

The Distribution of Trace*

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1. Introduction

Previous studies of clauses have revealed that the distribution of clauses is crucially different from that of nominals (see e.g., Emonds (1970, 1976), Horn (1974, 1975), Stowell (1981)).¹ First, a clause, unlike a nominal, cannot appear in the subject position of a nonfinite clause (Stowell (1981)):

- (1) a. *I consider [[that John came home] to be fortunate].
(Stowell (1981:149))
b. *We didn't really find [[that he had solved the problem] very surprising].
(adapted from Higgins (1973:159))

Second, a clause, unlike a nominal, cannot appear in the complement position of a preposition (Stowell (1981)):

- (2) a. *We talked [about [that they went on an overseas trip]].
(adapted from Stowell (1981:149))
b. *We talked [about [to go on an overseas trip]].
(adapted from Stowell (1981:159))

Third, a clause, unlike a nominal, cannot appear between a verb and a PP complement (Emonds (1970, 1976)):

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¹ Nominals include NPs and DPs (Chomsky (1995, 2000)), and clauses include TPs and CPs. For the distinction between NPs and DPs, see Chomsky (1995:342, 2000:139).

- (3) a. *She mentioned [that the cost included meals] to the tourists.
 b. *John reported [that he had seen the fight] to the press.
 (Emonds (1976:128))

It is well known that the trace of a clause, like a nominal, can appear in the above positions (Horn (1975), Higgins (1973), Postal (1994), Stowell (1981)):

- (4) a. [That Bill was a fool] we believed [*t* to be obvious].
 (Horn (1975:346, fn.5))
 b. [That he had solved the problem] we didn't really find [*t* very surprising].
 (Higgins (1973:159))
 c. [That Sonia was really quite competent], I couldn't convince Frank of *t*.
 (Postal (1994:175))
 d. [That the cost included meals], she mentioned *t* to the tourists.

These distributional differences between clauses and their traces have long remained unaccounted for.

There are also distributional differences between a nominal and its trace. A nominal cannot appear in the subject position of a complementizerless infinitival clause following an adverbial, whereas the trace of a nominal can appear in that position, as noted by Chomsky and Lasnik (1977):

- (5) a. *John believes sincerely [Bill to be the best man].
 b. Who does John believe sincerely [*t* to be the best man]?
 c. *We want very much [John to win].
 d. Who do you want very much [*t* to win]?
 (a-d from Chomsky and Lasnik (1977:478))

This contrast in grammaticality between (5a, c) and (5b, d) is also yet to be accounted for.

In this paper, I would like to consider the above examples and other related examples with the aim of providing a principled account for the distributional differences between clauses and their traces, and between nominals and their traces.

2. A New Analysis

In this section, I would like to present a new account for the distributional differences between clauses and their traces, and between nominals and their traces.

In the minimalist framework, the operations Agree and Move are subject to the following principle:

- (6) The operations Agree and Move require a goal that is both local and active.
(Chomsky (2000:123))

According to Chomsky (2001:9), an element is active if it bears an uninterpretable feature,² and the locus of Case/agreement/EPP may be taken to be T(ense), v^* (*Locus_{Tv*}*) or T, V(erb) (*Locus_{Tv}*).³ Following Chomsky (2001), let us adopt *Locus_{Tv*}*. Agree holds between an active probe and an active goal. A finite T and the head of a nominal subject can function as a probe and a goal, respectively. Suppose that Agree holds between a finite T (with a nominative-assigning property and uninterpretable ϕ -features) and the head of a nominal subject (with Case and interpretable ϕ -features). The value nominative is assigned to the Case of the head of the nominal subject and that Case is deleted from the narrow syntax. The uninterpretable ϕ -features of the finite T are valued and deleted by the interpretable ϕ -features of the head of the nominal subject (Chomsky (2001:6-8)).

In order to permit the derivation of examples like (4a-d) while still blocking examples like (1a, b), (2a, b), and (3a, b), it is necessary to apply Move before Agree. This leads us to the assumption that Agree applies after all applications of Move in a strong phase. In the copy theory of movement, a moved element and its trace are identical in constitution (Chomsky (1995, 2000, 2001, 2004, 2005, 2006)). When an element in the chain has its uninterpretable feature F deleted, other elements in the chain also have their Fs deleted by a convention suggested by Chomsky (1995:303). A slightly changed version of his convention may be stated as (7):

- (7) *The chain convention*

If E is (a part of) an element in a chain and has its uninterpretable feature F deleted, other Es have their Fs deleted if at least one E is a trace.

The condition “if at least one E is a trace” is consistent with the property of a chain. Note that if two elements both have phonetic content, they cannot form a chain.

² Uninterpretable features are features which do not “enter into interpretation at LF” (Chomsky (1995:277)).

³ The light verb v^* selects a verb which is not an unaccusative verb or a passive verb (Chomsky (1995)).

Either α or β must be a trace, or both can be traces to form a chain.⁴ The chain convention applies after the formation of the whole chain.

With respect to topicalization, I assume, following Müller (1997), that the feature [top] renders an element accessible to topicalization. Note that the trace of the topicalized clause in (4a-d) is in a Case position, which in turn indicates that a clause accessible to topicalization must bear Case (Stowell (1981:175)).^{5,6}

With this much as background, let us consider examples (1a, b), (2a, b), and (3a, b). Assuming that a preposition bears an oblique-assigning property (Chomsky (1981)), Bošković (1995) observes that a clause cannot be assigned the value oblique. His observation may be stated as the Oblique Case Principle (Iwakura (2002)):

(8) *The Oblique Case Principle* (OCP)

The head of a phonetically nonnull CP or TP cannot be assigned the value oblique.

⁴ In this connection, consider the following:

- (i) What did John expect t to be seen t' ? (Chomsky (1995:303))

There are two chains, (t, t') and (what, t), and the first chain consists of two traces.

⁵ I follow Bošković (1995) in assuming that the head of a clause (C or T) optionally bears Case.

⁶ With respect to topicalization, Stowell (1981:175) states that “[i]n order for a well-formed Topic structure to result, the verb must assign Case to the trace of the topicalized constituent.” This means that a clause has to be in a Case-position in order to be accessible to topicalization. If a nominal can appear in a complement position, that position is a Case position, whereas if a nominal cannot appear in a complement position, that position is a non-Case position. With this in mind, consider the following examples:

- (i) a. *Kevin persuaded Roger the value of his hamburgers.
b. *Eric reminded the teacher the danger posed by tigers.

(a, b adapted from Stowell (1981:410))

The deviance of (ia) indicates that a nominal cannot appear in the complement position following *Roger*, which in turn indicates that this position is a non-Case position. Similarly, the complement position following *the teacher* in (ib) is a non-Case position.

Let us next consider the following examples:

- (ii) a. Kevin persuaded Roger [that his hamburgers were worth buying].
b. Eric reminded the teacher [that tigers are dangerous]. (a, b from Stowell (1981:409))

Note that the *that*-clauses in (iia, b) are in non-Case positions, and that if they undergo topicalization, the resulting sentences in (iiaa, b) are ungrammatical;

- (iii) a. *[That his hamburgers were worth buying], Kevin persuaded Roger t .
b. *[That tigers are dangerous], Eric reminded the teacher t .

(a, b from Stowell (1981:409))

The deviance of (iiaa, b) each containing t (the trace of the topicalized clause) in a non-Case position, as opposed to the grammaticality of (4a-d) each containing t in a Case-position, confirms that a clause must bear Case in order to be accessible to topicalization.

According to Bošković (1995:36), examples like (2a, b) are “excluded because the Case features of the preposition *about* remain unchecked” (which means that the oblique-assigning property of *about* remains intact in the current minimalist framework (Chomsky (200, 2001, 2004, 2005, 2006)).

There is evidence that ECM verbs such as *consider* bear oblique-assigning properties (Iwakura (2002)), which leads to the following rule:

- (9) ECM verbs bear oblique-assigning properties.

As mentioned above, prepositions bear oblique-assigning properties (Chomsky (1981)). That a preposition can be assigned the value oblique is confirmed by the fact that PP (a projection of a preposition) can appear in the complement position of a preposition as in the following:^{7, 8}

- (10) a. I'm saving the cognac for [after dinner]. (Radford (1988:280))
 b. The man escaped from [behind the curtain].

(adapted from Radford (1988:280))

That an ECM verb bears an oblique-assigning property is confirmed by the fact that it, like a preposition, can value and delete the Case of a preposition, as shown by the grammaticality of examples like (11a, b) below:

- (11) a. They considered [[after the holidays] to be too late for a family gathering]. (Jaworska (1986:359) cited in Matsubara (2000:132))
 b. Kim considers [[under the bed] a good hiding place].
 (Chametzky (1985:30) cited in Matsubara (2000:132))

Given that ECM verbs bear oblique-assigning properties, we can attribute the deviance of (1a) to the Case of *that* and the oblique-assigning property of the matrix verb remaining intact because of the OCP. A similar account holds for the deviance of (1b).⁹

⁷ Following Matsubara (2000), I assume that a preposition bears a complete set of ϕ -features and optionally bears Case.

⁸ Given that a preposition bears an oblique-assigning property (Chomsky (1981), Bošković (1995)), Agree holds between *for* with an oblique-assigning property in (10a) and *after* with Case. The value oblique is assigned to the Case of *after*, and that Case is deleted. So long as a preposition bears an oblique-assigning property, therefore, the grammaticality of (10a, b) confirms that the prepositions *after* and *behind* can be assigned the value oblique.

⁹ Note that *that* in (1a) must bear Case so that the *that*-clause may be accessible to movement to the Spec of the infinitival T, whereas *that* in (1b) may or may not bear Case.

With respect to (3a, b), we can justify a rule such as (12) (Iwakura (2004)):

- (12) Three-place *mention*-class verbs bear oblique-assigning properties.

To see this, consider the following examples:

- (13) a. She mentioned it to the tourists [that the cost included meals].

b. John reported it to the press [that he had seen the fight].

- (14) a. [That the cost included meals], she mentioned *t* to the tourists.

b. [That he had seen the fight], John reported *t* to the press.

- (15) a. She mentioned to the tourists [that the cost included meals].

b. John reported to the press [that he had seen the fight].

((13b), (14b), (15b) adapted from Emonds (1976:128))

In (13a, b), expletive *it* has its Case valued and deleted, which indicates that the verbs *mention* and *report* bear Case value-assigning properties. In (14a, b), the trace of the topicalized clause has its Case valued and deleted, which also indicates that the verbs *mention* and *report* bear Case value-assigning properties. The grammaticality of (15a, b) indicates that the verbs *mention* and *report* can value and delete the Case of the preposition *to*, which in turn indicates that these verbs bear oblique-assigning properties.¹⁰ Given that three-place *mention*-class verbs bear

¹⁰ Note that the structure underlying examples (14a) and (15a) contains the following:

- (i) [_{VP} [_{PP} to the tourists] mention [_{CP} [_C that] the cost included meals]]

The validity of this structure is confirmed by the fact that the *that*-clauses in (14a) and (15a) are assigned the same θ -role as the *that*-clause in (ii) (which is derived from a structure containing (iii)) in accordance with Baker's (1988) Uniformity of Theta Assignment Hypothesis:

- (ii) She mentioned that the cost included meals.

- (iii) [_{VP} mention [_{CP} [_C that] the cost included meals]]

The verb *mention* in (i) may or may not bear an EPP-feature as a result of rule (iv) (Iwakura (2004)):

- (iv) Three-place *mention*-class verbs optionally bear EPP-features.

The EPP-feature of a verb induces object raising. See Chomsky (2005, 2006) for discussion of raising of an object to SPEC-V.

Suppose that C in (i) bears Case, and that *mention* bears an EPP-feature. Raising of CP to the Spec of *mention* and other relevant operations form (v), which is contained in the structure underlying (3a):

- (v) [_{VP} she [_{v'} v*-mention [_{VP} [_{CP} [_C that] the cost included meals]
[_{V'} [_{PP} to the tourists] [_{V'} *t*_V *t*]]]]]]

If CP in (v) undergoes topicalization, example (14a) is derived.

Suppose next that C in (i) lacks Case, and that *mention* lacks an EPP-feature. CP remains in its base-generated position, and structure (vi) is formed:

- (vi) [_{VP} she [_{v'} v*-mention [_{VP} [_{PP} [_P to] the tourists] [_{V'} *t*_V [_{CP} [_C that] the cost included meals]]]]]]

oblique-assigning properties, we can attribute the deviance of (3a) to the Case of C and the oblique-assigning property of the verb remaining intact because of the the OCP.¹¹ The same holds for the deviance of (3b).¹²

I will proceed to consider the derivation of example (4a). The structure underlying the example contains the following:

- (16) [_{v^{*}}[_{CP}[_C that]_{[_{TP} Bill was a fool]]]_{[v^{*}} we [_{v^{*}} v^{*}-believe [_{VP} t_V [_{TP} t₂ [_{T'}[_{T₂} to] [_{VP} be [_{TP} t₁ [_{T'} T₁ obvious]]]]]]]]]]]]]]]]]]]]}

This structure is based on Hornstein and Lightfoot's (1987) analysis of a small clause as a projection of an empty INFL in order to account for the generalization that the subject and predicate of a small clause agree in ϕ -features.¹³ Note that

Agree holds between v^* -mention and P, valuing and deleting the Case of P. The derivation converges as (15a).

¹¹ I am grateful to an anonymous reviewer for drawing my attention to the possibility that PP in an example containing [... V CP PP] may be analyzed as a constituent of CP, thereby rendering it difficult to relate PP to V. In this connection, it should be noted that there are cases where PP in [... V CP PP] cannot be analyzed as a constituent of CP. To see this, consider the following:

- (i) a. *She didn't mention that the file was deleted to her boss.
 b. *John reported that the house was on fire to the fire station.
 (ii) a. *The file was deleted to her boss.
 b. *The house was on fire to the fire station.

It is reasonable to assume that PP in [... V CP PP] cannot be analyzed as a constituent of CP, if that analysis causes ungrammaticality. If that is the case, the deviance of (iia) indicates that *to her boss* in (ia) cannot be analyzed as a constituent of the *that*-clause. Similarly, *to the fire station* in (ib) cannot be analyzed as a constituent of the *that*-clause. Thus we see that the deviance of an example containing [... V CP PP] has nothing to do with the possibility that PP may be analyzed as a constituent of CP. The suggested analysis can provide a unified account for the deviance of examples like (3a, b) and (ia, b) each containing [... V CP PP], regardless of whether PP may be analyzed as a constituent of CP or not.

¹² Given that three-place *give*-class verbs bear oblique-assigning properties, we can account for the deviance of (ia) (as opposed to the grammaticality of (ib)) by means of the OCP:

- (i) a. *They gave [that she was sick] special consideration.
 b. [That she was sick], they gave *t* special consideration.

(a, b adapted from Kuno (1973:370))

¹³ There are a small number of exceptions to this generalization such as (ia, b) below:

- (i) a. Children are a nuisance.
 b. John is all thumbs. (a, b from Matsubara (1997:202))

Given that a copular sentence is derived from a structure containing a small clause (Chomsky (1995), Stowell (1978, 1981)), examples (ia, b) are derived from structures such as (iia, b), each containing a small clause:

- (ii) a. [_{TP} T [_{VP} be [_{TP} children T a nuisance]]]
 b. [_{TP} T [_{VP} be [_{TP} John T all thumbs]]]

t_2 (the trace of CP), lacking phonetic content, is not subject to the OCP.¹⁴ Agree holds between v^* -*believe* and t_2 , valuing and deleting the Case of t_2 and the uninterpretable ϕ -features of v^* -*believe*. If the Case of t_2 is deleted, the Case of t_1 and the Case of C are deleted by the chain convention. CP with [top] raises to its surface position and the derivation converges as (4a). Similar remarks apply to the derivation of other examples in (4). Thus we see that the suggested analysis can account for why the trace of a clause, unlike a clause, can appear in the subject position of a nonfinite clause, in the complement position of a preposition, and between a verb and a PP complement, thereby accounting for the distributional differences between a clause and its trace.¹⁵

Let us next turn to example (5a). Before considering the derivation of the example, it is necessary to show that adverbials such as *very much* and *sincerely* are adjoined to v^* P rather than VP (Iwakura (2004)). To see this, consider the following examples:

- (17) a. I want it very much.
 b. I very much want it.
 c. *I want very much it.

The structure underlying (17a) may contain (18a) or (18b), depending on whether *very much* is adjoined to VP or v^* P:

- (18) a. [<sub>v^* P I [_{v^*} v^* -want [_{VP} [_{VP} t_V it] very much]]]
 b. [_{v^* P} [_{v^* P} I [_{v^*} v^* -want [_{VP} t_V it]]] very much]</sub>

These structures should be compared with the following structure contained in the structure underlying (17b):

- (19) [_{v^* P} very much [_{v^* P} I [_{v^*} v^* -want [_{VP} t_V it]]]]

Examples like (ia, b) are problematic not only to the minimalist program but also to any other linguistic theory, and they must be treated in exceptional ways since they are exceptional to the generalization concerning the subject and predicate of a small clause. I leave it for future research to account for these examples.

¹⁴ I leave it for future research to provide a principled account for the trace of a clause being able to be assigned the value oblique.

¹⁵ Note that a gerundive clause and a *wh*-clause can occur in the subject position of a nonfinite clause, in the complement position of a preposition, and between a verb and a PP complement (Emonds (1970, 1976), Ross (1973)). These clauses, therefore, need to be distinguished from the clauses discussed in the present paper.

Since *very much* in (17b) has the same function as *very much* in (17a) with respect to the verb, it is preferable that they appear in parallel positions. Note that *very much* in (17b) appears in a position adjoined to v^*P in (19). Then it follows that *very much* in (17a) should appear in a position adjoined to v^*P . This leads us to choose structure (18b) with *very much* adjoined to v^*P over (18a) with *very much* adjoined to VP.

The derivation of a deviant example such as (17c) requires adjunction of *very much* to VP as in (20):

$$(20) \quad [{}_{v^*P} I [{}_{v^*} v^*\text{-dislike} [{}_{VP} \text{very much} [{}_{VP} t_V \text{it}]]]]$$

If adjunction of *very much* to VP is not allowed, structure (20) is not formed. If (20) is not formed, there is no possibility of deriving a deviant example like (17c). The requirement that adverbials such as *very much* and *sincerely* be adjoined to v^*P rather than VP provides us with the effects that are provided by the adjacency condition on Case-assignment by verbs (Chomsky (1981)).

We are now in a position to consider examples (5a-d). The derivation of (5a) requires movement of the infinitival TP from its base-generated position to the right of *sincerely*.¹⁶ Since *sincerely* is adjoined to v^*P , it follows that the infinitival TP is moved to a position adjoined to v^*P . The structures underlying (5a) and (5b), therefore, contain (21a) and (21b), respectively:

$$(21) \quad \text{a. } [{}_{v^*P} [{}_{v^*P} [{}_{v^*P} \text{John} [{}_{v^*} v^*\text{-believe} [{}_{VP} t_V t_{\text{Bill to be the best man}}]]] \text{sincerely}] [{}_{TP} \text{Bill to be the best man}]]$$

$$\text{b. } [{}_{v^*P} [{}_{v^*P} [{}_{v^*P} \text{who} [{}_{v^*} \text{John} [{}_{v^*} v^*\text{-believe} [{}_{VP} t_V t_{\text{who to be the best man}}]]]] \text{sincerely}] [{}_{TP} t_{\text{who to be the best man}}]]$$

Agree holds between $v^*\text{-believe}$ in (21a) and *Bill* in $t_{\text{Bill to be the best man}}$ (the trace of the moved TP), valuing and deleting the Case of Bill and the uninterpretable ϕ -features of $v^*\text{-believe}$. It is important to note that *Bill* in $t_{\text{Bill to be the best man}}$ and *Bill* in the moved TP do not meet the condition of the chain convention “if at least one E is a trace.” Even if, therefore, the Case of *Bill* in $t_{\text{Bill to be the best man}}$ is deleted, the Case of *Bill* in the moved TP cannot be deleted by the chain convention. The derivation crashes; hence the deviance of (5a). The same holds for (5c).

¹⁶ This movement is in any case necessary to derive examples like (ia, b) below:

- (i) a. John wanted t in those days [PRO to get a degree in physics].
- b. Bill tried t very hard [PRO to solve the problem].

Let us next turn to (21b). Agree holds between v^* -*believe* and t_{who} in $t_{r\text{who}}$ to be the best man (the trace of the moved TP), valuing and deleting the Case of t_{who} and the uninterpretable ϕ -features of v^* -*believe*. Since t_{who} and *who* form a chain, the Case of *who* is deleted by the chain convention. Note that t_{who} in $t_{r\text{who}}$ to be the best man and t_{who} in the moved TP, both being traces, meet the condition of the chain convention “at least one E is a trace.” If, therefore, the Case of t_{who} in $t_{r\text{who}}$ to be the best man is deleted, the Case of t_{who} in the moved TP is deleted by the chain convention. The derivation converges as (5b). The same holds for (5d). Thus we see that the suggested analysis involving the chain convention in (7) allows us to account for the contrast in grammaticality between (5a, c) and (5b, d), thereby accounting for the distributional differences between a nominal and its trace.

3. Summary

In the present paper, I have advanced an analysis which allows us to account for why the trace of a clause, unlike a clause, can appear in the subject position of a nonfinite clause, in the complement position of a preposition, and between a verb and a PP complement, thereby accounting for the distributional differences between a clause and its trace. The suggested analysis can also account for the contrast in grammaticality between examples like (5a, c) and (5b, d), thereby accounting for the distributional differences between a nominal and its trace.

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