

Movement and Identification of the Empty Subject in Infinitives

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In this paper, we will mainly discuss the identification of the subject of control infinitives, namely, 'PRO.' In addition, we will discuss another empty subject, 'trace' in raising infinitives, compared with 'PRO.' Though these two types of empty subjects have been distinguished from each other since the early days of generative grammar, the mechanism which differentiates them has not been clearly understood. We propose an analysis in which the properties of T, namely, the tense feature and the ϕ -features, are responsible for the difference between control constructions and raising constructions: in the former, the movement of T is involved, which is the most economical derivation, while in the latter, the movement of DP is required in addition to the movement of T. What plays an important role in our analysis is the data of VP-ellipsis. We first show the correlation between the possibility of VP-ellipsis and the interpretation of PRO. Then we argue, based on the licensing condition on ellipsis presented by Lobeck (1995), that PRO is identified by the ϕ -features' specification through T, which is crucially dependent on the movement of the nonfinite T. Second, we show that our analysis correctly predicts that VP-ellipsis fails in infinitival relatives and infinitival interrogatives, which can be accounted for by Subjacency, which, consequently, supports our movement analysis.

***Control *Raising *Empty category *PRO *trace *VP-ellipsis
*Subjacency**

1. Introduction: Infinitives in question

In this paper, we will discuss the empty subject of control infinitives and raising infinitives, namely, 'PRO' and 'trace.' 'Empty' means that the element is phonetically null, i.e., phonetically unexpressed. To begin with,

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observe the infinitives in (1).

- (1) a. John tried [*e* to win the game].
b. John persuaded Mary [*e* to buy a new computer].

The empty category *e* in (1) should be a θ -role bearer: a ‘winner’ in (1a) and a ‘buyer’ in (1b). These phonetically unexpressed arguments which are assumed in the infinitival clauses are called ‘PRO.’⁽¹⁾ We can also confirm the existence of PRO by using a reflexive as in (2).

- (2) John_{*i*} tried [PRO_{*i*} to behave himself_{*i*}].

The subscripts indicate coreference. Since a reflexive requires its antecedent within a clause, we maintain that *himself* in (2) corefers to its clause-mate, PRO, whose reference is dependent on the matrix subject *John*. The relation of PRO and its antecedent is called ‘control.’

Now return to the examples in (1). We observe that the phonetically unexpressed argument indicated by *e*, which we call PRO, is understood to have the same referent as the element in the matrix clause: *John* in (1a) and *Mary* in (1b). This is represented in (3).

- (3) a. John_{*i*} tried [PRO_{*i*} to win the game].
b. John_{*i*} persuaded Mary_{*j*} [PRO*_{*i/j*} to buy a new computer].

PRO is controlled by the subject of the matrix clause in (3a), while it is controlled by the object of the matrix clause in (3b). We call the former case ‘subject control,’ and the latter case ‘object control.’ In these cases, PRO cannot refer to an element other than the subject or the object in the matrix clause as shown in (4).

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- (4) a. John_i tried [PRO_i to behave himself_i/*oneself_j].
 b. John_i persuaded Mary_j [PRO_j to behave herself_j/*oneself_k].

PRO must be controlled by *John* in (4a), and by *Mary* in (4b). Accordingly, PRO can be the antecedent of *himself* in (4a) and *herself* in (4b), but cannot be the antecedent of *oneself*. These cases are called ‘obligatory control’ (henceforth OC), which obtains when PRO appears in a complement infinitive. On the other hand, PRO is not obligatorily controlled in (5).

- (5) a. [PRO to kill civilians] is wrong.
 b. [PRO_i to behave oneself_i] would be necessary.

In (5), PRO is understood as a generic person. As a result, PRO may be the antecedent of *oneself* as shown in (5b). It is also possible for PRO of this type to refer to an arbitrary person depending on the context. These cases are called ‘non-obligatory control’ (henceforth NOC), which obtains, for instance, when PRO appears in a subject clause.

Let us turn to ‘trace’ in raising constructions. Observe the sentences in (6), which appear to be similar to control constructions. They also phonetically lack the subjects of the infinitival clauses, which are understood as *John* in (6a), and *Mary* in (6b).

- (6) a. John_i seems [*e*_i to be sick].
 b. Mary_i is likely [*e*_i to be in the garden].

However, in (6), the empty category indicated by *e* cannot be PRO, for *e* is not a θ -role bearer. The predicates such as *seem* and *be likely* belong to the category of one-place predicates, which take a proposition, Theme, as its only argument. Accordingly, the Theme argument of *seem* in (6a) is not *John*, nor *e*, but *John to be sick*. Similarly, in (6b), what ‘*is likely*’ is not

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Mary but *Mary* to be in the garden. Therefore, it is natural to consider that the subjects *John* and *Mary* in the sentences in (6) raise from the subject positions of the infinitival clauses to those of the matrix clauses, as illustrated in (7).

(7) a. John_i seems [*t_i* to be sick].



b. Mary_i is likely [*t_i* to be in the garden].



The arrows represent movement. The empty category which is indicated by *e* in (6) is now considered to be a ‘trace’ of the movement, which is indicated by *t* in (7). The constructions represented by (7) are called raising constructions. There is another type of raising construction, which is exemplified by (8).

(8) John believes Mary/her to be healthy.

Just as with predicates *seem* and *be likely*, the verb *believe* is considered to take a proposition as its Theme argument. However, *Mary* in (8) is assigned accusative Case as confirmed by the pronoun *her*. This leads us to assume that *Mary* raises to the position in the matrix where it can be assigned accusative Case.⁽²⁾ We call this type of raising construction ‘raising-to-object,’ while the type represented by (6) is called ‘raising-to-subject.’

We have briefly discussed the distinction between PRO in control infinitives and the trace in raising infinitives. The data are summarized in (9).

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(9) Infinitives in question

A. Control infinitives

- PRO in a complement clause: *anaphoric*

- (a) John_i tried [PRO_i to win].
 (b) John_i persuaded Mary_j [PRO_j to leave].
- } Obligatory Control (OC)
 specific reading (the antecedent is necessary)

- PRO in a subject clause: *pronominal*

- (c) [PRO_{arb} to kill civilians] is wrong.
- } Non-Obligatory Control (NOC)
 generic/arbitrary (contextually-determined) reading

B. Raising infinitives

- (d) Bill_i seemed [_{t_i} to be healthy].
 (e) John_i believed Mary_j [_{t_j} to be honest].

Now, two issues should be addressed: the interpretation and the distribution of these empty categories, PRO and trace. Why is PRO obligatorily controlled in some configurations, while arbitrarily interpreted in other configurations? Why does PRO appear in ‘control’ infinitives, while the trace appear in ‘raising’ infinitives? In other words, what is the syntactic difference between the control construction and the raising construction? We try to solve these issues in the following sections.

2. VP-ellipsis

2.1. Puzzling data

One of the keys to consider the mechanism which underlies infinitives is the possibility of VP-ellipsis. Let us observe the facts. The phenomenon called ‘VP-ellipsis’ is exemplified by the sentences in (10).

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● *VP-ellipsis in tensed clauses*

- (10) a. Dennis rarely [_{VP} plays the piano], but Susan often does [_{VP} e].
b. Because she shouldn't [_{VP} e], Mary doesn't [_{VP} smoke].

(Lobeck 1991: 88)

The VPs *plays the piano* in (10a), and *smoke* in (10b) are elided, which are indicated by [_{VP} e]. As shown by the data in (10), VP-ellipsis is possible in tensed clauses. Next, consider VP-ellipsis in infinitival clauses. As Saito and Murasugi (1990), Lobeck (1991, 1995), and Martin (2001) observe, VP-ellipsis is also possible in control infinitives.

● *VP-ellipsis is also possible in OC infinitives*

- (11) a. Mary wants me to [_{VP} go to college], but I_i don't want PRO_i to [_{VP} e].

(Saito and Murasugi 1990: 299)

- b. Kim isn't sure she can [_{VP} solve the problem], but she_i will try PRO_i to [_{VP} e].

(Martin 2001: 154)

Although VP-ellipsis is possible in OC as shown in (11), it is impossible in NOC.

● *VP-ellipsis is impossible in NOC infinitives*

- (12) a. *Mary doesn't [_{VP} smoke] because to [_{VP} e] is dangerous.

(Lobeck 1991: 88)

- b. *Because PRO to [_{VP} e] would be impractical, Mary won't [_{VP} go to the conference] this year.

(Lobeck *ibid.*: 83)

In addition, VP-ellipsis is not allowed in raising infinitives either.

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- *VP-ellipsis fails in raising infinitives*

- (13) a. *John was said to [_{VP} be sick], but he didn't seem to [_{VP} e].
 b. *I consider Pam to [_{VP} like soccer], and I believe Rebecca to [_{VP} e] as well.

(Martin *ibid.*: 154)

In sum, VP-ellipsis is possible in tensed clauses and OC infinitives, but impossible in NOC infinitives and raising infinitives. Then, what is responsible for these differences? We believe that solving this question sheds light on the underlying mechanism which differentiates tensed clauses, control infinitives, and raising infinitives. In order to solve the question, let us examine the licensing condition on ellipsis in general.

2.2. The licensing condition on ellipsis

In the previous research (Cf. Fukui and Speas 1986, Lobeck 1991, 1995, and Saito and Murasugi 1990), the licensing condition on ellipsis, in terms of syntax, is generalized as (14).

- (14) A functional head can license ellipsis of its complement only when the head undergoes Spec-Head agreement of the relevant features.

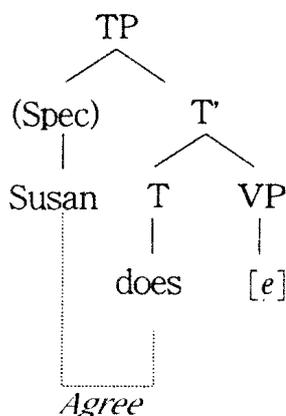
This generalization can be applied not only to VP-ellipsis but also to the phenomena called NP-ellipsis and sluicing. The example of VP-ellipsis (10a) is repeated below as (15a). NP-ellipsis is exemplified by (15b), in which the NP *friends* is elided; sluicing is exemplified by (15c), in which the TP *Sue asked Bill to leave* is elided.

- (15) a. Dennis rarely [_{VP} plays the piano], but Susan often does [_{VP} e].
 b. Although John's [_{NP} friends] were late for the rally, Mary's [_{NP} e] came on time.
 c. [_{TP} Sue asked Bill to leave], but why [_{TP} e] remains a mystery.

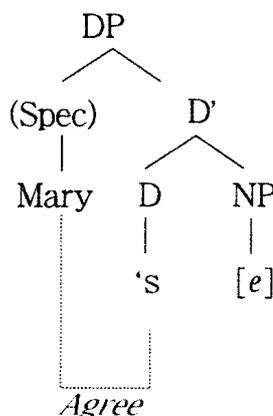
(Lobeck 1991:81, 86, 88 with modification)

The elliptical data above can be accounted for by the generalization (14), which is illustrated in (16). The structures (16a-c) represent the relevant part of (15a-c) respectively.

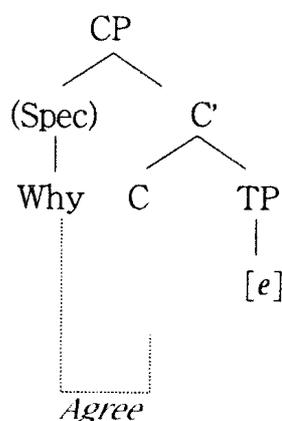
(16) a. VP-ellipsis



b. NP-ellipsis



c. Sluicing



We return to VP-ellipsis, which is of interest here. First, we consider VP-ellipsis in tensed clauses, which we have observed in (10), repeated here as (17) with the relevant representation.

(17) a. Dennis rarely [_{VP} plays the piano], but [_{TP} Susan often [_T does [_{VP} e]]].

b. Because [_{TP} she [_T shouldn't [_{VP} e]]], Mary doesn't [_{VP} smoke].

Following the licensing condition (14), we take the grammaticality in (17) to mean that the tensed T, realized by the auxiliaries *does* and *should*, enters into an Agree relation with its Spec and checks the relevant features, which licenses the ellipsis of the complement VP.

We turn to VP-ellipsis in control infinitives. As we have mentioned, VP-ellipsis is also possible in OC infinitives. We repeat examples (11) as

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(18) below.

(18) a. Mary wants me to [VP go to college], but I_i don't want [TP PRO_i [T to [VP e]]].

(Saito and Murasugi 1990: 299)

b. Kim isn't sure she can [VP solve the problem], but she_i will try [TP PRO_i [T to [VP e]]].

(Martin 2001: 154)

These grammatical data suggest that the agreement of some features takes place between PRO in [Spec, TP] and the head T in control infinitives analogously to the finite clauses in (17). Interestingly, VP-ellipsis is impossible in raising infinitives as shown in (19): (19a) is a raising-to-subject construction, and (19b) a raising-to-object construction.

(19) a. *John was said to [VP be sick], but he_i didn't seem *t_i* [T to [VP e]].

b. *I consider Pam to [VP like soccer], and I believe Rebecca [T to [VP e]] as well.

(Martin *ibid.*: 154)

Based on these facts, we consider that the properties of T in control infinitives are different from those in raising infinitives: the former license VP-ellipsis while the latter do not. In order to explain this difference, Martin (2001) argues that what licenses VP-ellipsis in control infinitives is the agreement of the null-Case feature; only the nonfinite T of control infinitives bears the null-Case feature and enters into a null-Case-checking relation with its specifier, PRO. However, his analysis runs into a problem, once control infinitives in non-complement positions are taken into consideration. VP-ellipsis is possible if a control infinitive is in the complement position as shown in (18), but impossible if in the subject position as shown in (20).

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(20) a. *Mary_i doesn't [_{VP} smoke] because [_{TP} PRO_i [_T to [_{VP} e]]] is dangerous.
 (Lobeck 1991: 88)

b. *Because [_{TP} PRO_i [_T to [_{VP} e]]] would be impractical, Mary_i won't
 [_{VP} go to the conference] this year.
 (Lobeck *ibid.*: 83)

According to the null-Case analysis, the null-Case features of PRO and T should agree in the sentences in both of (18) and (20) in the same fashion. Thus, it fails to predict the ungrammaticality of (20).

Rather than appealing to null-Case checking, which makes control infinitives and PRO special, we try to give a unified account for the Spec-Head agreement system in finite and nonfinite clauses. Based on the generalization (14), we assume that what licenses VP-ellipsis is the agreement of the ϕ -features between the head T and its Spec. Accordingly, the ϕ -features' agreement should take place in tensed clauses and control infinitives, in which VP-ellipsis is licensed, whereas the ϕ -features' agreement fails for some reason in NOC infinitives and raising infinitives. We will propose an analysis which explains these differences. Before proposing our analysis in Section 4, we briefly review previous research in the next section.

3. Previous analyses

In this Section, we briefly review the previous analyses: Borer (1989), Martin (2001), and Hornstein (1999). We would like to show what properties of infinitives they try to capture, and make clear what points of their proposals we will follow. At the same time, we will point out some unsolved problems, for which we would like to give explanations in the following sections.

3.1. Anaphoric Agr⁽³⁾: Borer (1989)

Borer (1989) tries to capture the anaphoric nature of PRO, arguing that what

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is anaphoric is not PRO itself but Agr.⁽⁴⁾ What she means by ‘anaphoric’ is that Agr lacks inherent reference, so that it is referentially dependent. She gives a natural account for a question why PRO is restricted to the subject position by reducing control effects to the relation between Agr and its subject. Borer further assumes that Infl moves to Comp by a familiar operation of head movement, and consequently a subordinate Comp is bound by a superordinate Infl.

There remain a few problems, however. First, Borer assumes that raising constructions are different from control constructions in that their Infl is ‘degenerate.’ Her intuition behind this statement seems to be on the right track, but it is not clear what ‘degenerate’ means. Second, Borer’s system cannot explain why PRO is construed as generic when it appears in a clausal subject such as *PRO to kill animals is wrong*, though she suggests a solution using the generic operator.

We would like to follow Borer’s intuition that nonfinite Infl seeks for a dependent element. However, we will propose a system which can explain the difference between control constructions and raising constructions more clearly. In addition, we would like to show how a generic reading of PRO obtains.

3.2. Tense properties as a clue: Martin (2001)

Martin (2001) captures the difference between control infinitives and raising infinitives, which Borer tries to express by means of ‘degenerate Infl.’ As mentioned, PRO is assumed not to appear in raising infinitives. Martin claims that the distribution of PRO can be accounted for by null Case, and that the possibility of null Case is attributed to tense properties of clauses. Consider the tense interpretation of the following sentences: the sentences in (21) contain control infinitives and those in (22) raising infinitives.

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- (21) a. Jenny remembered [PRO to bring the wine].
 b. Jim tried [PRO to lock the door]. (Stowell 1982: 563)
- (22) a. John appeared [*e* to like poker]. (Stowell *ibid.*: 567)
 b. Zagallo believed [Ronaldo to be the best]. (Martin 2001: 147)

Following Stowell, Martin observes that there is a ‘temporal ordering’ between the matrix clause and the infinitival clause in the control constructions in (21). In Stowell’s (1982) words, the time frame of the infinitival clauses is ‘unrealized future.’ For example, in (21a), *Jenny* had not yet brought the wine at the point she remembered she had to bring the wine. In (21b), *Jim* had not yet succeeded in locking the door at the point he tried to do so. In contrast, the tense interpretation of the raising infinitive is ‘identical to’ or ‘simultaneous with’ that of the matrix. For example, in (22a), it appeared that *Bill* liked poker at/during some past time. In (22b), *Zagallo* believed that *Ronaldo* was the best at/during some past time.

Based on these observations, Martin assumes that T in control infinitives has [+ tense, – finite] features, while that in raising infinitives has [– tense, – finite] features. He further assumes that the former checks null Case, while the latter does not check Case. In other words, there are two types of *to*’s in so-called *to*-infinitives, which bring about the difference between control infinitives and raising infinitives.

To conclude, the difference in tense properties between control infinitives and raising infinitives seems valid. However, Martin’s (2001) analysis still fails to explain some facts. First, Martin posits that the control infinitive has *independent* tense like future. However, when we consider the interpretation of tense in the more general framework, the tense of the subordinate clause cannot be understood without *depending* on the tense in the matrix clause. This fact should be reflected. Second,

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null Case theory has nothing to say about the interpretation of PRO; another mechanism is required for it. We believe that these two points can be folded in one theory. That is, tense properties would be crucial not only to the distribution of PRO but also to the interpretation of it.

3.3. Movement analysis: Hornstein (1999)

Hornstein (1999) is another work which tries to capture PRO's anaphoric properties. However, Hornstein's analysis is quite different from Borer's in that he reduces the anaphoric properties of PRO to those of an NP-trace; he claims that PRO is a trace of A-movement.⁽⁵⁾ According to Hornstein, the derivation of a control construction illustrated in (23b) is replaced by (23c).

- (23) a. John tries to win.
 b. John_i tries [PRO_i to win].
 c. John_i tries [*t*_i to win].
- 
- Move*

Important assumptions he adopts in his theory are the following.

- (24) a. θ -roles are features on verbs.
 b. A D/NP 'receives' a θ -role by checking a θ -feature of a verbal/predicative phrase that it merges with.
 c. There is no upper bound on the number of θ -roles a chain can have.
 (Hornstein 1999: 78)

These assumptions allow a D/NP to move from the subject position of an infinitival clause to that of the matrix clause in order to check a θ -feature in addition to a Case feature. Note that the assumptions in (24) become viable in the Minimalist framework, in which D-structure is withdrawn

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and the principles such as the θ -criterion and the Projection Principle would not hold any longer; the Projection Principle and the θ -criterion require one-to-one correspondence between an argument and a θ -role at any level of the derivation.

One of the important consequences of Hornstein's movement theory is the integration of raising and control, which have been strictly distinguished since the early stages of generative grammar. Hornstein claims that these constructions should be treated as the result of the same operation, namely, A-movement. However, treating control and raising in the same way does not seem to be empirically supported. In the previous sections, we have observed the difference between control infinitives and raising infinitives in the semantic interpretation as well as in the syntactic behavior, which seems to be caused by the different tense properties/features. First, the tense of the control infinitive is generally understood as unrealized future, so that a temporal order is observed with respect to the matrix tense. On the other hand, the tense of the raising infinitive is understood as simultaneous with the matrix tense. Second, VP-ellipsis is possible in control infinitives while impossible in raising infinitives as we have seen in Section 2.

Although the movement analysis cannot deal with problems related to T as above, Hornstein shows the possibility of connecting a superordinate clause and a subordinate clause by a chain formed by the movement of some element. The interpretation of PRO is determined through the chain. If this is successful, then we could give a unified explanation for both of the distribution and the interpretation of PRO and trace. In this sense, Hornstein's attempt is innovative and worthy of being taken into consideration when we develop our analysis in the Minimalist framework.

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3.4. Summary

We have examined three approaches to control and raising phenomena. In Borer's study, we have seen that PRO's identification is determined through the feature binding of AGR. We have also seen, as Martin points out, that tense properties play an important role in designating the type of infinitives, namely, control and raising. Finally, we have reviewed Hornstein's study, in which the possibility of accounting for the control phenomenon by the movement of some element over two clauses is suggested.

4. A proposal**4.1. The Minimalist framework**

Before proposing an analysis, we briefly illustrate the Minimalist framework, which is assumed as the theoretical background. In the Minimalist framework, the behavior of a syntactic object is explained by the features which it bears. One of the most important feature differentiations is the 'interpretable'/'uninterpretable' distinction. Interpretable features are considered to be legible at interface levels with other cognitive systems such as the conceptual-intentional system, while uninterpretable features are not. Thus, interpretable features must remain throughout the derivation, whereas uninterpretable ones must be deleted before reaching interface levels. If uninterpretable features remain without being deleted, the derivation 'clashes' and is to be ruled out. If all the uninterpretable features are deleted in the way which satisfies economy conditions, the derivation 'converges' and the grammatical sentence is generated.

Under the feature checking theory, syntactic operations are supposed to be induced by features. The operations which are relevant to our discussion are 'Agree' and 'Move' in Chomsky's (2000) terms. The operation Agree means the agreement of features, which leads to the

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deletion of uninterpretable features. The operation Move is a subcase of Agree: the relevant features Agree and then Move takes place.⁽⁶⁾

Now, let us see the standard feature contents. First, a general DP is assumed to have a set of ϕ -features, namely, [person, number, gender]. On the other hand, functional heads T and v, which enter into the checking relation with DP, are assumed to have the counterparts of DP's ϕ -features. The ϕ -features on DP are assumed to be interpretable, while those on T and v are assumed to be uninterpretable. Structural Case on DP is assumed to be licensed as a reflection of ϕ -feature checking, following Chomsky (2000). Generally, the finite T is assumed to license nominative Case, whereas the light verb v licenses accusative Case. Second, the tense feature is assumed on T. It is natural to consider that the tense feature is involved in LF, hence it should be [+ interpretable].

As for the conceptual background, we will follow Chomsky (2000), which argues that uninterpretable features are initially unvalued and that they receive specific values through Agree.

4.2. An analysis

Now we propose our analysis. Recall that we have reviewed three approaches in Section 3: Borer (1989), Martin (2001), and Hornstein (1999). We have come to the conclusion that the nature of the Agr(eement) and properties of T(ense) are both important to determine the interpretation and the distribution of PRO and trace. Adopting the Minimalist framework, we reduce properties of Agr and T to the ϕ -features and tense features as in (25).

- (25) a. PRO is identified by the ϕ -features' specification through T, following Borer's insight. In addition, we assume that PRO inherently has the default ϕ -features, whose values are underspecified.⁽⁷⁾ This means that PRO can enter into an Agree

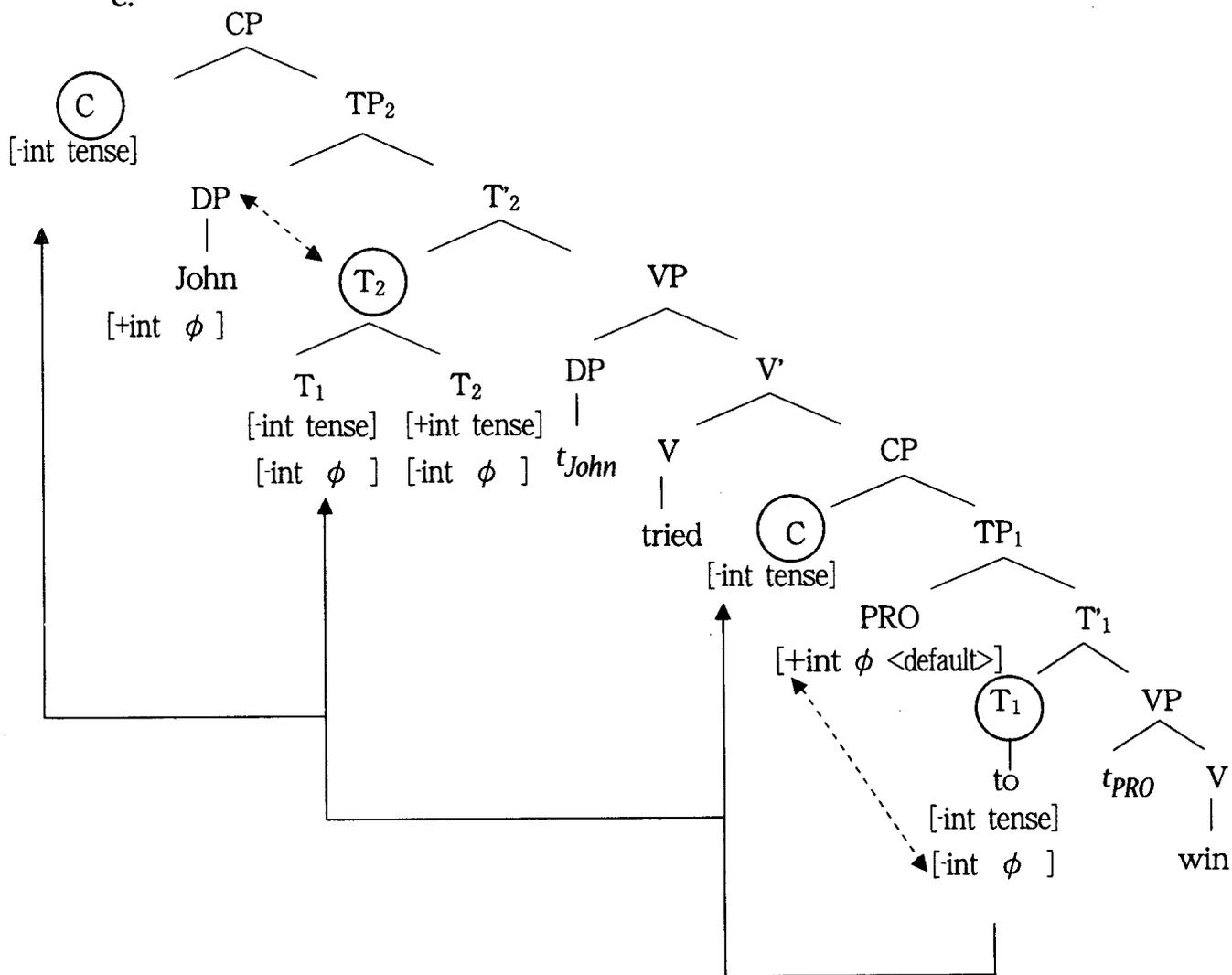
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relation with T.

- b. The tense feature of the nonfinite T is [-interpretable], while that of the finite T is [+interpretable]. This is based on the fact that the tense in infinitives cannot be construed independently, but the tense in finite clauses can.

We propose structure (26c) for the OC construction.

- (26) a. John tried to win.
- b. John_i tried [CP PRO_i to win].
- c.



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In (26c), we omit vP, which is not relevant here. Operation Move is indicated by solid lines, while Agree is indicated by dotted lines. Let us see the derivation step by step. First, PRO in the lowest VP moves to [Spec, TP₁] and enters into an Agree relation with T₁. However, as we have assumed in (25a), PRO's ϕ -features are default. We assume that the default ϕ -features are not enough to delete the uninterpretable ϕ -features on T immediately. Second, T₁ moves to T₂, stopping over C.⁽⁸⁾ The uninterpretable tense feature on T₁ receives the value from the interpretable tense feature on T₂ and deleted. The uninterpretable ϕ -features on T₁ and T₂ enter into an Agree relation with those of DP *John* through Spec-Head agreement. Here the uninterpretable ϕ -features on T₁ are given the same values as DP *John*, and these values are transmitted to PRO through the chain formed by the movement of T₁. Consequently, the values of PRO's ϕ -features are specified and the interpretation of PRO is designated to be *John*. Finally, T₂ moves to the finite C to check the uninterpretable tense feature of C, where the temporal interpretation of the sentence is completed,⁽⁹⁾ since the finite C denotes the speech time (Cf. Enç 1987).

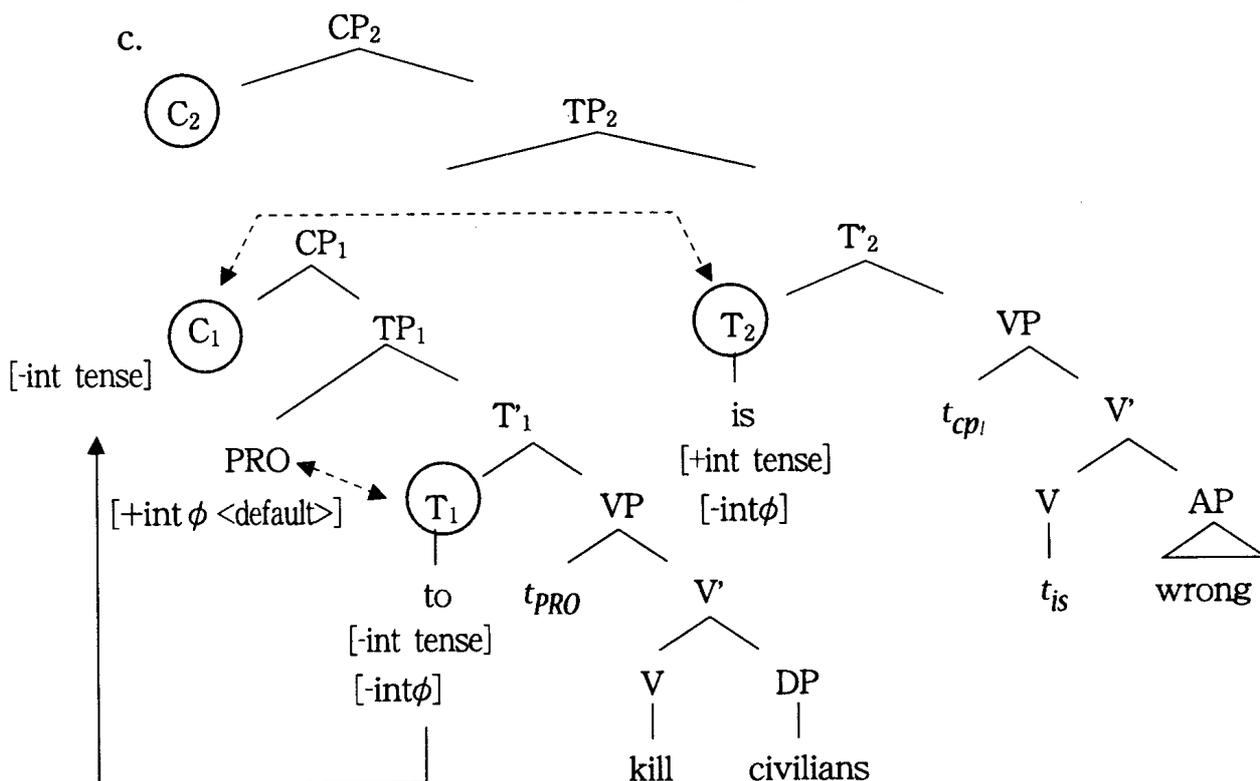
The present analysis has implications for the movement of PRO. One might wonder why it is T₁ but not PRO that moves. The answer is because the movement of T₁ is more economical than the movement of PRO. Even if PRO moves, T₁ also has to move for an independent reason: it must have its tense feature checked. However, if T₁ moves, PRO does not need to move since the ϕ -features of T₁ get a free ride on the tense feature. Consequently, the values of the ϕ -features received by T₁ are transmitted to PRO. Once PRO moves to [Spec, TP₁] and enters into the Agree relation with T₁, all that PRO needs, namely, the values of the ϕ -features, are given automatically through the chain formed by the movement of the head T₁.

We can explain how a generic/arbitrary reading of PRO obtains in

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NOC configurations using the same system which we have proposed in (25) and (26). Our analysis is presented in (27).

- (27) a. To kill civilians is wrong.
- b. [_{CP} PRO to kill civilians] is wrong.



Although the ϕ -features of T_1 agree with those of PRO and move to C_1 , then agree with T_2 , the ϕ -features cannot be specified because there is no DP that has the values of the ϕ -features. Accordingly, the ϕ -features of PRO remain default and PRO is interpreted depending on the context. Our argument so far is summarized in (28).

(28)

	PRO in complement clauses (26)	PRO in subject clauses (27)
ϕ -features of PRO	specified by Agree with T	underspecified
Interpretation of PRO	OC/ <i>anaphoric</i> (antecedent in the matrix)	NOC/ <i>pronominal</i> (arbitrary or generic)

Now the (im)possibility of VP-ellipsis in (N)OC constructions naturally follows. Recall that VP-ellipsis is possible in OC infinitives as well as in tensed clauses, but impossible in NOC infinitives.

● *VP-ellipsis is possible in tensed clauses*

(29) (= (17a)) Dennis rarely [_{VP} plays the piano], but [_{TP} Susan often [_T does [_{VP} e]]].

● *VP-ellipsis is also possible in OC infinitives*

(30) (= (18a)) Mary wants me to [_{VP} go to college], but I_i don't want [_{TP} PRO_i [_T to [_{VP} e]]].

● *VP-ellipsis is impossible in NOC infinitives*

(31) (= (20a)) *Mary_i doesn't [_{VP} smoke] because [_{TP} PRO_i [_T to [_{VP} e]]] is dangerous.

We have argued that OC obtains when the ϕ -features of PRO are specified by Agree with T as shown in (26), whereas NOC (generic/arbitrary readings) obtains when the ϕ -features of PRO are underspecified as shown in (27). Then, we speculate that VP-ellipsis is possible only if the ϕ -features of PRO are specified through Agree, which is crucially dependent on the movement of the nonfinite T. Although this may sound somewhat unusual, recall the general condition on VP-ellipsis.

(32) (= (14)) A functional head can license ellipsis of its complement only when the head undergoes Spec-Head agreement of the relevant features.

This condition applies to the head T and its Spec in infinitival clauses as well as in finite clauses, but its implement is just extended to the Agree in the matrix T and its Spec.

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Our system gives a unified account for VP-ellipsis in raising infinitives. Remember that VP-ellipsis is not permitted in raising constructions as shown in (33).

(33) (= (13a)) *John was said to [_{VP} be sick], but he didn't seem to [_{VP} e].

The ungrammaticality in (33) suggests that the nonfinite T in raising infinitives does not bear the relevant agreement features, namely, the ϕ -features. Given that T in raising infinitives does not have the ϕ -features, it naturally follows that the subject DP in an infinitive has to raise by itself to the Spec of the finite T to check its ϕ -features.

A support for the movement of the nonfinite T comes from the correlation between the existence of Comp and the temporal interpretation. Generally, raising infinitives are assumed to lack the category Comp in terms of ECP (Cf. Stowell (1982)). Consequently, in raising constructions, the nonfinite T has to move directly to the finite T without anchoring to Comp. This leads to the fact, which we have argued in Section 3.2, that the tense in the raising infinitive is interpreted as simultaneous with respect to the matrix tense and the temporal ordering does not obtain, as shown in (34a). In contrast, control infinitives, which have the position Comp, obtain temporal ordering with respect to the matrix tense as in (34b).

(34) a. (= (22a)) John appeared to like poker.

b. (= (21a)) Jenny remembered to bring the wine.

Lack of Comp in raising infinitives also restricts the verb selection. As is well known, eventive predicates are possible in control infinitives, while they are impossible in raising infinitives as shown in (35).

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- (35) a. Naomi tried to bring the wine.
 b. *Geno believed Rebecca to win the game.
 c. *The defendant seems to the DA to steal the car.

(Martin 2001: 150)

In sum, we have proposed that the nonfinite T moves to the matrix T in order to have its temporal interpretation completed, and that the movement is accompanied by the ϕ -features in control infinitives but not in raising infinitives. The existence of the ϕ -features of T is argued through the data of VP-ellipsis: the head T in control infinitives licenses VP-ellipsis since it bears the ϕ -features, whereas T in raising infinitives does not for it does not bear the ϕ -features. This proposal has two implications. First, what moves in control constructions is only the nonfinite T, for it is the most economical derivation: the ϕ -features of PRO can be specified through the ϕ -features' agreement of the nonfinite T in the matrix clause. On the other hand, in raising constructions, the nonfinite T does not have the ϕ -features, so that the subject DP of the infinitive itself has to move to the matrix in order to check the uninterpretable ϕ -features on the matrix T. Second, the possibility of VP-ellipsis in OC infinitives, where the implement of the licensing condition on VP-ellipsis is extended to the matrix clause, seems to suggest the rethinking of the definition of the 'phase'; the nonfinite CP would not be a (strong) phase. Our movement analysis is also supported in terms of the temporal interpretation and the verb selection. That is, in raising constructions, the moved T cannot anchor to C and has to directly land in the matrix T, which is consistent with the hypothesis that no Comp is involved in raising constructions. As a consequence, the temporal ordering interpretation fails and the simultaneous reading obtains instead. This structure restricts the verb selection: the nonfinite T in raising constructions cannot select any eventive verbs.

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5. Some consequences

In the previous sections, we have pointed out the correlation between the interpretation of PRO (OC/NOC) and the possibility of VP ellipsis, which is summarized in (36).

(36)

	PRO in complement clauses	PRO in subject clauses
ϕ -features of PRO	specified by Agree with T	underspecified
Interpretation of PRO	OC/ <i>anaphoric</i> (antecedent in the matrix)	NOC/ <i>pronominal</i> (arbitrary or generic)
VP-ellipsis	licensed	not licensed

We have argued that OC obtains via specification of PRO's ϕ -features, which is crucially dependent on the movement of the nonfinite T. In this case, VP-ellipsis is possible. On the other hand, in NOC constructions, the ϕ -features of PRO remain underspecified. In this case, VP-ellipsis is impossible.

In the next section, we further examine VP-ellipsis in infinitival relative clauses and infinitival interrogative clauses. In these constructions, movement of an item from infinitival clauses is prohibited because of Subjacency condition. Thus, we predict that PRO's ϕ -features cannot be specified through the movement of T, which ends in the failure of VP-ellipsis. This prediction is borne out.

5.1. Prohibited movement

To begin with, consider the sentences in (37) and (38): (37a) contains an infinitival relative clause and (38a) an infinitival interrogative clause. The (b)-sentences represent the structure of (a)-sentences.

- (37) a. Mary knows the books PRO to read on such a topic.
- b. Mary knows [_{DP} [_{DP} the books] [_{CP} PRO to read on such a topic]].

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- (38) a. Mary knows which house PRO to buy.
 b. Mary knows [_{CP} which house PRO to buy].

PRO in (37a) and (38a) may appear to be obligatorily controlled by *Mary* in the matrix clauses, for *Mary* c-commands PRO. However, as (39) indicates, PRO may be the antecedent of *oneself*, which suggests that PRO is not obligatorily controlled by *Mary* in either (37a) or (38a).

- (39) a. Mary_i knows the books PRO_{i/j} to read for herself_i/oneself_j on such a topic. (Cf. 37a))
 b. Mary_i knows which house PRO_{i/j} to buy for herself_i/oneself_j. (Cf. (38a))

Thus, the infinitival relative clause in (37a) and the infinitival interrogative clause in (38a) belong to the NOC. It means, based on our proposal, that the ϕ -features of PRO are not specified through the movement of T. In that case, we predict that VP-ellipsis in infinitives is impossible, and this prediction is borne out as shown in (40): (40a) shows that VP-ellipsis fails in the infinitival relative clause; (40b) shows that VP-ellipsis fails in the infinitival interrogative clause.⁽¹⁰⁾

- (40) a. *Mary doesn't know the journals to [_{VP} read on such a topic], but she knows the books to [_{VP} e].
 b. *Mary couldn't decide which car to [_{VP} buy], but she knows which house to [_{VP} e].

Then, what we have to consider next is why the ϕ -features of PRO in (37a) and (38a) fail to be specified by the ϕ -features of the DP *Mary*. In other words, why can the ϕ -features of the nonfinite T not move to the finite T in (37a) and (38a)?

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The answer seems to be provided from the general principle in grammar which prohibits movement. First, let us consider the case of relative clauses. It has often been discussed that the extraction (Move) of an item from the CP inside a DP is prohibited as shown in (41). This is originally observed by Ross (1967) and called the Complex NP Constraint (CNPC).

- (41) a. John met [_{DP} [_{DP} a girl] [_{CP} who sang the song]].
 b. *Which song_i did John meet [_{DP} [_{DP} a girl] [_{CP} who sang *t_i*]]?

The extraction, namely the operation Move, from an infinitival relative clause is not allowed either as shown in (42).

- (42) a. John found [_{DP} [_{DP} a man] [_{CP} to fix the car]].
 b. *What_i did John find [_{DP} [_{DP} a man] [_{CP} to fix *t_i*]]?

Based on these facts, we consider that what is responsible for the prohibited movement of the nonfinite T in (37a) is CNPC. Now, let us turn to the case of interrogative clauses. It seems that the same kind of constraint as CNPC prohibits the movement of the nonfinite T in (38a). The relevant condition here would be the *wh*-island condition, which prohibits the movement of an item from a question sentence as shown in (43).

- (43) a. You wonder [_{CP} when John ate the apples].
 b. *What_i do you wonder [_{CP} when John ate *t_i*]]?

The *wh*-island condition applies to infinitival interrogative clauses as (44) indicates.

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- (44) a. Mary knows [_{CP} where to put her coat].
 b. *What_i does Mary know [_{CP} where to put *t_i*] ?

Thus, the failure of the movement of the nonfinite T in (38a) would be attributed to the *wh*-island. Though we do not discuss it in detail here, it has been argued that the CNPC and the *wh*-island condition are reduced to the same principle ‘Subjacency,’ which is a constraint on movement in general. Thus, it would be natural that the specification of PRO’s ϕ -features are sensitive to Subjacency, because it crucially depends on the movement of T. To put it in the opposite way, the fact that the specification of PRO’s ϕ -features is sensitive to Subjacency suggests that our movement analysis is on the right track.

6. Conclusion

We have argued that the identification of PRO obtains via specification of its ϕ -features, which is dependent on the movement of the nonfinite T. On the other hand, the nonfinite T in raising infinitives does not bear the ϕ -features, which force the DP to move by itself. This different feature specification of T explains the puzzling data of VP-ellipsis: VP-ellipsis is possible only when the ϕ -features of head T Agree with those of its Spec and the values are given. Further, our movement analysis is supported in terms of the temporal interpretation and the verb selection. That is, the temporal-order reading obtains in OC constructions, where the nonfinite T moves to the matrix T anchoring to Comp, while temporal-order reading fails and ends in the simultaneous reading in raising constructions, where the nonfinite T has to move directly to the matrix T because of the absence of Comp. As a consequence, eventive verbs cannot be selected in raising constructions. Finally, we verified our analysis by using the island effects: OC, which is crucially dependent on the movement of the nonfinite T, is sensitive to Subjacency, under which

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the CNPC and the *wh*-island are subsumed.⁽¹¹⁾ Thus, feature specification of T, which reflects syntactic and semantic facts, and the movement of T driven by such features account for the distribution and the interpretation of the empty subjects, PRO and trace, in a unified way.

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Notes

1. Although PRO is often assumed in the subject position of gerunds as well, we do not discuss the gerund in this paper.
2. To be precise, we assume that the light verb checks accusative Case, following Chomsky (1995).
3. It is assumed that the language has abstract agreement Agr, which is sometimes represented within the Infl node with Tense.
4. Borer argues that the subject of control infinitives could be *pro*.
5. Hornstein postulates A-movement only in obligatory control constructions.
6. The EPP feature, which is associated with C, T, and *v*, is assumed to be responsible for inducing movement (Chomsky 2000). We follow this idea, but do not indicate the EPP feature in our representations for simplicity's sake.
7. We assume that PRO has the default ϕ -features, which are third person singular in English as shown in (i), while masculine third person plural in Italian as shown in (ii).
 (i) It is difficult [PRO_i to talk about oneself/*oneselves].
 (ii) È difficile [PRO_i parlare di *se stesso_i/se stessi].
 is difficult talk of *oneself/ oneself Haegeman (1991: 266)

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8. The movement of the nonfinite T to C , and further to the matrix C, is independently discussed in Pesetsky and Torrego (2001).
9. The assumption that the temporal properties are encoded in C has been discussed widely and is ensured, for example, in terms of lexical selection: a finite TP is selected by Comp *that*, while a nonfinite TP by Comp *for* (Chomsky and Lasnik 1977).
10. Lobeck (1995) and Johnson (2001) examine similar types of data, though their analyses are different from ours. The sensitivity to islands is not observed for VP-ellipsis in the finite clauses (Cf. Sag 1976).
 - (iii) a. John didn't hit a home run, but I know a woman who did.

Johnson (2001: 446)
 - b. I know which book Max read, and which book Oscar didn't.

Johnson (ibid.: 456)
11. VP-ellipsis is also impossible in adjunct (rational) infinitives as in (iv).

(iv) *Mary_i bought *Time* [PRO_i to [_{VP} read]], and John_j borrowed *News Week* [PRO_j to [_{VP} e]].

Our analysis, assuming Subjacency, seems to take care of this case along with the cases of infinitival relative clauses and infinitival interrogative clauses, for the extraction of an item from adjunct clauses is generally prohibited, which is subsumed under Subjacency. However, it is not obvious how the controller in adjunct clauses is determined: via ϕ -features' specification through agreement, in which the movement of T is crucial, or by some other means. We leave the question open how we should capture control effects in adjunct clauses. I am grateful to Prof. Nobuko Hasegawa for bringing this point to my attention.

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