or a superlative adjective in [(51)]: here, too, the relative pronoun *which* is ruled out.[8]"

(51)   That's the best that/*which can happen.

                              (Radden and Dirven (2007: 163), partially modified)

For the preparation of the following argument, we must step further into the detailed semantics of RRCs. In RRCs, the relative head and the RRC have a predication relation and the RRC gives essential information on the relative head by means of predicative modification. Then, by this modification, the RRC specifies and distinguishes the relative head from others. For instance, in (52), repeated from (1), *a book* is distinguished from other books by the modification *you can read*.

(52)   I found a book which you can read.

With this semantic effect in mind, we return to the case of superlatives. Superlatives need a premise set, since they are used to refer to the most outstanding item in a set.

(53)   Tom is the tallest student in his class.

In (53), the premise set is students in Tom's class, and this sentence means "in this set Tom is the most outstanding with regard to height". The RRC functions as a provided premise set too. (54a) is repeated from (53).

(54) a.   John is the tallest man that I ever met.

     b.   John is the tallest man [Op x, x man] [that I ever met x]

Since the category of the relative head is NP in (54a), the NP occupies the initial position in the RRC. Therefore, the LF interpretation is like (54b). That is, the RRC provides the premise set of man, which is restricted under the condition of *I ever met*, and *the tallest man that I ever met* in (54a) refers to the tallest man in the set.

On the other hand, if *wh* RRCs are used, in the initial position is a *wh* pronoun, which refers to the DP relative head *the tallest man*. The LF interpretation is as in (55).

(55)   John is the tallest man [who x, x the tallest man] [I ever met x]

Since the relative head is DP rather than NP, the relative head contains the superlative form. Therefore, unlike (54), which separates the superlative from the relative head, the RRC cannot provide a premise set for the superlative, and the superlative cannot satisfy the requirement that superlatives need a premise set.

As in the case of superlatives, *the only* needs a premise set, because it emphasizes that the number of members is one in the premise set. (57a) is the LF interpretation of (56), and (57b) is the case in which a *wh* RRC is used in (56).

(56)   She's the only woman here that I know very well.

(57) a.   She's the only woman here [Op x, x woman] [that I know x very well]

     b.   She's the only woman here [who x, x the only woman] [I know x very well]

Like the case of superlatives, in (57a), *that* RRCs provide a premise set, and (57a) means that "Assuming the set of woman satisfying the condition that *I know very well*, *she* is the only member of this set." However, in (57b), in the initial position there is the DP *the only woman*, but this expression also needs a premise set, and (57b) is inappropriate.

5.   Conclusion

In this paper, I have introduced various properties of RRCs and outlined problems of previous matching analysis by Chomsky (1977), raising analysis by Kayne (1994) and others, relative deletion analysis by Sauerland (2003), and hybrid analysis by Aoun and Li (2003). I have also proposed an alternative analysis explaining the properties focusing on the derivation and the size of the relative head, and have provided adequate explanations of not only the well-known problems of reconstructions but also relatively-untouched problems concerning definiteness effects, stacking, and relative heads involving *the only* or superlatives.

Notes

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[1] I do not treat other kinds of relative clause here, non-restrictive relative clauses (NRCs), free relatives, and infinitive relative clauses. On NRCs, see de Vries (2002), Cinque (2008).

[2] Bianchi (1999) claims that this dichotomy of relativizer *that* vs. *wh* is not clear as I discuss here. She provides data that suggest that both relativizers allow reconstruction effect.

(i)   a.   This is the picture of himself$_i$ that I think Bill$_i$ likes [~~the picture of himself$_i$~~]

<div align="right">(Bianchi (1999: 73), slightly modified)</div>

       b.   This is the picture of himself$_i$ which I think Bill$_i$ likes [~~the picture of himself$_i$~~]

<div align="right">(*ibid.*, slightly modified)</div>

I think this is a kind of idiolect and do not discuss it here.

[3] Bianchi (1999) offers data that suggest that the difference of complement and adjunct may be suspicious.

(i)   a.   [Which piece of evidence [that John$_i$ was asleep]] was he$_i$ willing to   discuss ~~which piece of evidence [that John$_i$ was asleep]~~?

<div align="right">(Bianchi (1999: 301), partially modified)</div>

       b.   [Which piece of evidence [that John$_i$ discovered]] was he$_i$ willing to   discuss ~~which piece of evidence [that John$_i$ discovered]~~?   (*ibid.*, slightly modified)

However, this case seems an exception, and Lebeaux (1991), Chomsky (1995), Fox and Nissembaum (1999), and Hunter and Franks (2014) accept this contrast. I also follow this position.

[4] The whole construction proposed here apparently seems similar to Sauerland's derivation, as there are two relative heads both inside and outside the RRC. However, I do not understand why the deletion is the crucial operation for interrelation between the matrix clause and the RRC, as Sauerland (2003) claims, and I do not adopt the deletion operation.

[5] If relative operators pied-pipe other categories in *that* RRCs like (i), they become ungrammatical because of the Doubly Filled Comp Filter, since the pied-piped PP occupies the spec of CP.

(i)   *the house in that I stayed

[6] In the other cases, *wh* relativizers can be replaced by pronouns. The RRC in (29) can be paraphrased as *she had grown up there*. The paraphrased phrases of RRCs in (30), (31) are *I stayed in it, I met his mother yesterday, I like some of them*, and *I met the mother of his* respectively. All these cases do not violate Binding Condition C, since *wh* relativizers do not act as R expressions.

[7] Note that the crucial point here is the connection between the categories of relative heads and the types of operators, not the order of the derivation. That is, even if *wh* RRCs adjoin to DPs before *that* RRCs, *that* RRCs adjoin to NPs counter cyclically via late Merge. The order of RRCs does not change.

[8] They also argue that when the relative head is the quantifier *all*, only *that* RRCs are used. It is not clear that the proposed explanation here also directly applies to the case of *all*.

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