Out of Control

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1. Introduction

In this paper a theory of theta role assignment at LF is proposed. This theory, along with the independently motivated requirements of movement and feature checking in the Minimalist Program (Chomsky 1993), is used to derive the properties of PRO by allowing the assignment of more than one theta role to long Case-chains which span multiple clauses. In this way, we seek to unify "Control" and "Raising" structures in English. Without PRO, Control Theory can be trivially eliminated. This would be desirable, since the proper formulation of Control Theory has always been a problem. Consider the following sentences with respect to the Minimalist theory of syntax.

(1) a. I believe [the doctor$_1$ to have examined Sam$_2$]
b. I believe [Sam$_2$ to have been examined t_2 by the doctor$_1$]

(2) a. I persuaded the doctor$_1$ [PRO$_1$ to examine Sam$_2$]
b. I persuaded Sam$_2$ [PRO$_2$ to be examined t_2 by the doctor$_1$]

(1a) and (1b) are truth conditionally synonymous, whereas (2a) and (2b) are not. The standard analysis for (1-2) is that in (1) the embedded subject raises to the matrix SpecAgr_OP after Spell-Out to check its Case, whereas in (2) the object is in the matrix clause—PRO is the subject of the embedded clause. PRO has a different controller in (2a) and (2b), accounting for the lack of synonymy. The approach adopted in this paper assumes that there is raising of the embedded subject to SpecAgr_OP in both (1) and (2); instead, we assert that that chain receives a single theta role in (1), and multiple theta roles in (2). The difference in theta assignment between (2a) and (2b) accounts for the lack of synonymy.

In this paper we will make the following assumptions concerning Minimalist syntax, many of which are uncontroversial.

- In this paper, as in Chomsky (1993), I will assume that theta roles are assigned at LF. Therefore, there is no direct way to control where DPs are base-generated, although one may 'rig' the theory to mimic theta assignment at D-structure.
- I assume that there is some ordering of Theta Roles by a "Thematic Hierarchy." The particulars of the Thematic Hierarchy—the nature of the theta role labels and their ordering—are beyond the scope of this paper, although the discussion of these issues by Grimshaw (1990) is influential.
- Also, following Chomsky (1993), I assume that Full Interpretation requires an LF representation to consist of all and only 'legitimate' objects; and moreover, in order to be legitimate, an object must be interpretable; to be interpretable, an argument must be theta-marked.
- Because theta roles are not 'morphological' in any sense, I assume that theta role requirements cannot cause morphologically driven movement. Therefore, a object cannot move solely to get a theta role.
- Finally, for expository clarity the English functional projections Tense and Agr_S are fused into Infl, following Thráinsson (1994). This may be done without any loss of generality, since in English T always moves to Agr_S, and SpecTP is not available as a landing site (Bobaljik and Jonas 1994).

In §2 we outline a theory of theta assignment at LF and some of its implications. In §3 we compare Raising and Control constructions and derive their properties from more elementary principles, and in §4 subject and object Control constructions are considered. We conclude that obligatory Control is unnecessary and hence eliminable.

2. Properties of Theta Theory at LF

In this section we advance a theory of theta assignment at LF, and consider some simple examples of theta assignment. In (3a) we define the Theta Domain, within which a head may assign a theta role. The Theta Domain is identical to the Minimal Domain, as defined in (3b).

(3a) **Theta Domain**
The Theta Domain of a head-chain η (within which η's theta roles are assigned at LF) is η's Minimal Domain, as defined in Chomsky (1993).

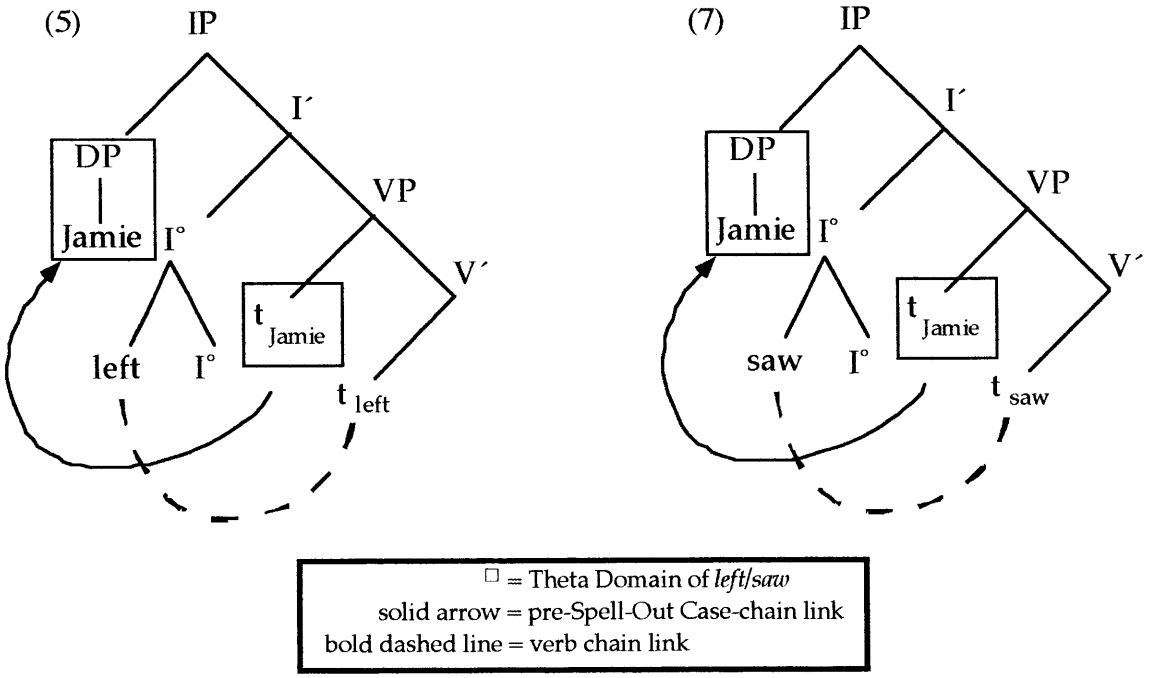
(3b) **Minimal Domain** (from Chomsky 1993)
The Minimal Domain, MD(α), of head-chain α is the set of nodes such that:
(i) each member of MD(α) is dominated by the least full-category maximal projection which dominates every position in α;
(ii) each member of MD(α) is distinct from and does not contain α; and
(iii) no member of MD(α) is dominated by any other member of MD(α).

In (4) we define Visibility so that only Case-chains will be available for theta assignment.

(4) **Visibility** (adapted from Chomsky 1981)
To be visible for theta marking at LF, a legitimate LF object must be assigned Case. Therefore, only Case-chains can be theta-marked.

In (5) we see a simple example of theta role assignment according to the definitions in (3) and (4), the LF structure of the sentence *Jamie left*. The Case-chain {[$_{DP}$ Jamie], t} is shown, as is the chain of the verb *left* from V to Infl. The Theta Domain of left is determined according to (3a); every node in the Theta domain of left in (5) has a square

around it. Clearly, a position in the Case-chain {[$_{DP}$ Jamie], t} is in the Theta Domain of *left* (in fact, both are). Therefore, the verb left can assign its theta role to the Case-chain {[$_{DP}$ Jamie], t}.



However, there is one relic of the Projection Principle which we want to preserve: that a given head can assign only a single theta role to a particular Case-chain. We call this principle Thematic Uniqueness and formally define it in (6).

(6) **Thematic Uniqueness**
For a head η and a Case-chain α, no more than one of the theta roles of η may be assigned to α.

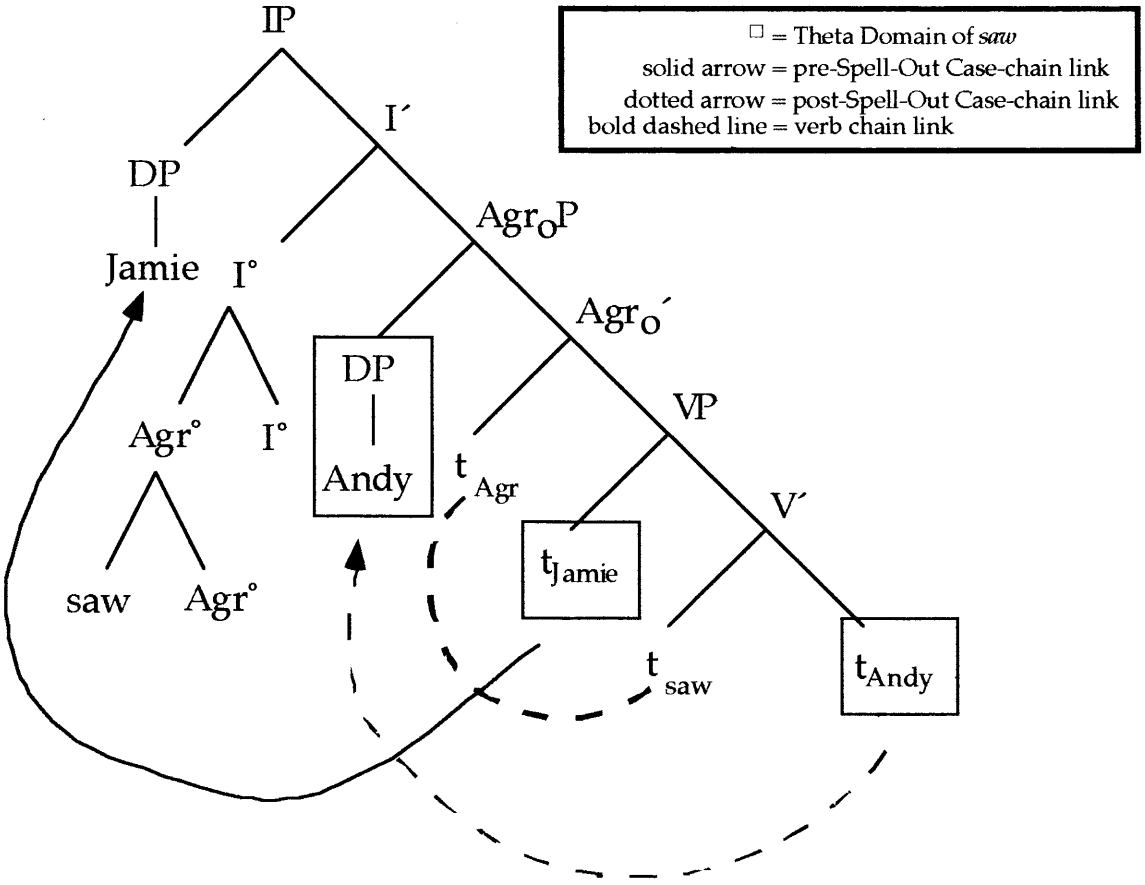
There are two arguments for Thematic Uniqueness: one conceptual and the other empirical. Conceptually, referring to theta roles in a structure *in the absence of unique global labels for theta roles* is minimally complicated if the role label consists of the pair <α, β>, where α is the syntactic head (interpreted as a function) and β is a Case-chain (interpreted as α's argument). In order for <α, β> to uniquely identify the thematic relationship, there can be only one theta role assigned by α to β. Empirically, consider the LF structure in (7) for the sentence *Jamie saw*. Thematic Uniqueness eliminates the possibility that *saw* could assign both its theta roles to the same Case-chain {[$_{DP}$ Jamie], t}, which would allow (7) to be interpreted to mean *Jamie saw herself/himself.* If there is more than one Case-chain and more than one theta role, how do we determine which Case-chain is assigned which theta role? In other words, how do we determine *which* Case-chain gets *which* theta role? The Theta Hierarchy Condition in (8) insures that the two orderings relevant to the assignment of theta roles simply *match up:* the Thematic Hierarchy (ordering theta roles) and the definition of Superordinate in (9), which defines the appropriate ordering among Case-chains. We are virtually guaranteed that, for any two Case-chains passing through the same Theta Domain, one will be Superordinate to the other. Therefore there is no ambiguity about which Case-chain will receive which theta role at LF—taking into account movement both before and after Spell-Out.

(8) **Theta Hierarchy Condition** (THC)
Assume head η assigns theta role <η, α> to Case-chain α, and assigns <η, β> to Case-chain β. Then, <η, α> is higher on the thematic hierarchy (of η) than <η, β> iff α is Superordinate to β.

(9) **Superordinate**
Given two Case-chains α and β, α is Superordinate to β iff some position in α c-commands every position in β.

For example, consider the sentence *Jamie saw Andy*, and its LF structure in (10).

(10)



The Case-chains of {[$_{DP}$ Jamie], t} and {[$_{DP}$ Andy], t} are shown, the former connected with a solid line to indicate that it is formed before Spell-Out., the latter with a dashed line to indicate its formation after Spell-Out. By (9), {[$_{DP}$ Jamie], t} is Superordinate to {[$_{DP}$ Andy], t}. Both Case-chains are in the Theta Domain of the V-chain of *saw*, as shown in (10). Thus the THC requires that {[$_{DP}$ Jamie], t} be assigned the theta role highest in the Thematic Hierarchy of *saw*—the 'agent' role. Consequently, {[$_{DP}$ Andy], t} is assigned the remaining 'patient' theta role, which is lower on the Thematic Hierarchy.

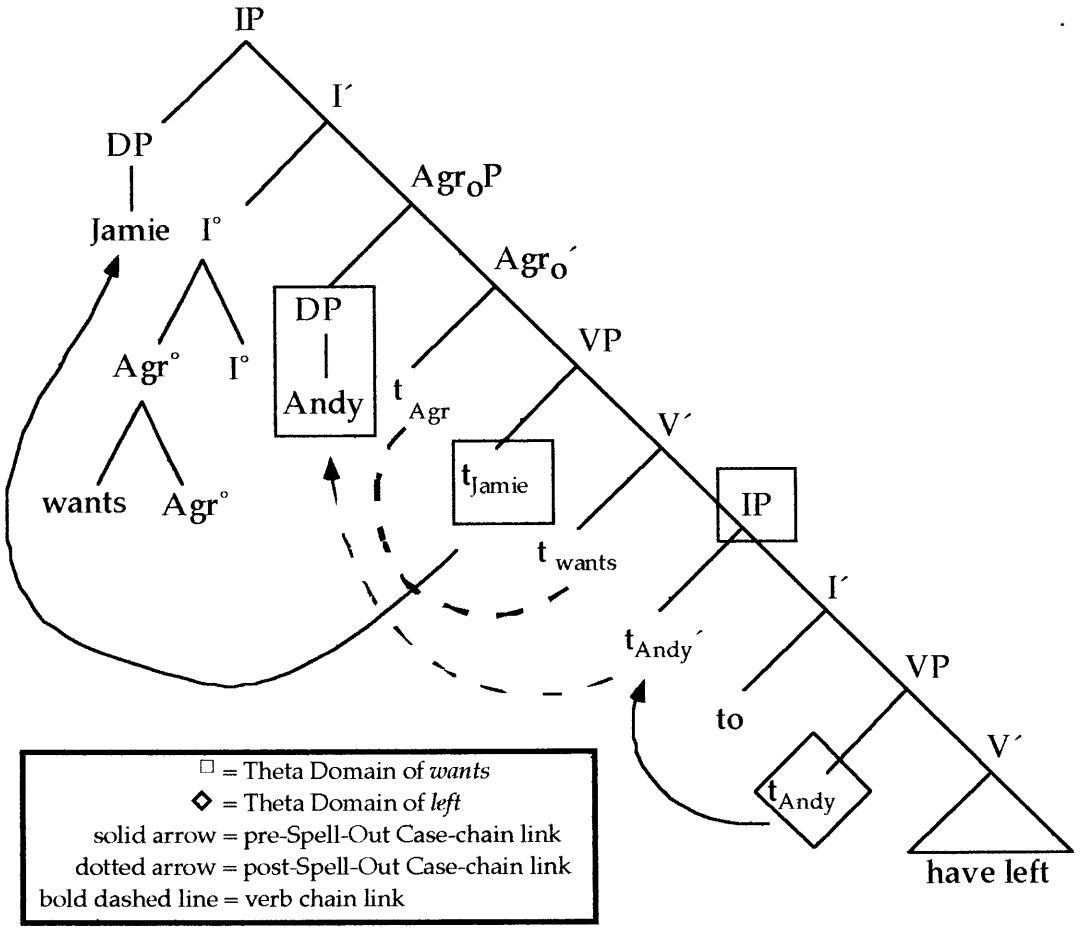
3. Control versus Raising Constructions

In §3 we compare 'Control' and 'Raising' LF structures with respect to the version of Theta Theory presented in §2. We will determine the possible theta assignments for a minimal set of sentences and their LF structures, deriving their

properties using the theory of theta assignment presented here and without making use of PRO. In particular, the sentences to be compared involve *want* with a Raising/ECM object and with a Controlled object, and *believe* with a Raising/ECM object—in addition to the ungrammatical status of *believe* as a Control verb.

First, we consider the sentence *Jamie wants Andy to have left*, along with its LF structure in (11).

(11)

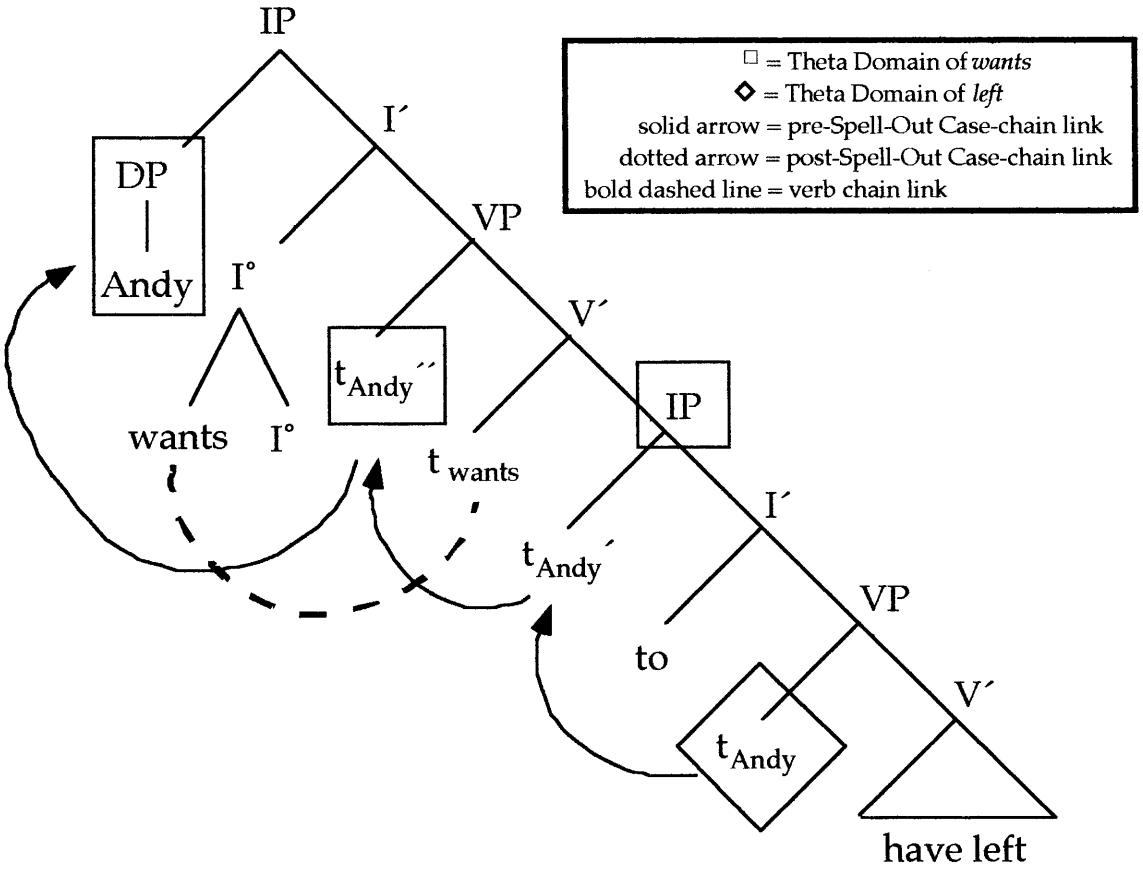


There are two Case-chains in (11): {[$_{DP}$ Jamie], t} and {[$_{DP}$ Andy], t′, t}, and by (9) it is clear that {[$_{DP}$ Jamie], t} is Superordinate to {[$_{DP}$ Andy], t′, t}. However, only the Case-chain {[$_{DP}$ Andy], t′, t} is in the Theta Domain of the verb *left*. Hence, because of the THC {[$_{DP}$ Andy], t′, t} is assigned the sole theta role of *left*. Finally, {[$_{DP}$ Jamie], t} must receive the theta role of *wants*; otherwise it would be assigned no theta role at all and hence be an illegitimate object at LF.[1]

[1]In addition, the THC may redundantly require {[$_{DP}$ Jamie], t} to be assigned the theta role of *wants* because it is Superordinate to {[$_{DP}$ Andy], t′, t}. However, this would be an additional unmotivated stipulation to the power of the THC, and we will not consider it further in this paper.

In (12) we see the LF of the sentence *Andy wants to have left.*

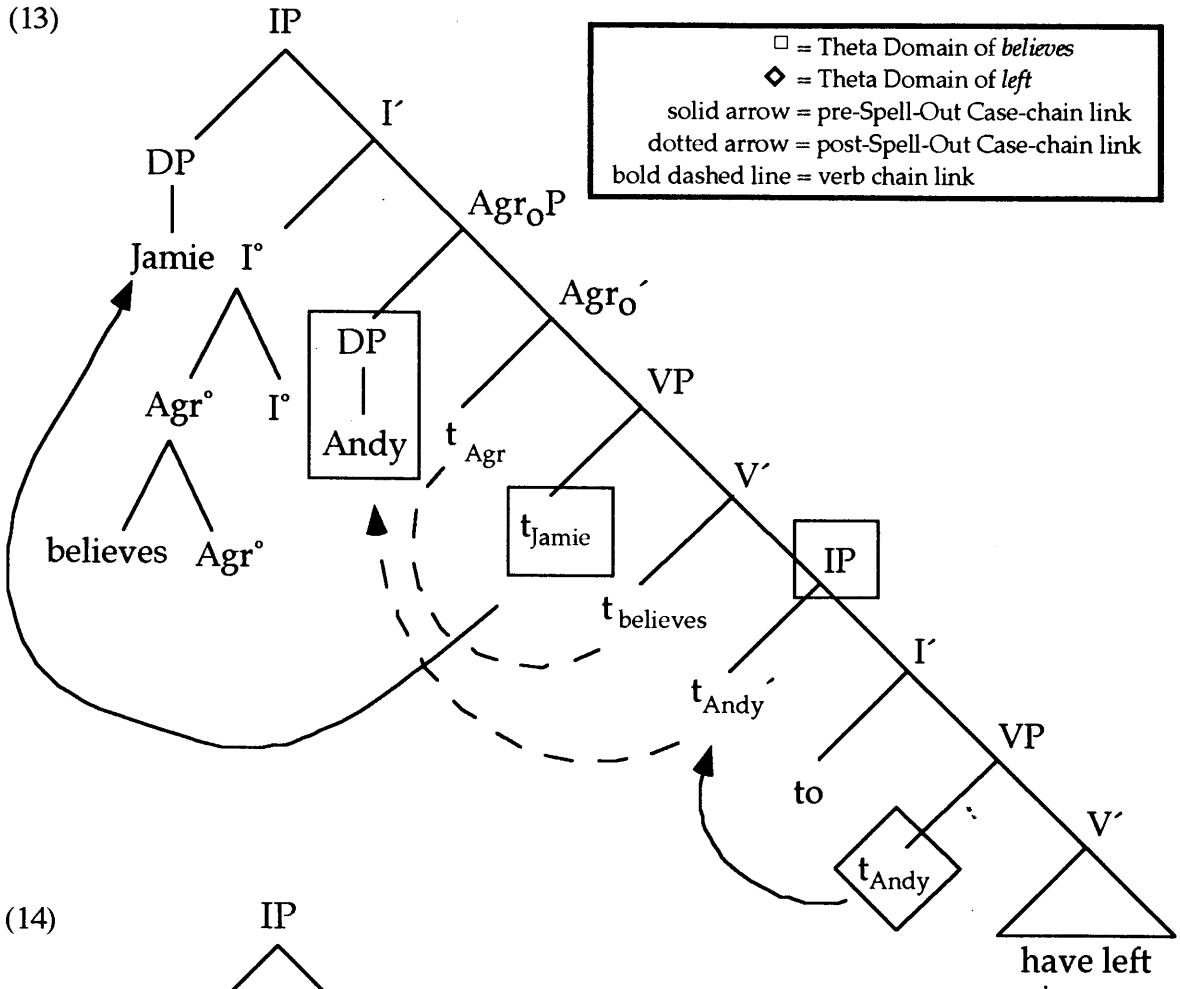
(12)



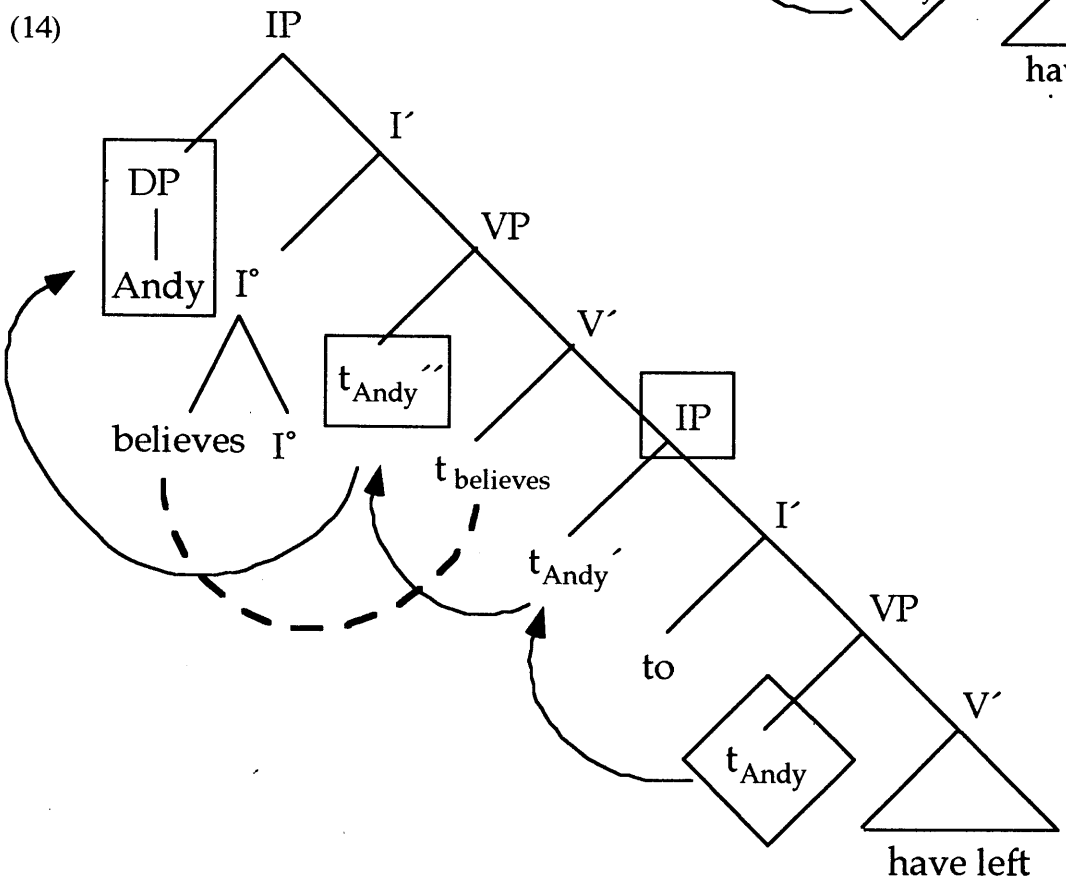
In (12) there is but a single Case-chain, {[$_{DP}$ Andy], t′′, t′, t}, which moves in a successive cyclic fashion from the embedded to the matrix clause in order to be Case-checked. Being a long Case-chain, {[$_{DP}$ Andy], t′′, t′, t} is in the Theta Domain of both *left* —the position t_{Andy} in (12)—and in the Theta Domain of *wants* —both [$_{DP}$ Andy] and t_{Andy}′′ in (12). Therefore, {[$_{DP}$ Andy], t′′, t′, t} is assigned the theta role of *left* as well as the theta role of *wants.* Moreover, note that the only difference between (11) and the LF structure of a Raising-to-Subject construction like *Jamie seems to have left* is that *seems* does not assign a theta role to the Case-chain—otherwise, the two are structurally identical.

Next we consider the sentence *Jamie believes Andy to have left,* and its LF in (13).

(13)


□ = Theta Domain of *believes*
◇ = Theta Domain of *left*
solid arrow = pre-Spell-Out Case-chain link
dotted arrow = post-Spell-Out Case-chain link
bold dashed line = verb chain link
IP
I´
DP
Jamie
Agr$_o$P
I°
Agr$_o$´
DP
Andy
Agr°
I°
VP
t Agr
believes
Agr°
t$_{Jamie}$
V´
IP
t$_{believes}$
I´
t$_{Andy}$´
VP
to
V´
t$_{Andy}$
have left

(14)


IP
I´
DP
Andy
VP
I°
V´
t$_{Andy}$´´
IP
believes
I°
t$_{believes}$
I´
t$_{Andy}$´
VP
to
V´
t$_{Andy}$
have left

At LF in (13) there are two Case-chains, {[$_{DP}$ Jamie], t} and {[$_{DP}$ Andy], t′, t}, and the Case-chain {[$_{DP}$ Jamie], t} is Superordinate to {[$_{DP}$ Andy], t′, t}. In (13) as in (11), the only Case-chain in the Theta Domain of *left* is {[$_{DP}$ Andy], t′, t}, so it is assigned the sole theta role of *left*. Also, as argued in (11), {[$_{DP}$ Jamie], t} must receive the sole theta role of *believes*, because otherwise it would be assigned no theta role at all and hence be an illegitimate object at LF.

Finally we consider the unacceptable sentence **Andy believes to have left* and its LF in (14). As in (12), there is a single Case-chain, {[$_{DP}$ Andy], t′′, t′, t}, which is in the Theta Domain of both *left* —because the node t_{Andy} in (14) is—and in the Theta Domain of *wants* —since both [$_{DP}$ Andy] and t_{Andy}′′ are. Therefore, in analogy to the LF in (12) of the grammatical sentence *Jamie wants to have left*, {[$_{DP}$ Andy], t′′, t′, t} should be assigned the theta role of *left* and the theta role of *wants*; and **Andy believes to have left* is predicted to be a grammatical sentence. However, this is an incorrect prediction. In fact, every verb which enters into Raising but not into Control constructions would face similar problems.

Obviously there is some parametric difference between verbs like *want* and verbs like *believe*, and different theories handle it in different ways, usually by stipulating a feature on the verb. Here, we will add a feature to each theta role, [± composible], and place a condition on theta assignment at LF in (15).

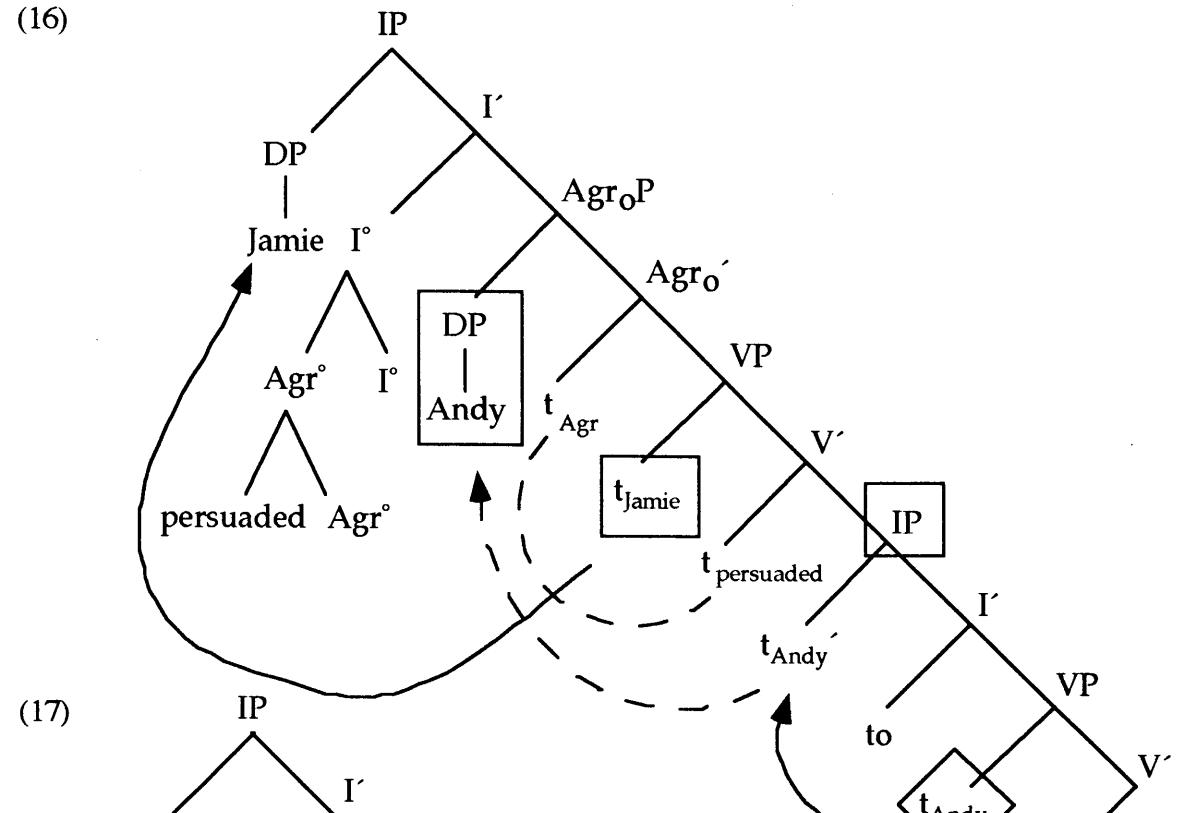
(15) **Theta Composition**
A Case-chain may be assigned *at most one* non-composible theta role.

From this, we can conclude that the theta role of *believe* and of *left* is [– composible], whereas the theta role of *wants* is [+ composible]. With that stipulation, (15) disallows both the theta roles of *believes* and *left* to be assigned to the Case-chain {[$_{DP}$ Andy], t′′, t′, t} in (14), because both theta roles are non-composible; whereas in (12), {[$_{DP}$ Andy], t′′, t′, t} can be assigned theta roles by both *wants* and *left* because only one of them (*left*) is non-composible. Although [± composible] is stipulated for each theta role, unlike earlier *ad hoc* stipulations to account for the same data—such as stipulating that only certain verbs allow S′-deletion—it may be possible to corroborate this stipulation through investigation of the lexical semantics of the verbs.

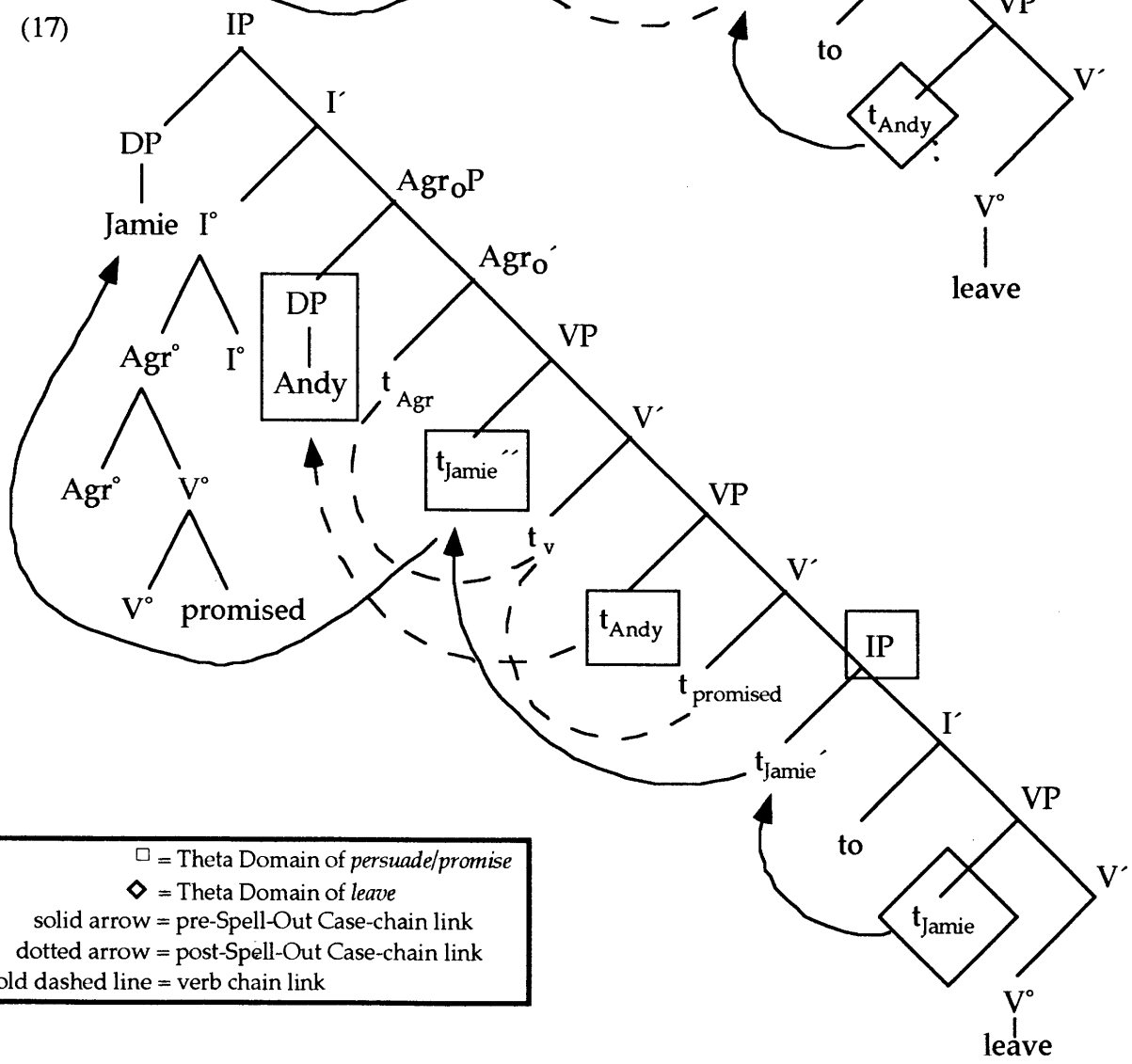
4. Subject Control versus Object Control

In §4 we compare the LF of Subject and Object Control structures, and using the Theta Theory defined in §2 we will derive their thematic properties without making use of PRO. Once again a minimal pair of sentences is contrasted: *Jamie persuaded Andy to leave* and *Jamie promised Andy to leave*, and their LF structures in (16) and (17), respectively. In (16), the LF corresponding to *Jamie persuaded Andy to leave*, there are two Case-chains: {[$_{DP}$ Jamie], t} and {[$_{DP}$ Andy], t′, t}. Only one of them is in the Theta Domain of *left*, so {[$_{DP}$ Andy], t′, t} is assigned the sole theta role of *left*. Both {[$_{DP}$ Jamie], t} and {[$_{DP}$ Andy], t′, t} are in the Theta Domain of *persuade*, and since {[$_{DP}$ Jamie], t} is Superordinate to {[$_{DP}$ Andy], t′, t}, the THC requires that {[$_{DP}$ Jamie], t} be assigned the theta role highest in the Thematic Hierarchy of *persuade*. The remaining 'patient' theta role of *persuade* is assigned to {[$_{DP}$ Andy], t′, t}, in addition to the theta role it already received from *left*.

(16)



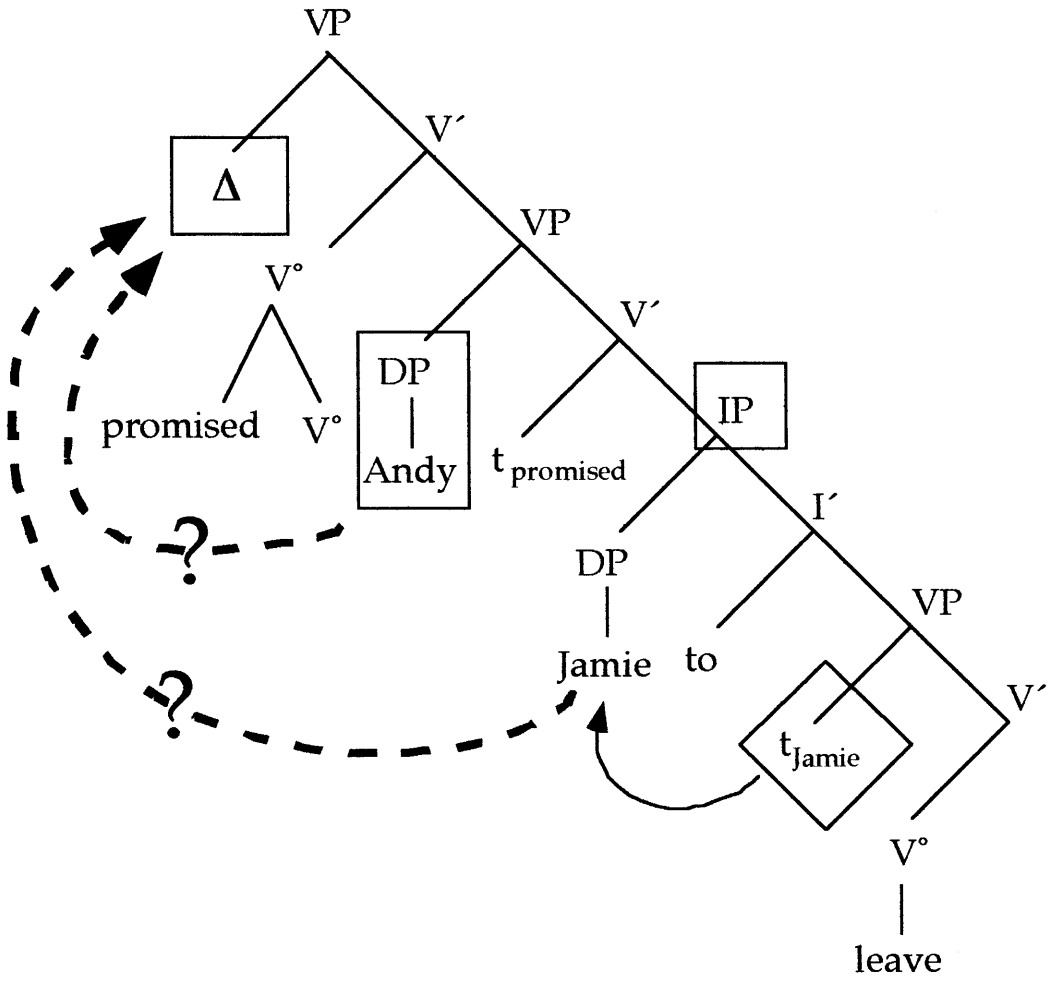
(17)



□ = Theta Domain of *persuade/promise*
◇ = Theta Domain of *leave*
solid arrow = pre-Spell-Out Case-chain link
dotted arrow = post-Spell-Out Case-chain link
bold dashed line = verb chain link

On the other hand, the LF in (17) corresponding to *Jamie promised Andy to leave* contains an additional VP shell structure, based on Larson (1991). Given the definitions of Equidistance and Shortest Move in Chomsky (1993), the extra VP-shell allows the Case-chain {[$_{DP}$ Jamie], t˝, t΄, t} to 'leapfrog' {[$_{DP}$ Andy], t}, as seen in (17΄).

(17΄)



The LF structure in (17) contains two Case-chains: {[$_{DP}$ Jamie], t˝, t΄, t} and {[$_{DP}$ Andy], t}. Since only one of the Case-chains, {[$_{DP}$ Jamie], t˝, t΄, t}, contains a position in the Theta Domain of *left*, it receives the theta role of *left*. In addition, since {[$_{DP}$ Jamie], t˝, t΄, t} is Superordinate to {[$_{DP}$ Andy], t}, the THC requires that {[$_{DP}$ Jamie], t˝, t΄, t} be assigned the theta role highest in the Thematic Hierarchy of *promise*. The remaining theta role of *promise* is assigned to {[$_{DP}$ Andy], t}.

In addition, these theta assignment mechanisms also account for Visser's generalization, that passives of subject control verbs are ungrammatical.

(18) a. Jamie persuaded Andy to leave
b. Andy was persuaded to leave

(19) a. Jamie promised Andy to leave
b. *Andy was promised to leave

If we assume that the patient theta role of *promise* is [– composible], then (19b) is ruled out because the Case-chain of *Andy* is assigned two non-composible theta roles (the other being the theta role of *leave*). That is, (19b) becomes structurally analogous to **Jamie believes to leave*, which as we have seen is predicted to be ungrammatical.

5. Unassigned Theta Roles and Arbitrary PRO

In §3 and §4 we accounted for instances of 'obligatory control'. As for 'optional control', we do not appeal to PRO; rather, we hypothesize that theta roles may remain unassigned under most circumstances. Unassigned theta roles receive a generic interpretation over the set of possible assignees, or an appropriate discourse referent, as outlined in Kamp and Reyle (1993). In addition, O'Neil (1995) discusses in more detail the mechanisms necessary to handle instances of optional control as well as obligatory control.

6. Conclusion

To recap: in this paper we have proposed a theory of theta role assignment at LF. This theory, along with independently motivated requirements of movement and feature checking, is used to derive the properties of PRO—in particular, we can account for Raising and Obligatory Control constructions in English. If PRO is redundant, then Control theory may be trivially eliminated. More work needs to be done, especially work on other English constructions and on other languages; this must be left for future research. However, assuming that the results presented in this paper hold up, then the need for a separate theory of Control has been eliminated, and by reducing a stipulated module of the grammar to independently motivated interface conditions, the results of this paper simplify the grammar.

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