Non-local Right-Node Raising: an Analysis using Delayed Tree-Local MC-TAG*

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Abstract

In this paper, we show that the analysis of right-node-raising (RNR) in coordinate structures proposed in Sarkar and Joshi (1996) can be extended to non-local RNR if it is augmented with delayed tree locality (Chiang and Scheffler, 2008), but not with flexible composition (Joshi et al., 2003). In the proposed delayed tree-local analysis, we define multi-component (MC) elementary tree sets with contraction set specification. We propose that a member of each of the MC sets participates in forming a derivational unit called *contraction path* in the derivation structure, and that contraction paths must be derivationally local to each other for the relevant contraction to be licensed.

1 Introduction

The term right node raising (RNR) was coined by Ross (1967) to describe constructions such as (1), in which an element, here the DP *the theory*, appears to be syntactically and semantically shared at the right periphery of the rightmost conjunct of a coordinate structure.[1] Furthermore, RNR may share an element at unbounded embedding depths (Wexler and Culicover, 1980). In (2)-(5), the shared argument is the object of the verb complement clauses, relative clauses, adjunct clauses and DPs embedded in the coordinating clauses.[2] We can thus characterize examples such as (1) as local RNR and examples such as (2)-(5) as non-local RNR.[3]

(1) [John likes __] and [Tim dislikes **the theory**].

(2) [John thought you paid __] and [Tim insisted you didn't pay **the rent**].

(3) [John likes the professor who taught __] and [Tim dislikes the student who debunked **the theory**].

(4) [John left before he heard __] and [Mary came after Sue announced **the good news**].

(5) [John likes the big book __] and [Tim likes the small book **of poetry**].

Early transformational analyses, e.g. Ross (1967), explained RNR by extending the standard notion of movement to allow across-the-board (ATB) movement, in which two underlying copies of the shared material are identified during movement, yielding a single overt copy located ex situ, outside of the coordinate structure. This type of analysis implies that, apart from the ATB aspect of the movement, RNR should otherwise behave as typical movement. This prediction is not borne out, however, as RNR is freely able to violate both the island constraints and the right-roof constraint. In example (3), the DP *the theory* is the argument of the verbs in the relative clauses, which are complex noun phrase islands. Under the ex situ analysis, depicted in (6), the shared argument raises out of the coordinate structure, thereby also escaping the complex noun phrase island. Such movement also violates the right-roof constraint, which limits rightward movement to a landing site one bounding node above the source (Sabbagh, 2007). If the relevant bounding nodes are vP and TP and the shared argument is merged under vP, movement outside of the coordinated TP structure would violate this constraint. Such behaviours

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[1] Subsequently, RNR has been shown to apply to noncoordinate structures as well. These will be discussed in Section 5.

[2] Here we discuss only examples with shared arguments; see Potter (2010) for discussion of shared modifiers in an analysis similar to Sarkar and Joshi (1996).

[3] Examples of RNR require stress on the contrasting elements (Hartmann, 2000; Féry and Hartmann, 2005).

are unpredicted if RNR is derived from movement of the shared element to a position outside of the coordinate structure.

(6) $[_{TP}$ John $[_{vP}$ likes the professor who taught t_i]] and $[_{TP}$ Tim $[_{vP}$ dislikes the student who debunked t_i]] **the theory**$_i$.

While some attempt has been made to explain the unpredicted behaviour of RNR in the ex situ analysis, e.g. Sabbagh (2007), an alternative approach to RNR is available which circumvents these complications by locating the shared elements in situ. Sarkar and Joshi (1996) propose such an in situ analysis using Tree Adjoining Grammar (TAG), positing that the shared element is located in the canonical position within the rightmost conjunct. One significant consequence of this analysis is that the contrast between movement and RNR requires no explanation; RNR is not derived from movement, and thus their differences in behaviour are unremarkable.

However, the implementation of Sarkar and Joshi's analysis does make clear predictions for the locality of RNR: it predicts that non-local RNR is illicit. As will be discussed in Section 2, the mechanism proposed by Sarkar and Joshi only permits sharing between two elementary trees that are directly composed. Thus, examples such as (1), in which the shared element *the theory* is an object of the two clauses being coordinated, are permitted. On the other hand, examples such as (2)-(5) are excluded, as the shared arguments in these examples are not objects of the coordinated clauses, but rather objects of clauses embedded within the coordinated clauses. Thus, an unattested contrast in grammaticality is again predicted, in this case between local and non-local RNR.

The remainder of this paper is organized as follows. In Section 2, we first illustrate how local RNR is handled in Sarkar and Joshi (1996), using elementary trees that conform to Frank's (2002) Condition on Elementary Tree Minimality (CETM). We then demonstrate how the mechanisms in Sarkar and Joshi cannot derive instances of non-local RNR with standard TAG. We consider two ways of augmenting the analysis, one with delayed tree locality (Chiang and Scheffler 2008) in Section 3, and the other with flexible composition (Joshi et al. 2003) in Section 4. We show that only the analysis with delayed tree locality yields well-formed derivation in TAG. In Section 5, we briefly discuss cases of noncoordinate RNR and show that our proposed analysis can be extended to these cases as well.

2 Sarkar and Joshi 1996

Sarkar and Joshi utilize elementary trees with contraction sets and coordinating auxiliary trees. The elementary trees necessary to derive (1) are illustrated in Figure 1. Note that (αthe_theory) is a valid elementary tree conforming to Frank's CETM, as a noun can form an extended projection with a DP, in line with the DP Hypothesis. Also, elementary trees such as (βand_dislikes$_{\{DP\}}$) are in accordance with CETM, as coordinators are functional heads (Potter 2010). In each of (αlikes$_{\{DP\}}$) and (βand_dislikes$_{\{DP\}}$), the object DP node is in the contraction set, notated as a subscript in the tree name and marked in the tree with a circle around it, and represents a shared argument. When (βand_dislikes$_{\{DP\}}$) adjoins to (αlikes$_{\{DP\}}$), the two trees will undergo contraction, sharing the node in the contraction set. Effectively, in the derived tree, the two nodes are identified, merging into one, and in the derivation tree, a DP simultaneously substitutes into the contraction nodes.

The derived and derivation structures are given in Figure 2. In (δ1), (αthe_theory) substitutes into (αlikes$_{\{DP\}}$) and (βand_dislikes$_{\{DP\}}$) simultaneously at the DP node, and in (γ1), the object DPs are merged into one. These are thus directed graphs: a single node is dominated by multiple nodes. Looking at (δ1) again, the elementary trees that are contracted are local to each other derivationally: (αlikes$_{\{DP\}}$) immediately dominates (βand_dislikes$_{\{DP\}}$). It is this local relationship that licenses contraction.

However, in instances of non-local RNR, this local relationship does not obtain. The intended derived structure for (3), for example, is given in Figure 5, using the elementary trees in Figures 1 and 3.[4] But the structure in Figure 5 cannot be generated with the given elementary trees, as it would require an illicit derivation, de-

[4] Note that (αlikes) and (βand_dislikes) trees are same as (αlikes$_{\{DP\}}$) and (βand_dislikes$_{\{DP\}}$), except that these do not have contraction nodes.

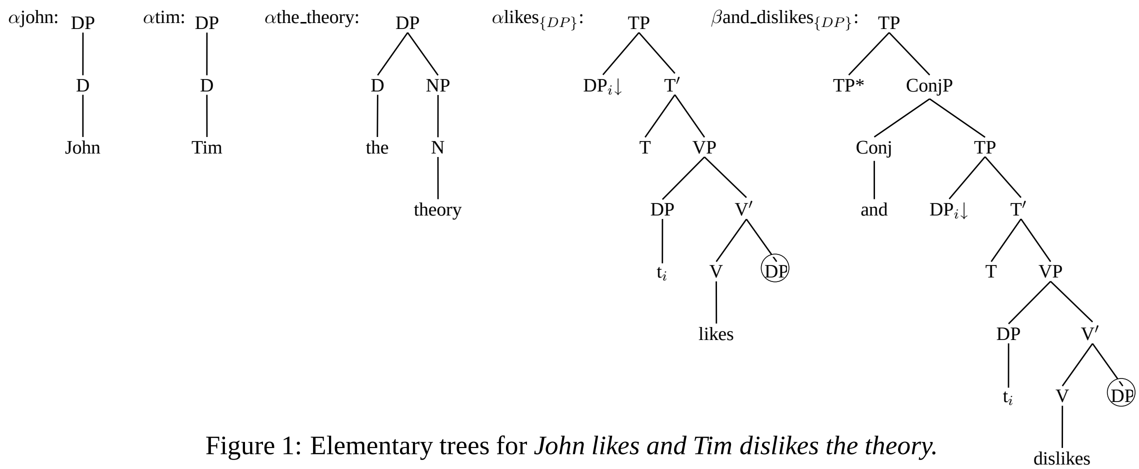

Figure 1: Elementary trees for *John likes and Tim dislikes the theory.*

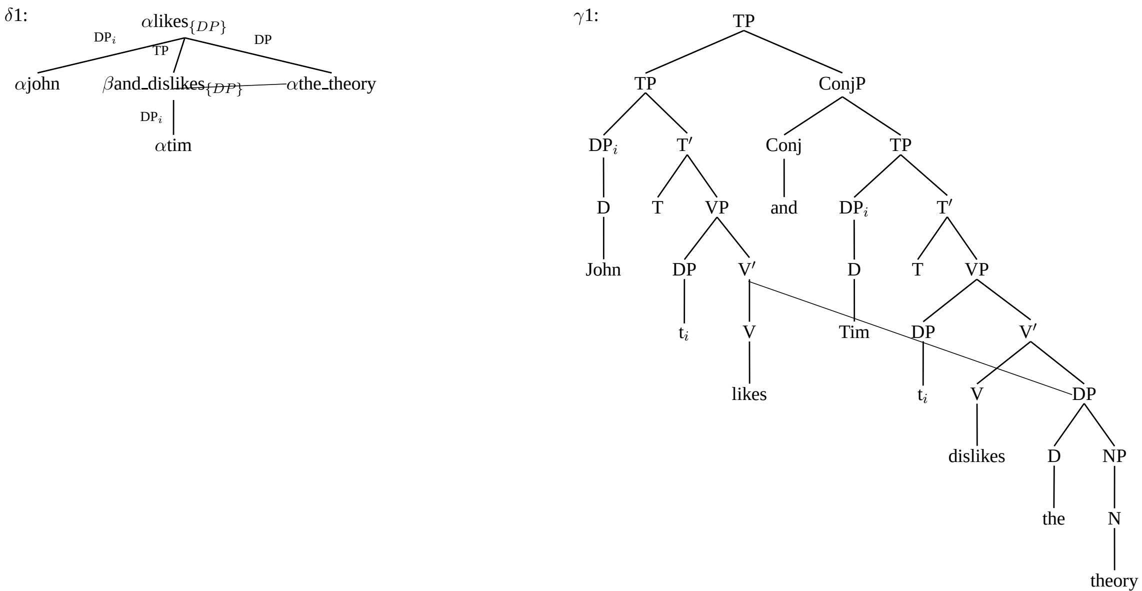

Figure 2: Derivation and derived structures for *John likes and Tim dislikes the theory.*

picted in Figure 4. Here, contraction must occur between the two relative clause elementary trees (βtaught$_{\{DP\}}$) and (βdebunked$_{\{DP\}}$). These relative clause trees though are not derivationally local to each other: they must each adjoin to the DP trees (αthe_professor) and (αthe_student) which in turn must substitute into the object positions of (αlikes) and (βand_dislikes).

3 Derivation using Delayed Tree-Local MC-TAG

To address this problem, we augment Sarkar and Joshi's analysis with delayed tree locality. As defined in Chiang and Scheffler, delayed tree-local multi-component (MC) TAG allows members of an

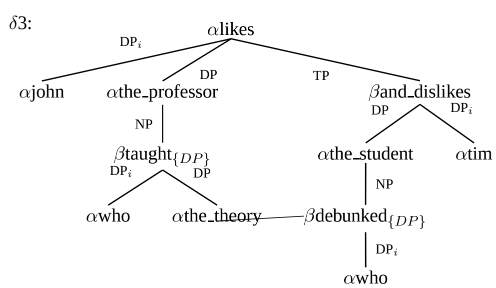

Figure 4: Illegal derivation structure for *John likes the professor who taught and Tim dislikes the student who debunked the theory* using standard TAG

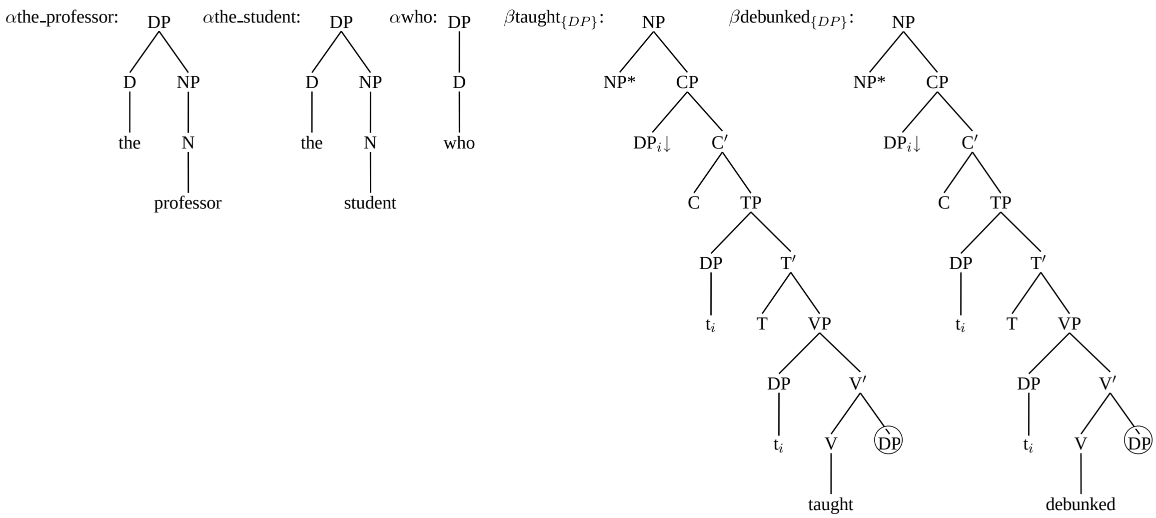

Figure 3: Elementary trees for *John likes the professor who taught and Tim dislikes the student who debunked the theory.*

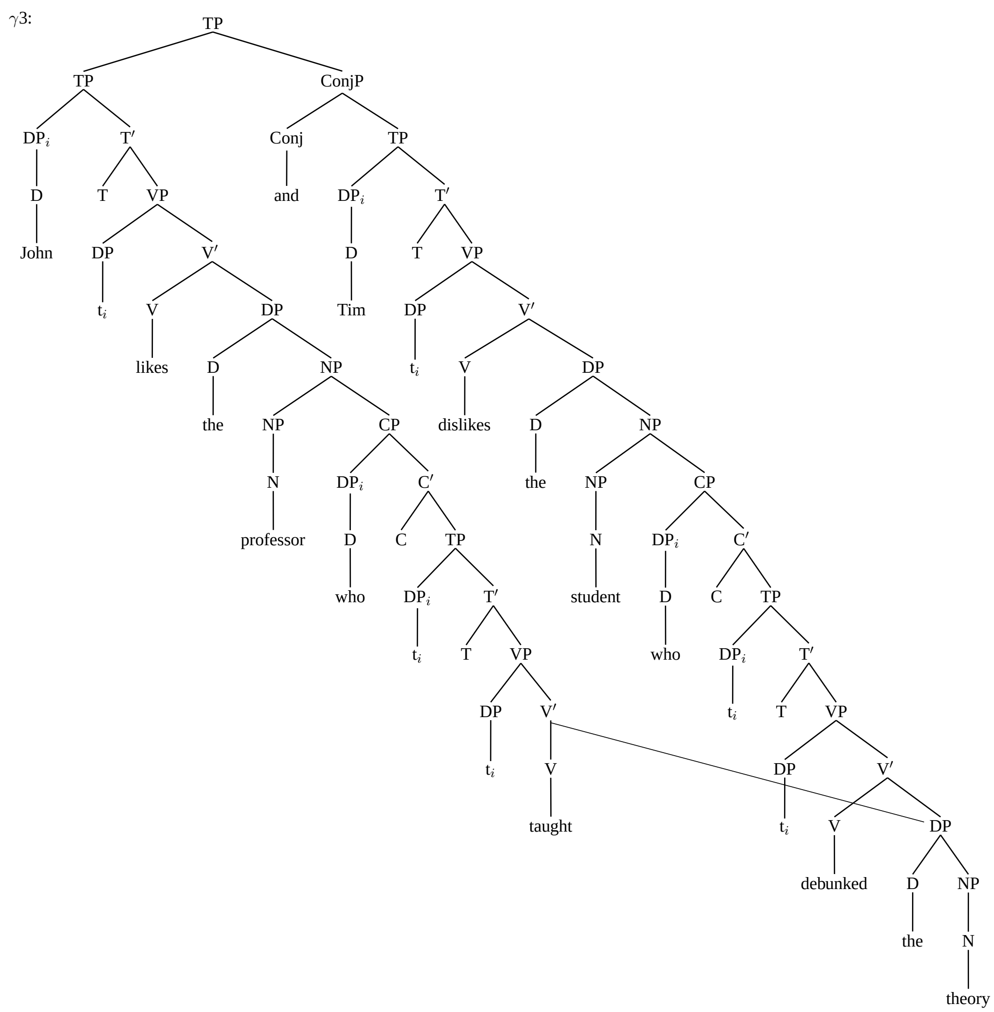

Figure 5: Derived structure for *John likes the professor who taught and Tim dislikes the student who debunked the theory.*

MC set to compose with different elementary trees as long as the members eventually compose into the same elementary tree. In the derivation structure, the members of the MC set do not need to be immediately dominated by a single node, though there must be a node that dominates all the members of the MC set. The lowest such node is called the *destination* of an MC set. The *delay* of an MC set is the union of the paths from the destination to each member of the MC set, excluding the destination itself.

In deriving (3), we propose MC elementary tree sets for relative clauses with shared nodes, as in Figure 6. We postulate a structural constraint between the two trees in the MC set: the degenerate tree component must dominate the relative clause tree component in the derived structure.

In effect, with the addition of the MC tree sets such as those in Figure 6, the specification of contraction sets is now divorced from the elementary trees that compose through coordination. To accommodate this separation, we need to extend the licensing condition for contraction. We take an elementary tree participating in coordination and the immediately dominated degenerate tree with contraction set as a derivational unit, and call it a *contraction path*. We propose that contraction between two MC sets A and B is licensed if A and B have corresponding contraction sets, and the contraction path containing the degenerate tree component of A either immediately dominates or is immediately dominated by the contraction path containing the degenerate tree component of B.

The delayed tree-local derivation for (3) is depicted in the derivation structure in Figure 7, generating the derived structure in Figure 5. (βtaught1$_{\{DP\}}$) adjoins to (αthe_professor), and (βtaught2$_{\{DP\}}$), a degenerate tree, adjoins to the TP node of (αlikes). (βand_dislikes) adjoins to this TP, and (βdebunked2$_{\{DP\}}$) adjoins to the TP of (βand_dislikes). (βdebunked1$_{\{DP\}}$) adjoins to (αthe_student) which substitutes into (βand_dislikes). The delay of the (taught$_{\{DP\}}$) MC set is $\{$(βtaught1$_{\{DP\}}$), (βtaught2$_{\{DP\}}$), (αthe_professor)$\}$ and the delay of the (debunked$_{\{DP\}}$) MC set is $\{$(βdebunked1$_{\{DP\}}$), (βdebunked2$_{\{DP\}}$), (αthe_student)$\}$. As no derivation node is a member of more than one delay, this is a 1-delayed tree-local MC-TAG derivation. In this

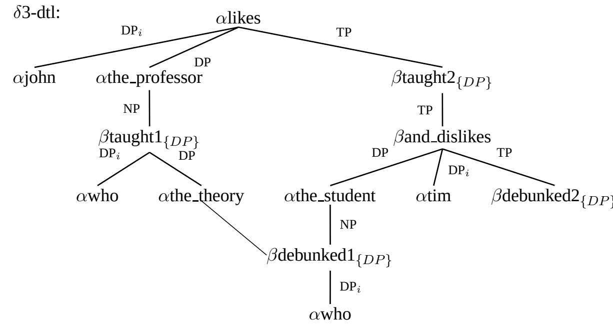

Figure 7: Derivation structure for *John likes the professor who taught and Tim dislikes the student who debunked the theory* with delayed tree locality

derivation, (αlikes) and (βtaught2$_{\{DP\}}$) form a contraction path, which immediately dominates another contraction path, made up of (βand_dislikes), a coordinating auxiliary tree, and (βdebunked2$_{\{DP\}}$), a degenerate tree with a corresponding contraction set specification. As the two paths are local to each other, contraction of the object DPs in the relative clause trees, (βtaught1$_{\{DP\}}$) and (βdebunked1$_{\{DP\}}$), is licensed.

The proposed analysis can rule out (7), where RNR has taken place across a coordinating clause without a shared argument.

(7) * [John likes the professor who taught _] and [Tim dislikes the student who took the course] and [Sue hates the postdoc who debunked **the theory**].

Due to the domination constraint between the two trees in the MC set, the only plausible derivation is as in Figure 8. But node contraction is not licensed in this derivation, as the two contraction paths, one containing (αlikes) and (βtaught2$_{\{DP\}}$), and the other containing (βand_hates) and (βdebunked2$_{\{DP\}}$), are separated by (βand_dislikes). As the two paths are not derivationally local to each other, contraction between the relative clauses is not licensed.

Local RNR can also be accounted for in terms of the proposed MC set with the contraction set specification, and contraction paths. Returning to (1), its derivation structure can be recast as in Figure 10, using the MC sets in Figure 9. In Chiang and Scheffler's definition of delayed tree-local MC-TAG, one member of an MC set is allowed

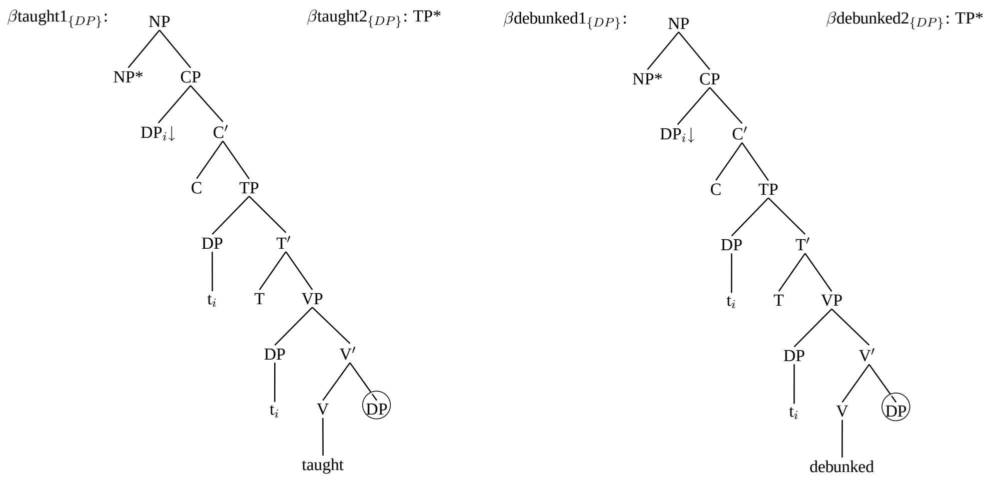

Figure 6: MC sets for relative clauses with contraction sets

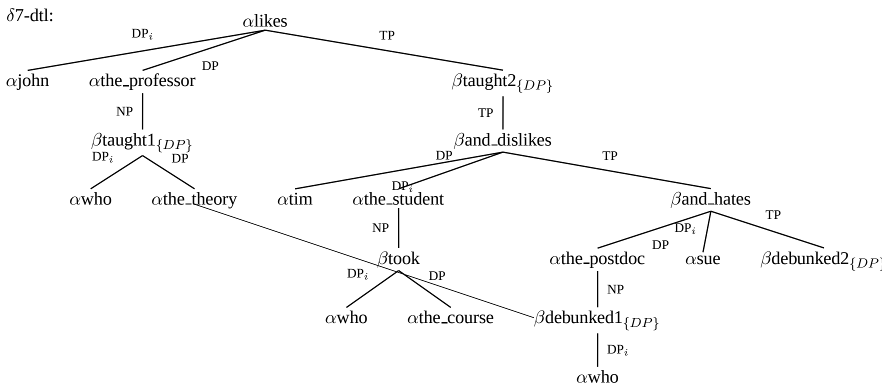

Figure 8: Illegal derivation structure for **John likes the professor who taught and Tim dislikes the student who took the course and Sue hates the postdoc who debunked the theory*

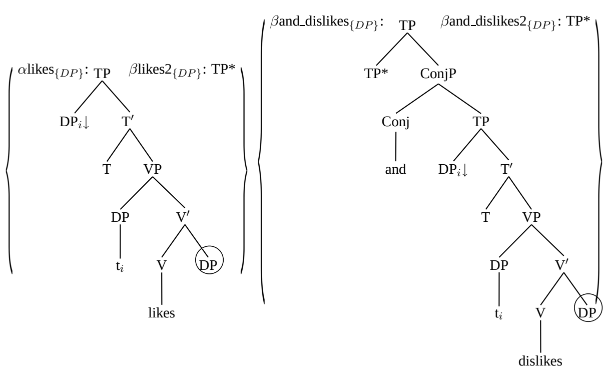

Figure 9: MC sets for *likes* and *and_dislikes* with contraction sets

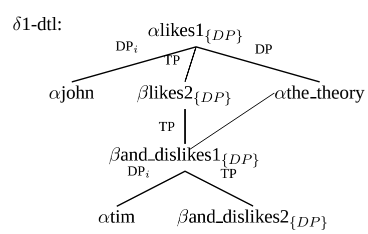

Figure 10: Delayed tree-local derivation for *John likes and Tim dislikes the theory*

to adjoin into another. As such, in Figure 10, (βlikes2$_{\{DP\}}$) adjoins to (αlikes1$_{\{DP\}}$), forming one contraction path, and (βand_dislikes2$_{\{DP\}}$) adjoins to (βand_dislikes1$_{\{DP\}}$), forming another. The two contraction paths are in immediate domination relation, licensing the contraction of the object DPs.

4 Derivation using Flexible Composition

We now attempt to augment Sarkar and Joshi's analysis with tree-local MC-TAG with flexible composition. Flexible composition can be seen as reverse-adjoining: instead of β adjoining onto α at node η, α splits at η and wraps around β. By reversing the adjoining this way, tree-locality can be preserved in an otherwise non-local MC-TAG derivation.

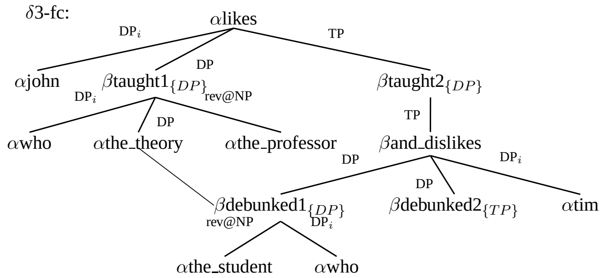

Figure 11: Illegal derivation structure for *John likes the professor who taught and Tim dislikes the student who debunked the theory* with flexible composition

As depicted in the derivation structure in Figure 11, flexible composition seems to keep the derivation tree-local: (αthe_professor) reverse-adjoins to (βtaught1$_{\{DP\}}$) which in turn substitutes into (αlikes), and (βtaught2$_{\{DP\}}$), the other component of the (taught$_{\{DP\}}$) MC set adjoins to (αlikes). And (βand_dislikes) adjoins to (βtaught2$_{\{DP\}}$), (βdebunked2$_{\{DP\}}$) adjoins to (βand_dislikes), and (αthe_student) reverse-adjoins to (βdebunked1$_{\{DP\}}$), which allows (βdebunked1$_{\{DP\}}$) to substitute into (βand_dislikes). The contraction path containing (αlikes) and (βtaught2$_{\{DP\}}$) and the one containing (βand_dislikes) and (βdebunked2$_{\{DP\}}$) are local to each other, and so contraction between the relative clauses should in principle be possible.

But there is a problem with this derivation: it substitutes (βtaught1$_{\{DP\}}$) and (βdebunked1$_{\{DP\}}$) into (αlikes) and (βand_dislikes) respectively. This is problematic because these substitutions are using new DP nodes created by the reverse-adjoining of (αthe_professor) to (βtaught1) and (αthe_student) to (βdebunked1). Though this composition is allowed by the definition in Joshi et al. (2003), it is not allowed by the definition in Chiang and Scheffler (2008), where it is speculated that allowing such derivation may increase the weak generative capacity beyond standard TAG.

This result provides further support for Chiang and Scheffler's (2008) observation that while any derivation using flexible composition can alternatively be expressed in a 2-delayed tree-local MC-TAG, a derivation using a 1-delayed tree-local analysis may not be expressed in an MC-TAG with flexible composition. To verify this observation, Chiang and Scheffler used ECM construction where there is a binding relationship between the matrix subject and the ECM subject, as in (8).

(8) John believes himself to be a decent guy. (Ryant and Scheffler, 2006)

They show that though there is a simple derivation using a 1-delayed tree-local MC-TAG, the derivation with flexible composition originally proposed for (8) by Ryant and Scheffler (2006) is actually illegal. There, a reverse-adjoining takes place at a site that is created by a reverse-substitution. We have essentially obtained the same results with the derivation of non-local RNR.

5 Noncoordinate RNR

Following Hudson (1976), Napoli (1983), Goodall (1987), Postal (1994), and Phillips (2003), and as illustrated in (9) and (10), RNR is possible in non-coordinated structures.

(9) a. [David changed __] while [Angela distracted **the baby**].

b. [I organize __] more than [I actually run **her life**].

c. [I organize __] although [I don't really run **her life**].

(10) a. Of the people questioned, those [who liked __] outnumbered by two to one those [who disliked **the way in which the devaluation of the pound had been handled**]. (Hudson, 1976)

b. Politicians [who have fought for __] may well snub those [who have fought against **animal rights**]. (Postal, 1994)

c. The professor [who taught __] dislikes the student [who debunked **the theory**].

Our proposed analysis of coordinate RNR can straightforwardly be extended to the examples in (9). In the derivation of each of the examples, the elementary tree representing the adjunct clause adjoins to the matrix clause, just as the elementary tree representing the coordinated clause did. These elementary trees thus form a natural class with coordinating elementary trees, and as such, they can each form a contraction path with the immediately dominated

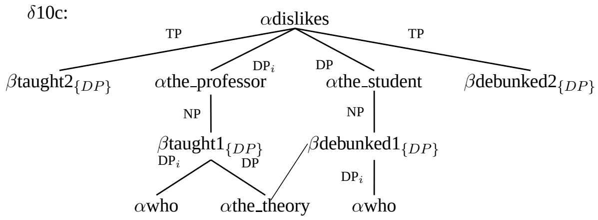

Figure 12: Derivation structure for *The professor who taught dislikes the student who debunked the theory*

degenerate tree. And since the contraction path containing the degenerate tree member representing the matrix clause immediately dominates the one containing the degenerate tree member of the adjunct clause, contraction of the object DPs is licensed.

Unlike the cases of coordinate RNR and the examples in (9), in the examples in (10), the second clause containing the shared argument is not adjoining onto the first clause with the shared argument. Rather, they are relative clauses, each contained in the subject DP and the object DP. (10c), for example, can thus be given a 1-delayed tree-local derivation as in Figure 12, using the elementary tree sets in Figure 6. Here, the degenerate trees, (βtaught2$_{\{DP\}}$) and (βdebunked2$_{\{DP\}}$), both adjoin to (αdislikes), forming two contraction paths, one containing (αdislikes) and (βtaught2$_{\{DP\}}$) and the other containing (αdislikes) and (βdebunked2$_{\{DP\}}$). The two paths are in sister relation, which is arguably as local as immediate domination relation. It thus follows that the contraction of the object DPs in the relative clause trees, (βtaught1$_{\{DP\}}$) and (βdebunked1$_{\{DP\}}$), is licensed.

6 Conclusion

In this paper, we have observed that non-local RNR calls for a TAG derivation that is more descriptively powerful than the one of standard TAG, and applied two such variants of TAG to the problem, tree-local MC-TAG with flexible composition and 1-delayed tree-local MC-TAG. We have shown that the analysis of local RNR proposed in Sarkar and Joshi can be extended to non-local RNR if it is augmented with delayed tree locality but not with flexible composition. We have seen that the proposed analysis is constraining as well, ruling out non-contiguous RNR, and can also be extended to handle cases of noncoordinate RNR.

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