# Coordination in TAG without the Conjoin Operation

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## Abstract

In this paper, we propose an alternative to Sarkar and Joshi's (1996) Conjoin Operation approach to clausal coordination with shared arguments. The Conjoin Operation applies across elementary trees, identifying and merging arguments from each clause, yielding a derivation tree in which the shared arguments are combined with multiple elementary trees, and a derived tree in which the shared arguments are dominated by multiple verbal projections. In contrast, our analysis uses Synchronous Tree Adjoining Grammar in order to pair syntactic elementary trees that participate in the derivation of clausal coordination with semantic elementary trees that use a lambda term to abstract over the shared argument. This allows the sharing of arguments in coordination to be instantiated in semantics, without being represented in syntax in the form of multiple dominance.

## 1 Introduction

In clausal coordination, one or more arguments can be shared by the verbal predicates of the conjuncts. For example, in (1), an object argument, *Pete*, is shared by *likes* and *hates*, and in (2), a subject argument, *Sue*, is shared by the two verbs.

(1) Sue likes and Kim hates Pete.
  a. likes(Sue,Pete) $\wedge$ hates(Kim,Pete)

(2) Sue hates Pete and likes Kim.
  a. hates(Sue,Pete) $\wedge$ likes(Sue,Kim)

A widely adopted analysis to such coordination, since Ross (1967), is to postulate an across-the-board (ATB) movement of the shared argument, in which multiple underlying copies of the shared material are identified during movement, yielding a single overt copy located outside of the coordinate structure. So, (1) and (2) would be derived from movement of the shared argument from both conjuncts to a position outside of the coordinate structure, as in (3) and (4).

(3) [Sue likes $t_i$] and [Kim hates $t_i$] **Pete**$_i$.

(4) **Sue**$_i$ [$t_i$ hates Pete] and [$t_i$ likes Kim].

Not to mention the problematic aspects of the exact mechanism where movement somehow identifies two syntactically distinct objects, the ATB movement analysis incorrectly predicts that shared arguments be barred from islands, given that movement dependency is subject to island constraints (Wexler and Culicover, 1980). (5) illustrates that a *wh*-movement dependency cannot be formed across a relative clause, an island. In contrast, in (6), a shared argument can form a putative ATB movement dependency across relative clauses.

(5) * What did Max denounce [the senator who wrote $t_i$]]? (Sabbagh, 2014, 14)

(6) Max publicly denounced [the senator [who wrote $t_i$]], and Pauline outwardly criticized [the magazine editor [who published $t_i$]], **[the speech that encouraged the riot]**$_i$. (Sabbagh, 2014, 15)

Combinatory Categorial Grammar (CCG) (Steedman, 1996) places the shared argument outside the coordinating conjuncts without postulating movement. It uses a syntactic combinator $(X\backslash X)/X$ for conjunctions, which combines two constituents of any type (one on the left and the other on the right represented by the slash direction). In semantics, the coordinated constituents provide a predicate lambda term which is then reduced using the shared argument. CCG



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combines type-raising and function composition to handle coordination which leads to a view of constituency that is quite different from traditional phrase structure.

Another prominent analysis, starting with Wexler and Culicover (1980), is to postulate that the appearance of a shared argument is a result of ellipsis of corresponding arguments from other conjuncts. Under the ellipsis analysis, (1) and (2) would be a result of eliding the object argument from the first conjunct (7) and the subject argument from the second conjunct (8), respectively.

(7) [Sue likes ~~Pete~~] and [Kim hates **Pete**].

(8) [**Sue** hates Pete] and [~~Sue~~ likes Kim].

The ellipsis analysis predicts that a clausal coordination with a shared argument and the corresponding non-elided version should have the same meaning. But this is not always the case (Sabbagh, 2007). For instance, while (9) means that the same student read every paper and summarized every book, (10) can mean different students read every paper and summarized every book.

(9) **A student** read every paper and summarized every book.

(10) A student read every paper and a student summarized every book.

This takes us to the multiple dominance analysis, first proposed by McCawley (1982), that postulates that a shared argument is multiply dominated by elements from multiple conjuncts. A version of this approach has been developed in Sarkar and Joshi (1996) within the TAG literature. Sarkar and Joshi (1996) posit that the shared argument is located in the canonical position within each conjunct, and propose an operation, the Conjoin Operation, that applies across elementary trees. This operation identifies and merges the shared argument when two elementary trees combine via coordination, yielding a derived tree in which an argument is multiply dominated by two verbal projections. The Conjoin Operation analysis has been used and extended often in TAG-based linguistic research, including the semantics of clausal coordination and scope (Banik, 2004; Han et al., 2008; Storoshenko and Frank, 2012), and the syntax of Right-Node-Raising (Han et al., 2010).

According to the multiple dominance analysis, as the shared argument is in a dominance relation within each conjunct, it must be syntactically licensed in each conjunct. However, as observed in Cann et al. (2005), the syntactic requirement of the shared argument must be met by the elements within the conjunct it occurs with, and not by elements in other conjuncts. For instance, the negative polarity item in the shared object, which occurs in the second conjunct on the surface, is licensed by negation in the second conjunct (11), but not by negation in the first conjunct (12).

(11) John has read, but he hasn't understood **any of my books**. (Cann et al., 2005, 1e)

(12) * John hasn't understood, but has read **any of my books**.

In this paper, using Synchronous Tree Adjoining Grammar, we propose an alternative to the TAG analysis of coordination, which does not rely on the Conjoin Operation. In our proposal, the shared argument is syntactically present only in one conjunct, and syntactically missing in other conjuncts. The syntactic elementary trees representing the conjuncts with missing arguments are paired with semantic elementary trees with unsaturated arguments, and the syntactic elementary trees with shared arguments are paired with semantic elementary trees that use lambda terms to abstract over the shared arguments. Composition of these trees via adjoining allows sharing of arguments to be instantiated in semantics, without being represented in syntax in the form of ATB movement, ellipsis or multiple dominance.

The remainder of this paper is organized as follows. In Section 2, we illustrate in more detail how the Conjoin Operation identifies a shared argument. Our STAG analysis where sharing of arguments takes place in semantics, not in syntax, is presented in Section 3. This analysis is extended in Section 4 to account for ATB *wh*-movement, and the interaction of coordination and quantification.

## 2 Argument Sharing via the Conjoin Operation

Sarkar and Joshi (1996) utilize elementary trees with contraction sets and coordinating auxiliary trees. The elementary trees necessary to derive (1) are given in Figure 1.[1] In each of ($\alpha$likes$_{\{DP\}}$)

[1] We follow Frank's (2002) Condition on Elementary Tree Minimality (CETM), and adopt the DP Hypothesis and the VP-internal Subject Hypothesis in defining our elementary

and ($\beta$and_hates$_{\{DP\}}$), 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 ($\beta$and_hates$_{\{DP\}}$) adjoins to ($\alpha$likes$_{\{DP\}}$) via the Conjoin Operation, the two trees undergo contraction, sharing the node in the contraction set. Effectively, this allows the DP tree, ($\alpha$Pete), to simultaneously substitute into the contraction nodes, and in the derived tree, the two nodes are identified, merging into one. The substitution of ($\alpha$Sue) and ($\alpha$Kim) into the subject DP nodes of ($\alpha$likes$_{\{DP\}}$) and ($\beta$and_hates$_{\{DP\}}$), in addition to the simultaneous substitution of ($\alpha$Pete) into the object DP nodes of the two elementary trees, generates the derived tree ($\gamma$1) in Figure 1. The resulting derived tree is a directed graph as a single node is dominated by multiple nodes. The shared argument, *Pete*, is thus represented as a syntactic argument of both the verbs, *likes* and *hates*, capturing the meaning of the sentence that the person that Sue likes and the person that Kim hates are the same individual.

## 3 Argument Sharing via Semantics using STAG

According to the NPI examples (11)-(12) discussed in section 1, the shared argument seems to be forming syntactic dependencies only with elements in the conjunct in which it appears on the surface, but not with elements in other conjuncts. We capture this intuition with the proposal that the shared argument is syntactically present only in one of the conjuncts, and missing in other conjuncts, resulting in predicates with unsaturated arguments in semantics. We explain our analysis with a shared object argument example in subsection 3.1 and a shared subject argument example in subsection 3.2.

### 3.1 Object argument sharing

For the analysis of (1), an example of clausal coordination with a shared object argument, we propose elementary tree pairs in ($\beta$likes$_{\{DP\}}$) and ($\beta'$likes$_{\{DP\}}$) in Figure 2. ($\beta$likes$_{\{DP\}}$) is an auxiliary TP tree that introduces a coordinator and adjoins to another TP it coordinates with. The object argument of this auxiliary tree is null, directly reflecting the fact that it is absent in the first conjunct. The content of the null object argument, however, must be resolved in semantics. This requirement is implemented by the semantic elementary tree ($\beta'$likes$_{\{DP\}}$), in which the variable corresponding to the object argument ($x$) has been $\lambda$-abstracted over, turning the conjunct into a predicate ($\langle e,t\rangle$). This predicate must adjoin to another predicate whose object argument has been similarly $\lambda$-abstracted over. This adjunction requirement is represented in the elementary tree by the *obligatory adjunction* or *oa* constraint (Vijay-Shanker, 1992) on the TP node of ($\alpha$hates$_{\{DP\}}$). The *oa* constraint should also provide a list of auxiliary trees compatible with this elementary tree in order to satisfy the object sharing requirement in the semantic structure. To save space in the figures, we show the *oa* constraint but we do not explicitly provide a list of trees. In all the subsequent trees we will also provide such an *oa* constraint and since it serves the same purpose in all of them we do not comment on it further. The boxed numeral $\boxed{1}$ in ($\beta$likes$_{\{DP\}}$) and ($\beta'$likes$_{\{DP\}}$) indicates a link between the syntactic and semantic tree pairs to ensure the synchronous derivation between the syntax and the semantics: a DP tree substitutes into the subject position marked with $\boxed{1}$ in ($\beta$likes$_{\{DP\}}$), and the semantic tree paired with this DP must substitute into the position marked with $\boxed{1}$ in ($\beta'$likes$_{\{DP\}}$).[2]

The TP and the predicate that ($\beta$likes$_{\{DP\}}$) and ($\beta'$likes$_{\{DP\}}$) adjoin to are provided by elementary tree pairs in ($\alpha$hates$_{\{DP\}}$) and ($\alpha'$hates$_{\{DP\}}$) in Figure 2. ($\alpha$hates$_{\{DP\}}$) is a typical transitive initial tree in syntax with subject and object substitution sites. ($\alpha'$hates$_{\{DP\}}$), however, is an atypical transitive elementary tree in semantics in which the object argument has been $\lambda$-abstracted over: here, the variable corresponding to the object argument ($x$) is $\lambda$-abstracted over to provide a predicate ($\langle e,t\rangle$).[3] This predicate will combine with the meaning of the object argument to provide a formula ($t$). Note that the TP node in ($\alpha$hates$_{\{DP\}}$) and the highest $\langle e,t\rangle$ node in ($\alpha'$hates$_{\{DP\}}$) are marked with the link $\boxed{3}$. These are the positions onto which ($\beta$likes$_{\{DP\}}$) and ($\beta'$likes$_{\{DP\}}$) adjoin in syntax and semantics respectively.

trees. Elementary trees such as ($\beta$and_hates$_{\{DP\}}$) are in accordance with CETM, as coordinators are functional heads.

[2]For the sake of simplicity, we include only the links that are relevant for the current discussion.

[3]Semantic elementary trees in which $\lambda$-operators abstract over argument variables have been proposed and utilized in Frank and Storoshenko (2012) to handle many difficult cases of quantifier scope within tree-local MC-TAG.

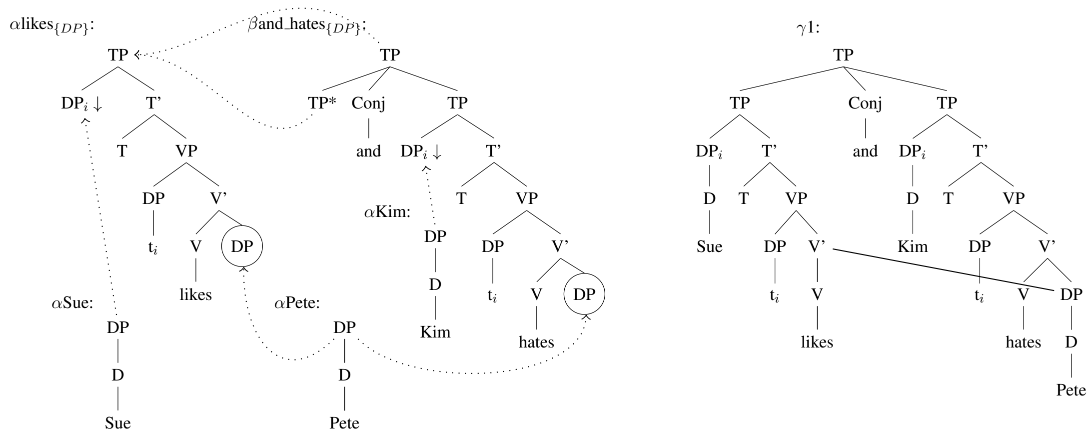


Figure 1: Elementary trees and derived tree for *Sue likes and Kim hates Pete* with the Conjoin Operation

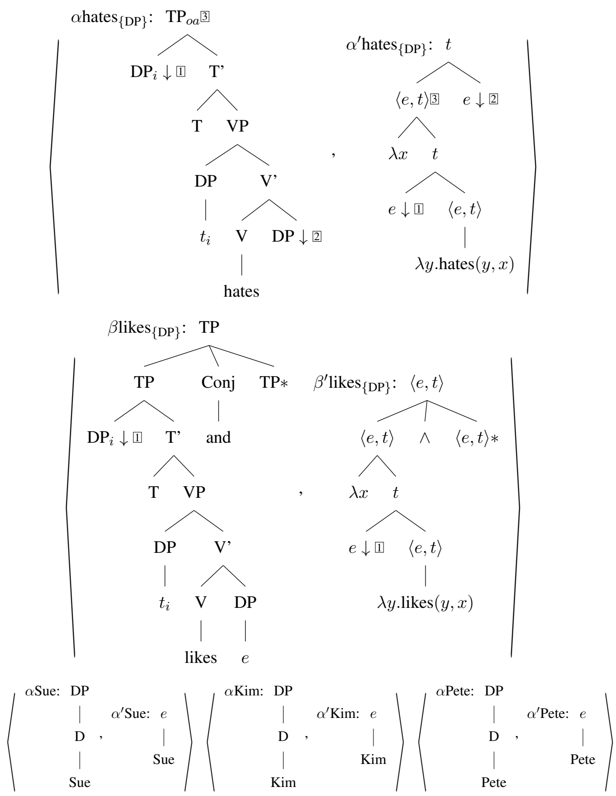


Figure 2: Elementary trees for *Sue likes and Kim hates Pete*

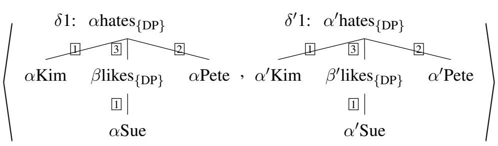


Figure 3: Derivation structures for *Sue likes and Kim hates Pete*

Figure 3 depicts the isomorphic syntactic and semantic derivation structures for (1). Following the convention in Nesson and Shieber (2006; 2007), here we use boxed numerals for links to denote locations in parent elementary trees where the TAG operations took place. The syntactic and the semantic derived trees are given in Figure 4. In contrast to the Conjoin Operation approach, in our analysis, ($\alpha$Pete), the syntactic elementary tree representing the shared argument, composes only with a single predicative elementary tree, ($\alpha$hates$_{\{DP\}}$). In the syntactic derived tree ($\gamma$1), therefore, *Pete* is represented as the object DP of *hates*, but not *likes*. Similarly in semantics, ($\alpha'$Pete) composes only with ($\alpha'$hates$_{\{DP\}}$). However, because the object abstracted predicate of ($\beta'$likes$_{\{DP\}}$) is adjoining onto the predicate node in the object abstracted ($\alpha'$hates$_{\{DP\}}$), the correct meaning of (1) is derived, in which the person Sue likes and Kim hates is Pete, as stated in the logical form in (1a). ($\gamma'$1) can be reduced to (1a) via $\lambda$-conversion following the application of the Generalized Conjunction (GC) Rule (Barwise and Cooper, 1981) defined in (13).

(13) Generalized Conjunction (GC) Rule:
[Pred1 $\wedge$ Pred2] = $\lambda z$[Pred1($z$) $\wedge$ Pred2($z$)]

### 3.2 Subject argument sharing

Figure 5 contains our proposed elementary trees to derive (2), an example of clausal coordination with a subject shared argument. ($\beta$likes$_{\{DP_i\}}$) introduces a coordinator and its subject argument is null, reflecting the fact that it is absent in the second conjunct. In ($\beta'$likes$_{\{DP_i\}}$), the variable cor-

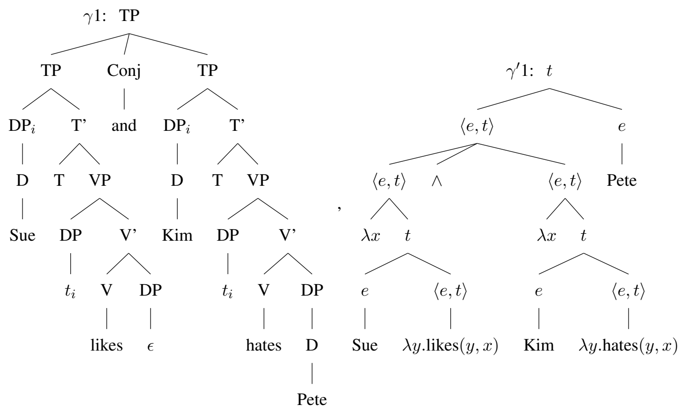

Figure 4: Derived trees for *Sue likes and Kim hates Pete*

responding to the subject argument ($x$) has been $\lambda$-abstracted over, turning the conjunct into a predicate ($\langle e, t\rangle$). This implements the requirement that the subject argument still needs to be saturated. ($\alpha$hates$_{\{DP_i\}}$) is a typical transitive initial tree in syntax. In ($\alpha'$hates$_{\{DP_i\}}$), however, the variable corresponding to the subject argument ($x$) has been $\lambda$-abstracted over to provide a predicate ($\langle e, t\rangle$) which will combine with the meaning of the subject argument to provide a formula ($t$).

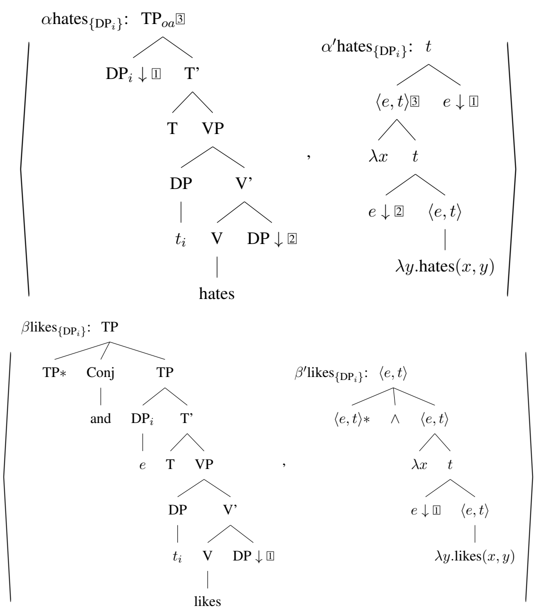

Figure 5: Elementary trees for *Sue hates Pete and likes Kim*

The isomorphic syntactic and semantic derivation structures for (2) are provided in Figure 6 and the derived trees are given in Figure 7. The shared subject argument represented by the elementary tree pair $\langle\alpha\text{Sue}, \alpha'\text{Sue}\rangle$ composes only with the predicative elementary tree pair $\langle\alpha\text{hates}_{\{\text{DP}_i\}}, \alpha'\text{hates}_{\{\text{DP}_i\}}\rangle$. Therefore, in the syntactic derived tree, *Sue* is represented as the subject DP of *hates*, but not *likes*. In the semantic derived tree, however, the subject abstracted predicate of ($\beta'$likes$_{\{DP_i\}}$) adjoins onto the predicate node in the subject abstracted ($\alpha'$hates$_{\{DP_i\}}$), and so the correct meaning of (2) is derived via the application of $\lambda$-conversion and the GC Rule to ($\gamma'2$), in which the person that hates Pete and likes Kim is Sue, as stated in the local form in (2a).

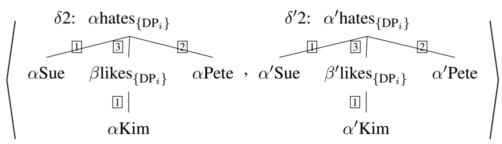

Figure 6: Derivation structures for *Sue hates Pete and likes Kim*

# 4 Extensions

## 4.1 ATB wh-movement

According to the Conjoin Operation analysis, instances of ATB *wh*-movement, as in (14), involve a *wh*-movement in each clausal conjunct followed by identification and merging of the *wh*-phrases as the two clauses compose. In our analysis, a *wh*-movement takes place only in one conjunct in syntax, while the function of the *wh*-phrase is captured as a shared argument in semantics.

(14) Who does Sue like and Kim hate?

a. $\text{WH}x[\text{person}(x)][\text{likes}(\text{Sue}, x) \wedge \text{hates}(\text{Kim}, x)]$

Additional elementary trees required to derive (14) are given in Figure 8. ($\alpha$wh_hates$_{\{DP_j\}}$) is a typical transitive initial tree with a *wh*-movement of the object argument. ($\alpha'$wh_hates$_{\{DP_j\}}$) is a

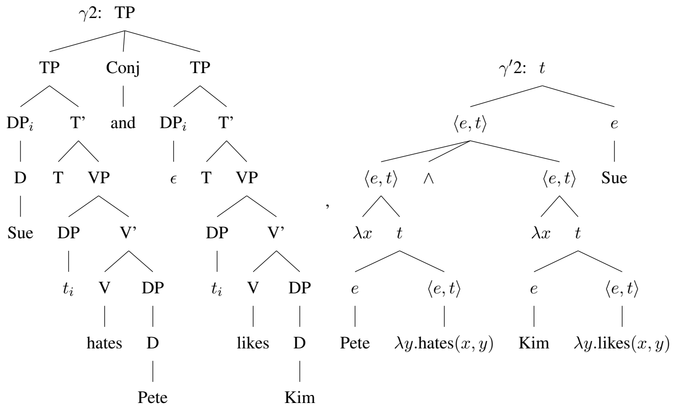


Figure 7: Derived trees for *Sue hates Pete and likes Kim*

corresponding semantics tree with a $\lambda$-abstrated object argument. Here, we abstract away from the full semantics of *wh*-questions and simply represent the predicate-argument structure. In representing the semantics of *who*, we follow the tree-local multi-component treatment of quantification (Shieber and Schabes, 1990; Nesson and Shieber, 2006) and implement a generalized quantifier analysis to adopt the model of Han et al. (2008). We thus propose that the semantics of *who* has two components: ($\alpha'$who) is a variable and substitutes into the argument position $e$ linked with $\boxed{2}$ in ($\alpha'$wh_hates$_{\{DP_j\}}$), and ($\beta'$who) represents the scope and adjoins onto $t$ again linked with $\boxed{2}$ in ($\alpha'$wh_hates$_{\{DP_j\}}$). The coordinating auxiliary tree pairs ($\beta$likes$_{\{DP\}}$) and ($\beta'$likes$_{\{DP\}}$) depicted in Figure 2 will each adjoin onto the TP node in ($\alpha$wh_hates$_{\{DP_j\}}$) and the $\langle e,t\rangle$ node in ($\alpha'$wh_hates$_{\{DP_j\}}$), both linked with $\boxed{3}$. The full derivation structures and derived trees are given in Figure 9 and Figure 10.

In our analysis, the *wh*-movement of the object argument takes place within the predicative initial tree representing the second conjunct, onto which the coordinating auxiliary tree representing the first conjunct adjoins, stretching the distance between the *wh*-moved DP in [Spec,CP] and the trace position within the VP. The application of $\lambda$-conversion and the GC Rule to ($\gamma'$14) reduces it to the logical form in (14a), which correctly states that the person that Sue likes and Kim hates is the same individual and the question is asking for the identity of this individual.

### 4.2 Quantification and coordination

In clausal coordination with shared arguments, in general, these shared arguments scope over the

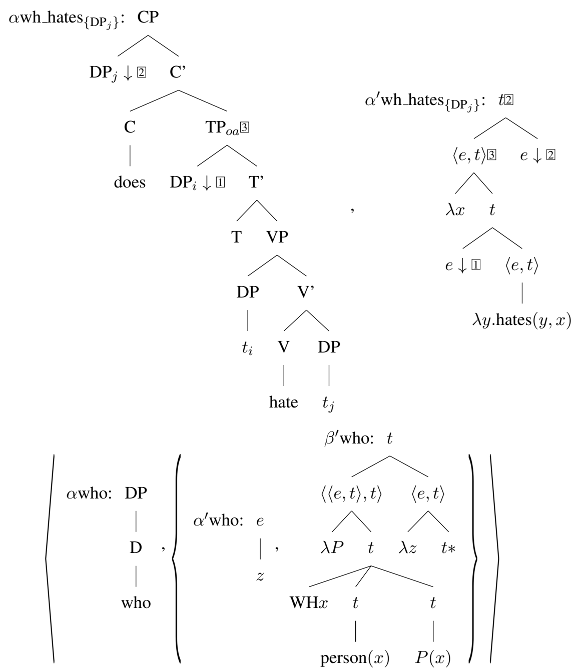


Figure 8: Elementary trees for *Who does Sue like and Kim hate?*

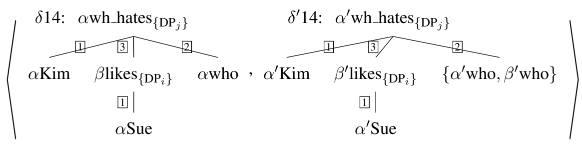


Figure 9: Derivation structures for *Who does Sue like and Kim hate?*

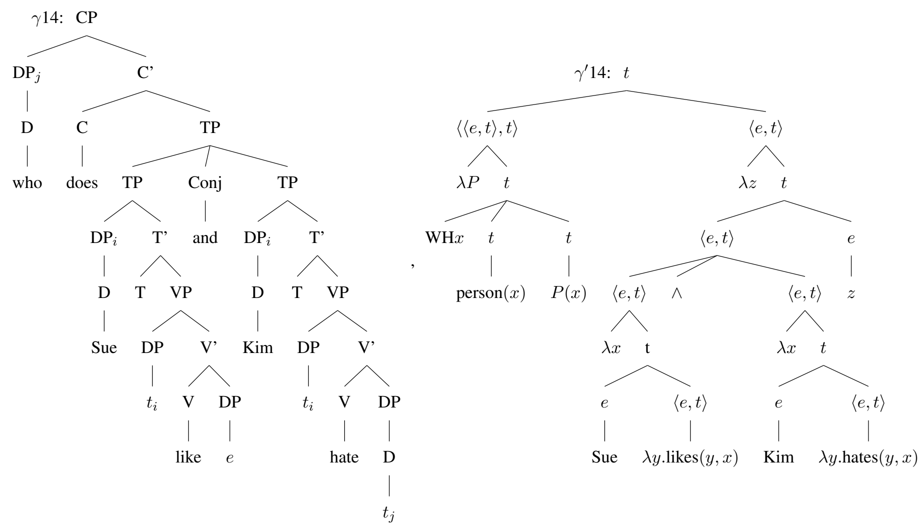

Figure 10: Derived trees for *Who does Sue like and Kim hate?*

coordinator, and the non-shared arguments scope under the coordinator (Banik, 2004; Han et al., 2008). This is illustrated in (15) (repeated from (9)) for a subject shared argument, and (16) for an object shared argument. In addition, clausal coordination with multiple shared arguments, as in (17), exhibits scope ambiguity. All three examples are taken from Han et al. (2008).

(15) A student read every paper and summarized every book. ($\exists > \wedge > \forall$)

a. $\exists x_1[\text{student}(x_1)][\forall x_2[\text{paper}(x_2)][\text{read}(x_1, x_2)] \wedge \forall x_2[\text{book}(x_2)][\text{summarized}(x_1, x_2)]]$

(16) A student takes and a professor teaches every course. ($\forall > \wedge > \exists$)

a. $\forall x_2[\text{course}(x_2)][\exists x_1[\text{student}(x_1)][\text{takes}(x_1, x_2)] \wedge \exists x_1[\text{professor}(x_1)][\text{teaches}(x_1, x_2)]]$

(17) A student likes and takes every course. ($\exists > \forall > \wedge, \forall > \exists > \wedge$)

a. $\exists x_1[\text{student}(x_1)][\forall x_2[\text{course}(x_2)][\text{likes}(x_1, x_2) \wedge \text{takes}(x_1, x_2)]]$

b. $\forall x_2[\text{course}(x_2)][\exists x_1[\text{student}(x_1)][\text{likes}(x_1, x_2) \wedge \text{takes}(x_1, x_2)]]$

In Han et al. (2008), semantic derivation of examples such as (15)-(17) requires a composition of an initial predicative tree and a coordinating auxiliary tree, each with a contraction node representing the shared argument. These elementary trees both project to $t$. The wide scope of the shared argument is enforced by stipulating that the scope component of the contraction node is active only in the coordinating auxiliary tree, which adjoins onto the highest $t$ above the coordinator. The scope information of the contraction node in the initial predicative tree is inherited from the scope component of the contraction node in the coordinating auxiliary tree. In our analysis, the shared argument is present only in one of the conjuncts, and so a single scope component straightforwardly interacts with the coordinator as the coordinating auxiliary tree adjoins below the scope of the shared argument.

We use (16) to illustrate our analysis with a single shared argument and briefly discuss (17) to illustrate how our analysis can be extended to multiple shared arguments. Additional elementary trees needed to derive (16) are given in Figure 11. We represent the semantics of quantified nominal phrases as multi-component sets, as we did for the semantics of *who*. For example, for the semantics of *a student*, ($\alpha'$a_student) provides the argument variable, and ($\beta'$a_student) introduces the existential quantifier and provides the scope of the quantification. In addition to the elementary tree pairs for *a student*, we will utilize similar elementary tree pairs for *a professor* and *every course*, with one difference being that the elementary tree representing the scope component of *every course* will contain a universal quantifier, instead of an existential quantifier. The elementary tree pairs $\langle \alpha\text{teaches}_{\{DP\}}, \alpha'\text{teaches}_{\{DP\}} \rangle$ and $\langle \beta\text{takes}_{\{DP\}}, \beta'\text{takes}_{\{DP\}} \rangle$ are similar to the predicative initial tree and the coordinating auxiliary tree we have seen before in Figure 2. The only difference is that ($\alpha'\text{teaches}_{\{DP\}}$) and ($\beta'\text{takes}_{\{DP\}}$) are now augmented with links to accommodate the scope components of the quan-

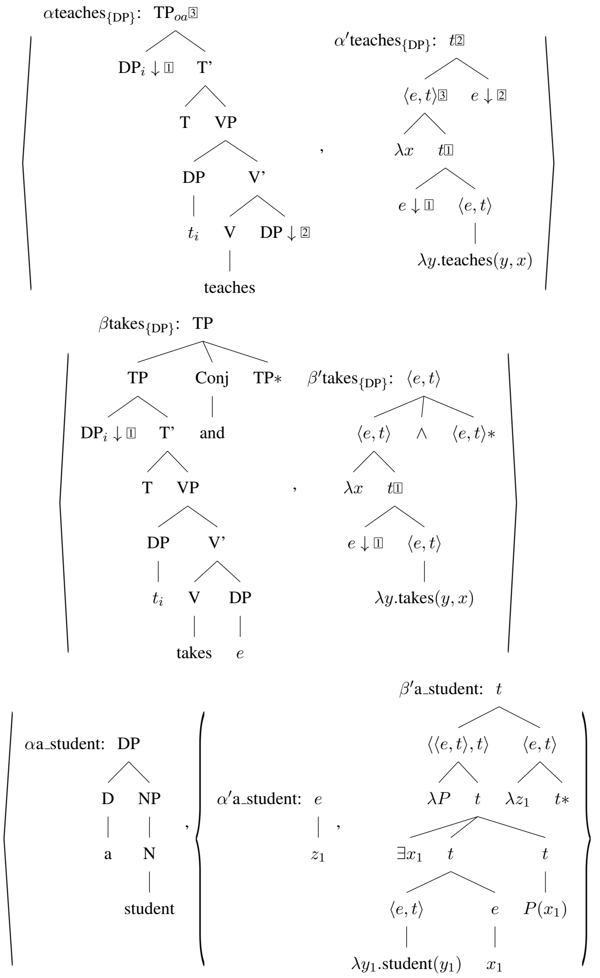


Figure 11: Elementary trees for *A student takes and a professor teaches every course*

tified noun phrases. In ($\beta'$takes$_{\{DP\}}$), the link $\boxed{1}$ for the scope component of the subject DP is on $t$, which is below the coordinator. In ($\alpha'$teaches$_{\{DP\}}$), the link $\boxed{1}$ for the scope component of the subject DP is on the $t$ below the $\langle e,t\rangle$ node onto which the coordinating auxiliary tree adjoins. Together, the non-shared arguments in each conjunct are guaranteed to scope below the coordinator. Moreover, in ($\alpha'$teaches$_{\{DP\}}$), the scope component of the object DP, which is the shared argument, is linked to the highest $t$ above the $\langle e,t\rangle$ node onto which the coordinating auxiliary tree adjoins. This then ensures that the shared argument scopes over the coordinator.

The isomorphic syntactic and semantic derivation structures are given in Figure 12 and the derived trees are given in Figure 13. To save space, we have reduced all the generalized quantifier ($\langle\langle e,t\rangle,t\rangle$) nodes in the semantic derived tree, ($\gamma'$16). Application of the GC Rule and $\lambda$-conversion to ($\gamma'$16) further reduces it to the logical form in (16a).

To derive the clausal coordination with subject and object shared arguments in (17), elementary tree pairs for *likes* and *takes* consistent with our proposal are provided in Figure 14. ($\beta$likes$_{\{DP_i,DP\}}$) is a coordinating auxiliary tree with an empty DP position for the object and a DP substitution site for the subject, and is paired with a multi-component set in semantics that includes an auxiliary tree recursive on $\langle e,\langle e,t\rangle\rangle$, an $e$ substitution tree for the subject argument variable, and a $t$ auxiliary tree for the scope component of the subject argument. ($\alpha$takes$_{\{DP_i,DP\}}$) is an initial predicative tree with an empty DP position for the subject and a DP substitution site for the object, and is paired with ($\alpha'$takes$_{\{DP_i,DP\}}$), which has $e$ substitution sites for the subject and the object argument variables. Note that the $t$ node of ($\alpha'$takes$_{\{DP_i,DP\}}$) has multiple links, $\boxed{1}$ and $\boxed{2}$, for the scope components of the subject and the object DPs. This indicates that the two scope component trees will multiply-adjoin to the $t$ node, as defined in Schabes and Shieber (1994), and predicts scope ambiguity, as the order in which the two trees adjoin is not specified.

## 5 Conclusion and Future Work

We have outlined a Synchronous TAG analysis of clausal coordination with shared arguments that does not rely on the Conjoin Operation, utilizing only the standard TAG operations, substitution and adjoining. Therefore, we do not require modified parsing algorithms to handle the Conjoin Operation, unrooted trees, or tree nodes with multiple parents as in Sarkar and Joshi (1996). In our analysis, the shared argument is present syntactically only in one conjunct in which it appears on the surface. In semantics, the conjunct with a missing argument is represented as a predicate with an unsaturated argument, and adjoins onto the predicate node that has been $\lambda$-abstracted over by the shared argument. The shared argument, thus, does not participate in movement, ellipsis or multiple-dominance in our analysis, eschewing the incorrect predictions made by these approaches.

It remains as future work to extend our analysis to cases where the shared object argument is in an island, as in (6). The phenomenon where a syntactic constituent at the right periphery of a rightmost clause appears to be shared is generally known as

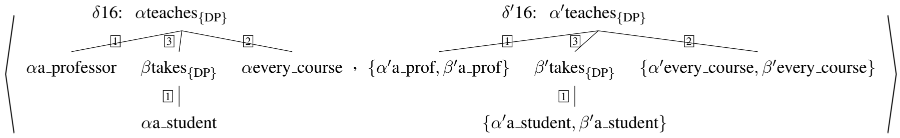

Figure 12: Derivation structures for *A student takes and a professor teaches every course*

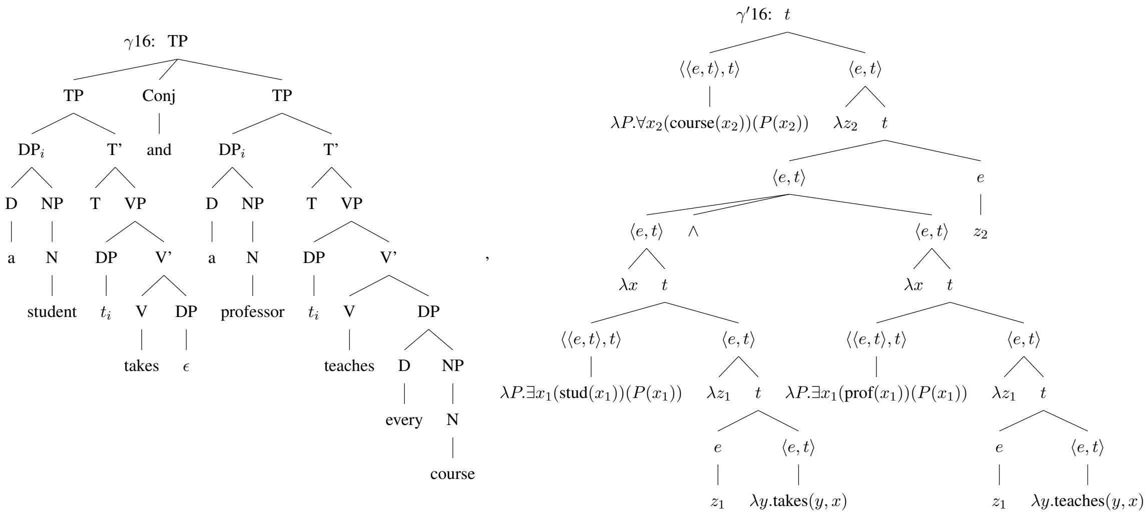

Figure 13: Derived trees for *A student takes and a professor teaches every course*

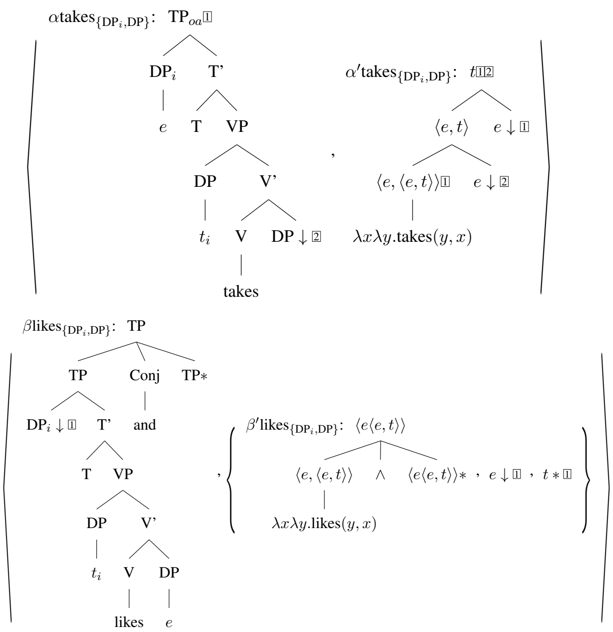

Figure 14: Elementary trees for *A student likes and takes every course*

Right-Node-Raising (RNR). RNR is not restricted to coordination, as can be seen in (18) (Hudson, 1976; Goodall, 1987; Postal, 1994).

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

A question that must be addressed first though is whether all apparent RNR constructions should be given a unified account (Barros and Vicente, 2011). We leave this as future research as well.

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