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# On Covert *Wh*-agreement and *That*-trace Effect

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## Abstract

This paper shows that *wh*-feature checking in the clause domain which a *wh*-phrase moves through can be reduced to feature properties. In Standard English, T-to-C movement never occurs in the embedded clause from which a *wh*-phrase is extracted. This fact suggests that *wh*-feature checking in the embedded clause is implemented in LF (Logical Form). This checking is closely related to *that*-trace effect and the asymmetric extraction possibilities from subject and non-subject positions in sentences with overt complementizers. The effect actually varies across Germanic languages. Its acceptance depends on whether the complementizer *that* functions as an semantically defective expletive or not.

Keywords: *wh*-agreement, *wh*-feature, T-to-C movement, *that*-trace effect

## 1. Introduction

Many languages exhibit *wh*-agreement within the movement domain of a *wh*-phrase. The languages which allow *wh*-agreement can be divided into two types in a general way: one employing syntactic operations and the other employing a special morphology. Standard English belongs to the former in that *wh*-movement induces T-to-C movement. In the case where a *wh*-phrase in an embedded clause moves up to a matrix clause, T-to-C movement never occurs in the embedded clause. It seems *prima facie* that the failure of the movement indicates disappearance of *wh*-agreement in the embedded clause. However, some languages exhibit T-to-C movement when a *wh*-phrase in an embedded clause moves up to a matrix clause. This fact has a flavor of occurrence of *wh*-agreement in the clause domain which a *wh*-phrase moves through.

This paper envisages the possibility that in the languages where overt *wh*-agreement does not occur, it occurs covertly in LF, and demonstrates that *that*-trace effect and the asymmetric extraction possibilities from subject and non-subject positions in sentences with overt complementizers are accounted for as a consequence of the analysis of the covert *wh*-agreement. A more curious but nevertheless prevalent feature of *that*-trace effect is that it is unstable. An apparent complementizer-trace configuration is allowed in many languages. This paper also focuses on this fact and shows that the disappearance of *that*-trace effect is ascribed to the nature of an expletive generated in the head of CP which interfaces with *wh*-agreement.

## 2. *Wh*-agreement

As mentioned before, Standard English exhibits *wh*-agreement employing syntactic operations such as T-to-C movement. In (1), a *wh*-phrase forms a Spec-head relation with the head of CP and agrees with its *wh*-feature.

- (1) [<sub>CP</sub> What<sub>i</sub> did<sub>i</sub> [<sub>TP</sub> you *t<sub>i</sub>* [<sub>VP</sub> buy *t<sub>j</sub>*]]]

French optionally employs syntactic operations called “stylistic inversion” when a *wh*-phrase undergoes movement as in (2). This inversion can occur in the embedded clause from which a *wh*-phrase moves as in (2b).

- (2) a. Qui a-t-elle rencontré?  
 who has-she met  
 b. Qui a-t-elle dit qu’ avait vu Paul?  
 who did she say that had seen Paul

*Wh*-agreement is not confined to syntactic operations. Some languages can trigger complementizer alternation in the clause from which a *wh*-phrase is extracted, which is reminiscent of a phenomenon occurring in Irish, where the clause from which a *wh*-phrase is extracted can have the special interrogative or relative complementizer *aL* rather than the neutral complementizer *goN* as in (3), and other languages exhibit a morphological change of INFL accompanied by *wh*-movement.

- (3) Irish *goN*-*aL* alternation  
 a. [ *Wh*<sub>i</sub> [<sub>CP</sub> *aL*/\**goN*... [<sub>CP</sub> *aL*/\**goN*... [<sub>CP</sub> *aL*/\**goN* [ ... *t*... ]]]]]  
 b. Cé *aL* deir siad *aL* chum t-amhrán sint  
 Who COMP say they COMP composed that song

(Chung and McCloskey (1987))

The latter type of languages manifests realis-irrealis alternation in INFL. Cases in point are Kikuyu (the language of an agricultural Negroid people in the largest Bantu-speaking group in Kenya), Palauan (the language of the islands of Palau in the Western Caroline Islands), Hausa (the language of a widespread Negroid people of the Sudan and Nigeria), and Moore (a Gur language spoken in Burkina Faso). According to Haik (1990), in these languages the clause from which a *wh*-phrase is extracted can trigger irrealis morphology in INFL, and the irrealis morphology appears only in the domain between its S-structure position and the variable it binds. For concreteness, in Kikuyu, when a *wh*-phrase moves to CP-SPEC, it triggers irrealis form in the clause from which it is extracted, not realis form, as shown in (4).

- (4) Kikuyu *Wh*-agreement  
 a. nó-ó<sub>i</sub> ó-γ w-ecifri-a [ Ngó γ e a-ú γ-írε [ áte *t*<sub>i</sub> o-On-írÉ Kaanake ]]  
 FP-who SP-T-think-T Ngui SP-say-T that PP-see-T Kaanake  
 (irrealis) (irrealis) (irrealis)  
 “Who do you think Ngūgĩ said saw Kaanake?”  
 b. ó-γ w-<sup>1</sup> é ciiri-á [ nó-ó<sub>i</sub> Ngó γ e a-ú γ-írε [ áte *t*<sub>i</sub> o-On-írÉ Kaanake ]]  
 (realis) FP-who (irrealis) (irrealis)  
 “Who do you think Ngūgĩ said saw Kaanake?”  
 c. ó-γ w-<sup>1</sup> é ciiri-á [ Ngó γ e a-ú γ-írε [ áte nó-o<sub>i</sub> *t*<sub>i</sub> o-On-írÉ Kaanake ]]  
 (realis) (realis) (irrealis)  
 “Who do you think Ngūgĩ said saw Kaanak?”  
 d. nó-o<sub>i</sub> Káma ú a-ér-<sup>1</sup> írÉ *t*<sub>i</sub> [ áte Kariokĩ á-<sup>1</sup> tēm-írÉ mo-tē<sup>1</sup> ]  
 FP-who K. SP-tell-T that K. PP-cut T CP-tree  
 (irrealis) (realis)  
 “Who did Kamu tell (that) Karioki cut a tree?”

(Haik (1990:352))

A common property which lies behind the phenomena accompanied by *wh*-movement presented above is that *wh*-agreement, whether it be syntactic or morphological, is exhibited in the domain between the moved *wh*-phrase and its original position.

Now let us go back to English *wh*-agreement. In Standard English, as mentioned before, when a *wh*-phrase in an embedded clause moves up to a matrix clause, T-to-C movement never occurs in the embedded clause. From this fact, we have a hunch that *wh*-agreement does not occur in the embedded clause. However, scrutiny shows that some varieties of English (e.g.

Belfast English) and interim grammars of children allow T-to-C movement in the domain between the moved *wh*-phrase and its original position.

(5) Belfast English

- a. Who<sub>i</sub> do you think [ did John convince *t<sub>i</sub>* [ that Mary went ] ]?  
 b. \*Who<sub>i</sub> do you think [ did John convince *t<sub>i</sub>* [ did Mary go ] ]?

(Henry (1995:118))

(6) Children's English

What<sub>i</sub> do you think [ did John buy *t<sub>i</sub>* yesterday ]?

In Belfast English and Children's English, interrogative context does not go lower than the clause from which the *wh*-phrase is extracted. T-to-C movement does not occur below the clause from which the *wh*-phrase is extracted.

From these facts, it follows that in English, *wh*-agreement can occur in the embedded clause from which a *wh*-phrase is extracted. If it is on the right track that every language has the same interface level between the computational system and the performance system (the conceptual-intentional level), then the languages which do not exhibit overt *wh*-agreement have *wh*-feature checking implemented in LF. Thus in Standard English, *wh*-feature checking including T-to-C movement in the embedded clause from which *wh*-phrase is extracted is implemented in LF in marked contrast to languages such as Belfast English and Children's English.

With this background, let us go into the detailed mechanism of *wh*-feature checking in Standard English.

(7) What do you think [<sub>CP</sub> what that [<sub>TP</sub> John T[*wh*] [<sub>VP</sub> bought *t* ] ] ] (LF)



→ What do you think [<sub>CP</sub> what that-T [ *wh* ] [<sub>TP</sub> John [<sub>VP</sub> bought *t* ] ] ] (LF)

→ What do you think [<sub>CP</sub> that [<sub>TP</sub> John [<sub>VP</sub> bought *t* ] ] ] (LF)

In (7), the *wh*-phrase in the CP-SPEC of the embedded clause is reproduced instead of the intermediate trace of the fronted *wh*-phrase. According to Stowell (1982) and Rizzi's (1996) suggestion that tense bears *wh*-feature, *wh*-feature is specified in T in (7). Although T in an embedded clause which a verb takes as an indirect question in its complement can bear Q-feature as well as *wh*-feature, we assume that the T in the embedded clause of (7) bears only *wh*-feature, since the matrix verb does not take a genuine interrogative sentence in its complement. We also assume that overt or covert properties of *wh*-feature checking are due to difference of feature strength as in the Minimalist Program of Chomsky (1995) (cf. Pesetsky and Torrego (2001)). Thus the *wh*-feature of the embedded clause in (7) is weak and is erased in LF after it is checked off. The reproduced *wh*-phrase in the CP-SPEC of the embedded clause in (7) disappears after the *wh*-feature checking with the C head of the embedded CP which bears *wh*-feature brought by T-to-C movement in LF, since it loses semantic properties after the checking and provides no instructions which the conceptual-intentional system requires. The failure of this series of *wh*-feature checking leads to leaving *wh*-feature unchecked and thus the derivation will crash.<sup>1</sup>

Feature strength in *wh*-feature checking is reminiscent of optional stylistic inversion in French. (8a), where T-to-C movement does not occur in the embedded clause, indicates that the *wh*-feature of the embedded T is weak and thus is checked in LF. In (8b), on the other hand, the *wh*-feature of the embedded T is strong, since T-to-C movement occurs in the embedded clause.

(8) French

- a. Qui a-t-elle dit que Paul avait vu?  
 who did she say that Paul had seen  
 "Who did she say that Paul had seen?"  
 b. Qui a-t-elle dit qu' avait vu Paul?  
 who did she say that had seen Paul  
 "Who did she say that Paul had seen?"

### 3. *That*-trace Effect

Having seen the possibility of LF *wh*-feature checking in an embedded clause from which a *wh*-phrase is extracted, we show that *that*-trace effect is explained as a consequence of the analysis of *wh*-feature checking presented above.

Much attention has been focused on the asymmetric extraction possibilities from subject and non-subject positions in sentences with overt complementizers, as shown in (9) and (10).

(9) a. \*Who do you think [<sub>CP</sub> *t*' that [<sub>TP</sub> *t* saw John ] ]?

b. Who do you think [<sub>CP</sub> *t*' [<sub>TP</sub> *t* saw John ] ]?

(10) What do you think [ that /  $\emptyset$  [ John repaired *t* ] ]?

(9a), which exhibits *that*-trace effect, is totally ungrammatical in Standard English. The LF structures of (9a, b) will be (11a, b) respectively.

(11) a. Who do you think [<sub>CP</sub> *who* that [<sub>TP</sub> *t* saw John ] ]

b. Who do you think [<sub>CP</sub> *who*  $\emptyset$  [<sub>TP</sub> *t* saw John ] ]

(12) Who<sub>i</sub> do you think [<sub>CP</sub> *who*<sub>i</sub>  $\emptyset$ <sub>i</sub> [<sub>TP</sub> *t*<sub>i</sub> T<sub>i</sub> [*wh*] [<sub>VP</sub> saw John ] ] ] (LF)

agree

In the (b) case of (11), where *that* does not occupy the head of the embedded CP, the null-COMP agrees in a SPEC-head relation with the *wh*-phrase *who* which is the reproduction of its intermediate trace and thus obtains the same index as the *wh*-phrase.<sup>2</sup> The *wh*-phrase *who* agreed with the embedded T when it was in TP-SPEC and thus the T has the same index as *who*, as shown in (12). By transitivity, the null-COMP forms an agreement relation with the embedded T, which is similar to the analysis adopted in the recent Minimalist Program (e.g. Chomsky (2001a, b)), and obtains the same index as the T has. In this case, the null-COMP bears the same *wh*-feature as the Embedded T has and thus can check the *wh*-feature of *who* without T-to-C movement.

A crucial point of this checking is that it is implemented without movement. Economy principles favor more economical operations. In *wh*-movement of a subject, in fact, T-to-C movement does not occur as follows:

(13) \* [ Who did [ buy the carpet ] ]? (no emphatic reading)

We assume then that a derivation crashes if a more economical operation is not chosen.

With this, let us take a look at *that*-trace effect.

(14) Who<sub>i</sub> do you think [<sub>CP</sub> *who*<sub>i</sub> *that*<sub>j</sub> [<sub>TP</sub> *t*<sub>i</sub> T<sub>i</sub> [<sub>VP</sub> saw John ] ] ] (LF)

In (14), *that* occupies the head of the embedded CP and does not agree with the *wh*-phrase *who* which is the reproduction of its intermediate trace, since it has its own index. In this case, the failure of agreement blocks the COMP and the embedded T from sharing the same index, predicting no supply of *wh*-feature from the embedded T to the COMP. T-to-C movement is employed to carry out *wh*-feature checking between the COMP and the *wh*-phrase in the CP-SPEC. This operation, however, is not economical, since it falls back on movement and can be obviated by a more economical operation such as *wh*-feature transfer from an embedded T to a null-COMP as in (12), which does not depend on movement operations, i.e. T-to-C movement. The non-economical operation causes the derivation to crash. This is why a sentence which exhibits *that*-trace effect is totally ungrammatical in Standard English.

Let us consider extraction of an object *wh*-phrase as in (15) next.

(15) a. What<sub>i</sub> do you think [<sub>CP</sub> *what*<sub>i</sub>  $\emptyset$ <sub>i</sub> [<sub>TP</sub> John<sub>j</sub> T<sub>j</sub> [<sub>VP</sub> repaired *t* ] ] ]

b. What<sub>i</sub> do you think [<sub>CP</sub> *what*<sub>i</sub> *that*<sub>k</sub> [<sub>TP</sub> John<sub>j</sub> T<sub>j</sub> [<sub>VP</sub> repaired *t* ] ] ]

In the (a) case of (15), where *that* does not occupy the head of the embedded CP, although the null-COMP can obtain the same index as the *wh*-phrase in the CP-SPEC, discrepancy of the index of the null-COMP and the embedded T tames with providing the null-COMP with *wh*-feature of the embedded T. T-to-C movement is the last resort to carry out *wh*-feature checking

between the null-COMP and the *wh*-phrase. In the (b) case of (15), *that* in the head of the embedded CP has its own index and thus cannot agree with the *wh*-phrase in the SPEC-CP which is the reproduction of the intermediate trace of *what*. This discrepancy yields T-to-C movement in the last resort because of the absence of *wh*-feature in the head of the embedded CP. Both cases of (15), whether *that* occupies the head of the embedded CP or not, fall back on T-to-C movement and thus are equivalent in derivation. The result is that both derivations do not crash, predicting the extraction possibilities from non-subject positions in sentences with or without overt complementizers.

#### 4. Variable Acceptance of *That*-trace Effect

*That*-trace effect, as mentioned before, is unstable; an apparent complementizer-trace configuration is allowed in many languages. The tableau (16) puts in order (un) acceptability of *that*-trace effect in Germanic languages. Most Scandinavian languages allow *that*-trace effect; West Germanic languages, which English belongs to, allow it except Present-day English and Low German.

(16) Variable Acceptance of *That*-trace<sup>3</sup>

Germanic Languages		doubly-filled COMP	<i>that</i> -trace
Scandinavian	Icelandic	○	○
	Norwegian	○	○
	Swedish	○	○
	Danish	○	○
West Germanic	Frisian	○	?
	Dutch	○	○
	West Flemish	○	○
	Low German	×	×
	High German	○	○
	Yiddish	○	?
	English	OE	○
ME		○	○
PE		×	×

A common property observed in Germanic languages is that the languages which allow *that*-trace effect tolerate doubly-filled COMP, where the complementizer *that* immediately follows something which is unquestionably in COMP. This doubly-filled COMP seems to be closely related to the absence of *that*-trace effect, so close scrutiny of synchronic and diachronic variations of a complementizer system will pave the way to parameterize the cross-linguistic variation of *that*-trace effect.

Let us take a look at Icelandic first. This language, as already pointed out, tolerates *that*-trace effect, and moreover, permits doubly-filled COMP.

##### (17) Icelandic Doubly filled COMP

- a. Ég veit ekki hvort að þetta er í lagi.  
I know not whether that this is all right
- b. Hann fór þegar að ég kom.  
He left as that I came
- c. þetta er mað urinn sem að kom í gær.  
This is man-the that that came yesterday

(Vikner (1995:122))

Similar phenomena are observed in Middle English (ME). ME tolerates *that*-trace effect and doubly-filled COMP in marked contrast to Present-day English.

(18) ME *that*-trace

grymbert who wolde ye that ȝ sholde goo and daye hym to come  
 Grymbert, who do you wish that should go and do him come

(*Reynard the Fox*, cited in Bergh and Seppänen (1992:132))

(19) ME Doubly-filled COMP

a. Blameth nat me if that ye chese amis  
 Blame not me if that you choose amiss

(Geoffrey Chaucer, *The Miller's Prologue*, line 3181)

b. Though that my tale be of an hostileer  
 Though that my story is about an innkeeper

(Geoffrey Chaucer, *The Cook's Prologue*, line 4359)

A question arises about what is the nature of *that* which appears in the head of CP in the languages which allow doubly-filled COMP. The nature of this complementizer seems to provide the way to understand the disappearance of *that*-trace effect. Since the element which appears in the left side of the complementizer *that* in an embedded CP indicates a clause type of the CP (cf. Cheng (1997)), the complementizer seems to be incidental to its left side element. One type of this evidence comes from the following example:

(20) ME Embedded Infinite Clauses

a. they declared the same to the kyng, who strayt wayes *commaunded that M' marces to be deluyerd* owt of hand to m' Cromewell and so it was.

(George Cavendish, *Life and Death of Cardinal Wolsey*, 131)

b. he never had *knowleched that the tale to be trewe*.

(*Paston Letters*, I, 177, p.235)

In ME, *that*, an incidental complementizer, can appear in front of infinitive complements of verbs such as *command*-type verbs and ECM verbs. This fact that *that* which appears in tensed clauses can also appears in the C-system of infinitives suggests that the complementizer only bears the function of a subordinator. Moreover, ME allows a chain of elements which are discrepant in properties each other as well as Icelandic, e.g. *whether that*.

(21) ME *whether that*

a. Whether that the prescience of God is the certaine cause of the necessite of things that to comen be.

(Geoffrey Chaucer, *Troylus* iv, 1012)

b. I wote not whether that the length of mater acumbred you.

(*Paston Letters*, III, 793, p.183)

From these observations, it is predicted that the complementizer *that* which appears in a seemingly unexpected situation as in infinitives or CPs yielding doubly-filled COMP is a semantically defective element, i.e. an expletive.

With this background, let us go into an explanation of the cross-linguistic variation of *that*-trace effect. As mentioned before, the languages which permit *that*-trace effect also tolerate doubly-filled COMP. It follows then that these languages form a configuration where a *wh*-phrase in an embedded clause moves through the specifier position of the embedded CP on its way to the sentence initial position and the complementizer *that* establishes a SPEC-head relation with the *wh*-phrase in the course of the *wh*-movement.

(22) a.  $who_i \dots [_{CP} t_j \text{ that } [_{TP} t_j T_j [wh] [ \quad ]]]$  (overt syntax)

b.  $who_i \dots [_{CP} who_j \text{ that}_j [_{TP} t_j T_j [wh] [ \quad ]]]$  (LF)

agree

- $who_j \dots [_{CP} \text{ } who_j \text{ } that_j [_{wh} [_{TP} \text{ } t_j \text{ } T_j \text{ } [ \quad ] ] ] ] ] ] (LF)$   
 →  $who_j \dots [_{CP} \text{ } who_j \text{ } that_j [_{TP} \text{ } t_j \text{ } T_j \text{ } [ \quad ] ] ] ] ] (LF)$   
 →  $who_j \dots [_{CP} \text{ } that_j [_{TP} \text{ } t_j \text{ } T_j \text{ } [ \quad ] ] ] ] ] (LF)$

The LF representation of (22a) will be (22b). In (22b), the complementizer *that* in the embedded CP can obtain the same index as the *wh*-phrase *who*, which is the reproduction of its intermediate trace, since the complementizer, as pointed out before, is a semantically defective expletive. The *wh*-phrase agrees with the embedded T and thus shares the same index with the T when it is in the SPEC-TP. Since an agreement relation is established between *that* sharing the same index with *who* and the T, the former can bear the same *wh*-feature as the T has and thus can be in a checking relation with *who*. This results in no crash of the derivation.

A curious question is when *that*-trace effect appeared in English. This effect, as already mentioned, was allowed in ME. Retrieving data from corpora including *OED* second edition (CD-ROM) concerning *that*-trace effect and doubly-filled COMP reveals that *that*-trace effect appeared about the same period when doubly-filled COMP disappeared. Many data involving doubly-filled COMP, including variants, are retrieved. The tableau (23) puts in order the disappearance of doubly-filled COMP.

(23) Doubly-filled COMP

COMP+COMP	13th	14th	15th	16th	17th	18th	19th	20th	
though that	████████████████████								
although that	████████████████████								
if that	████████████████████								
while that	████████████████████								
before that	████████████████████								
since that	████████████████████								
after that	████████████████████								
Wh+COMP									
whether that	████████████████████								
when that	████████████████████								
where that	████████████████████								
what that	████████████████████								
which that	████████████████████								
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how that	████████████████████								

Although the duration of doubly-filled COMP varies according to categories, it disappeared early in the 17th century. A *that*-trace configuration, which had held from OE, also disappeared about the same period (*that*-trace effect appeared then). More precisely, *wh*-feature checking involving a semantically defective expletive *that* in the C-system was lost together with the disappearance of it, and was shifted to *wh*-feature checking involving null-COMP (recall the discussion in the former section), which is prevalent in Present-day English.

## 5. Summary

In this paper, it is shown that overt or covert realization of *wh*-feature checking in the clause domain which a *wh*-phrase moves through can be reduced to feature strength of *wh*-feature. Standard English bears weak *wh*-feature in the embedded



clause from which a *wh*-phrase is extracted and thus its checking in the embedded clause is implemented in LF. *That*-trace effect and the asymmetric extraction possibilities from subject and non-subject positions in sentences with overt complementizers are explained as a consequence of the mechanism of the *wh*-feature checking. The variable acceptance of *that*-trace configuration depends on whether the complementizer *that* functions as a semantically defective expletive or not.

### Notes

1. T-to-C movement is barred by the Extension Condition, since the operation induces head adjunction. However, adherence to the Extension Condition will change the basic relations. T-to-C movement do not tamper with the basic relations the label *that* projects (see Chomsky (2000:136–137)), taking precedence over the Extension Condition.

2. Introduction of index in a derivation violates the Inclusiveness Condition in Chomsky (2000). The term “index” is employed here for terminological convenience. So by “x obtains the same index as y” or “x has the same index as y” we mean that x shares the same properties as y has.

3. Although Faroese, Swiss German, and Afrikaans (a variant of Dutch spoken in the South Africa) are included in Germanic languages, they are excluded from the tableau for lack of data concerning doubly-filled COMP and *that*-trace effect.

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