

# A Role of T-to-C Movement in Syntax

— A Case Study of *That-Trace* Effects —

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This paper investigates a role of T-to-C movement in the explanation of *that-t(race)* effects. Given that the computational system of human language ( $C_{HL}$ ) must have a mechanism to capture a movement property, the proper implementation of T-to-C movement will offer a principled explanation to *that-t* effects along the minimalist guidelines. We review three proposals and consider their theoretical implementation of T-to-C movement in *that-t* effects. We argue that T-to-C movement has a function of satisfying an edge feature in T and claim that *that-t* effects fall out from an unsatisfied edge feature in T for the failure of this movement. We see that this implementation is empirically supported and is superior to the two previous proposals we consider. We conclude that the proposed T-to-C movement approach is the most viable in minimalist attempts to explain *that-t* effects.

Key words: T-to-C movement, *that-trace* effects, an edge feature, overt complementizers, cross-linguistic variations

## 1. Introduction

The Minimalist Program (hereafter, MP) (Chomsky [14] and his subsequent writings) reconsiders the proposals of earlier frameworks and seeks for principled explanations of language by reducing its properties to interface conditions and general properties of organic systems (the Strong Minimalist Thesis (Chomsky [17])). This paper considers a role of T-to-C movement in the explanation of *that-t(race)* effects. *That-t* effects are illustrated in (1):

- (1) a. \*Who<sub>i</sub> do you think [<sub>CP</sub> that  $t_i$  will visit Mary]?  
 b. Who<sub>i</sub> do you think [<sub>CP</sub>  $t_i$  will visit Mary]?

As shown in (1), the subject of the embedded clause can be *wh*-moved only when the complementizer *that* is absent in Standard English.<sup>1</sup> There have been a number of proposals for *that-t* effects in the literature but none of these proposals has received a principled account. In the recent minimalist literature, some proposals have been made which claim that T-to-C movement can give a principled explanation to *that-t* effects. Given that movement is a ubiquitous property of language and that there must be a mechanism to capture this property in some manner in any theory of language, the resort to this movement for the account of *that-t* effects will live up to the minimalist standards of explanation and will hence be favored over government-based accounts in the Government and Binding framework (Browning [11], Chomsky [12, 13], Kayne

[35], Lasnik and Saito [39], Pesetsky [50], Rizzi [53] among others). But a question remains of how to implement T-to-C movement theoretically in such a way that it is conceptually natural and empirically justifiable; it is not the case that any T-to-C movement will do. The purpose of this paper is to seek for correct implementation of T-to-C movement in the account of *that-t* effects by reviewing three recent proposals in the MP. We will argue that T-to-C movement in *that-t* effects is due to an edge (or more specifically, EPP) feature (EF) in T and is driven for the satisfaction of this edge feature, as recently proposed in Mizuguchi [45].

This paper has the following organization. In section 2, we will briefly consider two kinds of locality in the MP as our background and see that they are irrelevant to the account of *that-t* effects. In section 3, we will first discuss two proposals that crucially employ T-to-C movement in the account of *that-t* effects and point out their problems. In section 4, we will claim that T-to-C movement is relevant to *that-t* effects in that it has a function of satisfying an inherited EF in T; *that-t* effects come from the fact that an EF in T cannot be satisfied for the failure of this movement due to overt complementizers like *that*. This proposal, we will see, is empirically supported and is favorable over the proposals reviewed in section 3. In section 5, we will consider focusing effects on *that-t* and show that the proposed analysis can also account for the absence of *that-t* effects in some focusing contexts. In section 6, we will summarize our discussion and present a conclusion of this paper.

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## 2. Brief Background

Before going into our main discussion, in this section we will briefly discuss why a different approach is needed for the explanation of *that-t* effects. An interesting aspect of *that-t* effects is that they escape two kinds of locality conditions proposed in the MP. One form of locality in syntax reduces to closest c-command (Chomsky [15:122]), which is formulated as the “Minimal Link Condition” (MLC) in a feature-based, Attract/probe-goal theory of movement. The MLC states that given  $\alpha$  and  $\beta$ , which are both potential targets of  $\gamma$ ,  $\gamma$  cannot search for  $\beta$  over  $\alpha$  when  $\alpha$  is closer to  $\gamma$  than  $\beta$  ( $\gamma > \alpha > \beta$ ). For instance, superiority effects and *wh*-island effects follow from the MLC, for there is a closer *wh*-phrase between C and a moved *wh*-phrase ( $C > who > what$ ) when C attracts (or probes for) this *wh*-phrase:

- (2) a. \*What<sub>i</sub> did-C [who buy *t<sub>i</sub>*?  
 b. \*What<sub>i</sub> does-C Mary wonder [<sub>CP</sub> who bought *t<sub>i</sub>*]?

The other form of locality restricts computational workspace and is called the Phase Impenetrability Condition (PIC). The PIC is stated as follows (Chomsky [15, 16, 17]):

- (3) a. The domain of H is not accessible to operations outside HP; only H and its edge are accessible to such operations.  
 b. [<sub>ZP</sub> Z ... [<sub>HP</sub>  $\alpha$  [<sub>H'</sub> H YP]]]

In (3), H is a phase head (either C or transitive *v*\*) and “edge” is the residue outside of H', either specifiers or elements adjoined to HP. Due to the PIC, the complement domain of a phase becomes inaccessible for the computation in the next higher phase. In the ZP phase in (3b), only  $\alpha$  and H are accessible to C<sub>HL</sub>.

These locality conditions are deducible from computational efficiency considerations: they have the effect that the search space is minimized as much as possible by restricting the search option to an element or syntactic domain closest to an attractor/probe (“minimal search”) and hence computational complexity is kept to the minimum. These minimalist approaches to locality are, however, useless in the explanation of *that-t* effects. As we can easily see, in (1), there is no closer *wh*-phrase in the embedded clause or anywhere else that intervenes between the matrix C and *who* and blocks further search. Hence the MLC is irrelevant. Likewise, the PIC is also irrelevant because the successive cyclic movement of *who* can bring

it to phase edges, making it visible to computation in the next higher phase domain.<sup>2</sup>

We have seen that neither the MLC nor the PIC provides a principled explanation for *that-t* effects. This motivates a different approach to *that-t* effects.

## 3. T-to-C Movement and *That-t* Effects

In this and the next sections, we will consider proposals on *that-t* effects in which T-to-C movement plays a role in their explanation. We will first review two proposals and point out their non-trivial problems. We will then claim in the next section that T-to-C movement is for EF checking, arguing that this explains *that-t* effects in a conceptually natural and empirically desirable manner.

### 3-1 Economy-based Account

Pesetsky and Torrego [51] (henceforth, P&T) propose an economy-based account of *that-t* effects. Let us consider how T-to-C movement is relevant to their analysis, together with the assumptions they crucially employ as regards nominative Case.

In making their proposal, P&T assume that nominative Case is an uninterpretable Tense feature (*uT*) in D. They further assume that the embedded declarative C bears this *uT* with an EPP property. With these assumptions in mind, first consider object *wh*-movement, which, unlike subject *wh*-movement in (1), is insensitive to *that* in the embedded clause:

- (4) a. Who<sub>i</sub> do you think [<sub>CP</sub> that John will visit *t<sub>i</sub>*?  
 b. Who<sub>i</sub> do you think [<sub>CP</sub> John will visit *t<sub>i</sub>*]?

The derivation of (4a) under P&T's analysis is represented in (5).<sup>3</sup>

- (5) Who<sub>i</sub> do you think [<sub>CP</sub> *t<sub>i</sub>* [<sub>T</sub> that]<sub>+C<sub>{uT, uWh}</sub></sub>] [<sub>TP</sub> John will visit *t<sub>i</sub>*]?

In the derivation of the embedded clause, the embedded C has *uWh* with an EPP property, which drives successive cyclic movement of *who* to [Spec, CP], in addition to *uT*. P&T argue that *uWh* is satisfied by the movement of *who* while *uT* is satisfied by T-to-C movement. According to P&T, *that* in C is not a complementizer but an instance of T that has been moved to C for *uT*: for them, *that* doubles T. Thus, under their analysis, the presence of *that* is an indication of T-to-C movement; in other words, *that* represents a different realization of this movement.

On the other hand, in (4b), where *that* is absent, T-to-C movement does not take place; instead, P&T argue that *uT* in C is satisfied through the movement of the subject *John* to [Spec, CP] from [Spec, TP] because it also

has  $uT$ , which has already been checked through its Agreement with T. Consider the derivation of (4b) in (6):

- (6) Who<sub>i</sub> do you think [<sub>CP</sub>  $t_i$  John <sub>$t_{[uT]}$</sub> ] C <sub>$t_{[uT]}$</sub>  [<sub>TP</sub>  $t_i$  will visit  $t_i$ ]]?

Thus,  $uT$  can be satisfied either by T-to-C movement, which is realized as *that*, or by subject movement to [Spec, CP].

Now consider subject *wh*-movement out of the embedded clause in (1). P&T argue that *that-t* effects follow because T-to-C movement, which is eventually realized as *that*, is blocked due to economy. First consider a grammatical sentence in (1b), which is repeated below as (7a), and its derivation in (7b):

- (7) a. Who<sub>i</sub> do you think [<sub>CP</sub>  $t_i$  will visit Mary]?  
 b. Who<sub>i</sub> do you think [<sub>CP</sub>  $t_i$  C <sub>$t_{[uT]}$</sub>  [<sub>TP</sub>  $t_i$  will visit Mary]]?

In (7), *who* satisfies not only  $uWh$  in C but also its  $uT$  when it moves to the embedded [Spec, CP] on its way to the matrix clause because it has (checked)  $uT$  as well, just like *John* in (6). Given the simultaneous checking of the two features by the subject *wh*-phrase, P&T claim that due to the Economy Condition in (8), the derivation in (7b) excludes a less economical derivation that employs BOTH *wh*-movement AND T-to-C movement for checking of the relevant features in C (cf. Chomsky [16]):

- (8) *Economy Condition*

A head H triggers the minimum number of operations necessary to satisfy the properties (including EPP) of its uninterpretable features.

(Pesetsky and Torrego [51:359])

This, they argue, explains *that-t* effects in (1a), where  $uT$  in C is checked not by *who* but by a different operation (T-to-C movement, which is indicated by the presence of *that*). With (8) in place, this derivation is ruled out as less economical compared with (1b). Consider (1a), repeated below as (9a), and its derivation in (9b):

- (9) a. \*Who<sub>i</sub> do you think [that  $t_i$  will visit Mary]?  
 b. Who<sub>i</sub> do you think [<sub>CP</sub>  $t_i$  [<sub>T</sub> that]<sub>+C $t_{[uT]}$</sub> ] [<sub>TP</sub>  $t_i$  will visit Mary] → violates (8)!

Given the assumptions on nominative Case and the Economy Condition in (8), there is no need to rely on T-to-C movement to satisfy  $uT$  in C in subject *wh*-movement. Thus, under P&T's analysis, *that-t* effects are ruled out by economy.

### 3-2 Interface-based Account

Roussou [57] is another recent study which proposes an account of *that-t* effects in a slightly different frame-

work. She proposes to reformulate the Empty Category Principle (ECP) in terms of the interfaces. Rizzi [54] proposes a conjunctive ECP and argues that proper head government is required for formal licensing and that theta government or antecedent government is required for identification. Roussou suggests that the licensing and identification portions of the ECP correspond to PF and LF requirements, respectively. As for the licensing part, now reinterpreted as a PF requirement, it is satisfied iff Agr-feature in T is lexicalized through T-to-C movement. Crucial to Roussou's analysis is that an overt complementizer cannot lexicalize Agr-feature while a null complementizer can. As for the identification part, now reinterpreted as an LF requirement, Agr-feature is a variable and its interpretation must be determined through being derivationally linked to a *wh*-phrase. Roussou, following Manzini and Roussou [42], argues that a *wh*-phrase is externally Merged to [Spec, CP], instead of being internally Merged there. The operation that mediates between a *wh*-phrase in [Spec, CP] and Agr-feature in the embedded C for interpretation is Agree. To phrase it in familiar terms, a *wh*-phrase is a probe that seeks for Agr-feature as its goal, which has raised to the embedded C through T-to-C movement for lexicalization. T-to-C movement is also required for the interpretation of Agr-feature because unless T moves to C, it will be invisible due to the PIC.

With this proposal in place, consider (1). The ungrammaticality of (1a) is straightforward because the overt complementizer blocks T-to-C movement for the lexicalization and interpretation of Agr-feature. On the other hand, this is not the case in (1b) for the absence of *that*. Consider the derivations in (10):

- (10) a. \*Agree(who, Agr) [Agr interpretation]  
 Who do you think [<sub>CP</sub> that-C [<sub>TP</sub> T <sub>$t_{[Agr]}$</sub> ] will visit Mary]]? (= (1a))  
 \*T-to-C movement [Agr lexicalization]  
 b. Agree(who, Agr) [Agr interpretation]  
 Who do you think [<sub>CP</sub> C-T <sub>$t_{[Agr]}$</sub> ] will [<sub>TP</sub>  $t_i$  visit Mary]]? (= (1b))  
 T-to-C movement [Agr lexicalization]

Thus, under Roussou's proposal, *that-t* effects follow from the fact that the PF and LF requirements of Agr-feature cannot be satisfied due to the failure of T-to-C

movement.

### 3-3 Problems with P&T and Roussou

In 3.1 and 3.2, we have considered two proposals which resort to T-to-C movement in the account of *that-t* effects. It can be said that these proposals live up to the minimalist standards of explanation: economy (computational efficiency) is employed in P&T and the ECP requirements are reinterpreted as interface requirements (interface conditions) in Roussou. These are elements of principled explanation in the MP. This said, there are non-trivial theoretical and empirical problems with the two proposals which make them unviable. Let us start with P&T.

#### 3-3-1 T-to-C Movement for *uT* Checking

Recall that the assumption crucial to P&T's analysis is that *uT* (nominative Case) is also present in C. However, there are some problems with this assumption. Firstly, it is unclear how this assumption is motivated theoretically and empirically, apart from the purpose of explaining *that-t* effects and related matters. In addition, a Tense feature can more reasonably be considered as "interpretable" because it determines the value of  $\pm$ tense and has interpretive effects in the semantic component. The third problem is that under their assumption, this *uT* in C is checked by a (*wh*-)subject in (1b) and (4b). But this violates the Activity Condition, which requires both a probe and a goal to have an unchecked uninterpretable feature for the checking operation (Agree) to take place. As we have already noted, *uT* of the subject, which is supposed to be a goal of *uT* in C, has already been checked via its  $\phi$ -feature Agreement with T. Finally, P&T argue that *that* is not C but T originally, and moves to C for the checking of *uT* in C. This immediately raises a question of where *that* is base-generated in cases where modal auxiliaries are in T, since they should compete for the same structural position. Likewise, if a subject can satisfy *uT* in C when *that* is absent as in (6), why is it that *that* must not appear in T in this case? For instance, why are the following sentences disallowed?

- (11) a. \*Who<sub>i</sub> do you think [<sub>CP</sub> John [<sub>T</sub> will that] visit *t<sub>i</sub>*]?  
 b. \*Who<sub>i</sub> do you think [<sub>CP</sub> John [<sub>T</sub> that will] visit *t<sub>i</sub>*]?

We can see that *that* (an alleged T) and modals cannot co-occur, which calls into question the assumption that *that* is an instance of T that has moved to C.

If *that* is a realization of T-to-C movement as claimed

by P&T, we also get a prediction that *that* could appear wherever this movement applies. Consider a matrix interrogative clause, which P&T claim has *uT* and T-to-C movement is motivated for this reason. Then it is expected that *that* can appear in C as a reflex of T-to-C movement; or another prediction is that a subject can raise to [Spec, CP] for the deletion of *uT*, which leads to the absence of T-to-C movement. These predictions are, however, empirically false (= (12a, b)); the only available derivation is the one in which familiar T-to-C movement (i.e., modal auxiliary movement) takes place (= (12c)):

- (12) a. \* [<sub>CP</sub> [<sub>T</sub> that]<sub>+C<sub>±TP</sub></sub> [<sub>TP</sub> John will visit Mary]]?  
 (Intended: Will John visit Mary?)  
 b. \* [<sub>CP</sub> John<sub>i</sub> C<sub>±TP</sub>] [<sub>TP</sub> *t<sub>i</sub>* will visit Mary]]?  
 (Intended: Will John visit Mary?)  
 c. [<sub>CP</sub> Will<sub>i</sub>-C [<sub>TP</sub> John *t<sub>i</sub>* visit Mary]]?

As illustrated, a problem with P&T's analysis is that it cannot explain the distribution of *that*: *that* and T-to-C movement clearly have different distributions in syntax. It is not the case that they can freely alternate with each other; *that* is restricted to embedded contexts. The same thing can be said about T-to-C movement for *uT*: in Standard English, it is restricted to matrix contexts. Likewise, there are cases in which a subject cannot move to [Spec, CP] to check *uT* in C. Under P&T's analysis, empirically wrong predictions would follow as regards which grammatical option is used to check *uT* in C, unless unmotivated stipulations are incorporated.

In addition to the above problem, the analysis of *that* as a realization of T-to-C confronts a problem even in the embedded contexts. For instance, consider the following pairs:

- (13) a. \*I heard about the fact [<sub>CP</sub> Mary did it].  
 b. I heard about the fact [<sub>CP</sub> that Mary did it].  
 (14) a. \*The conjecture [<sub>CP</sub> John will never return] is pervasive.  
 b. The conjecture [<sub>CP</sub> that John will never return] is pervasive.  
 (15) a. \*Sam conjectures [<sub>CP</sub> John will never return].  
 b. Sam conjectures [<sub>CP</sub> that John will never return].

*That* is required to be present in the CP complement of some predicates. This suggests that the embedded subject cannot move to [Spec, CP] and that T-to-C movement, which is eventually realized as *that* in Standard English, is forced. But the question is "why." Under P&T's proposal, nothing forces one option over the other and without a

stipulation, ungrammatical examples above, along with grammatical ones, are predicted just like the pair in (4), an empirically wrong result, since both options licitly satisfy  $uT$  in C. On the other hand, if *that* is not T but C as conventionally assumed, the ungrammaticality of the data is explained with a theory of null complementizers (Bošković and Lasnik [9]; Ormazabal [48]). Thus the above examples show that *that* is not a realization of T-to-C movement.

To support their analysis, P&T cite examples from Belfast English (BE), where T-to-C movement is found with genuine T elements like modal auxiliaries, instead of *that*. As (16) and (17) from BE show, T moves to C only when a non-subject *wh*-phrase moves:

- (16) a. Who<sub>i</sub> did John hope [would he see  $t_i$ ]?  
 b. What<sub>i</sub> did Mary claim [did they steal  $t_i$ ]?

(17) \*Who<sub>i</sub> did John say [did  $t_i$  go to school]?

(non-emphatic)

Crucial to P&T is the fact that BE demonstrates the absence of T-to-C movement in subject *wh*-movement (= (17)). The facts of BE, however, do not endorse their argument. Firstly, it has been argued that T-to-C movement observed in BE is due to successive cyclic movement (Henry [29]), which is also observed in many languages such as Spanish and French. For instance, consider Spanish long distance *wh*-movement in (18):

- (18) Qué pensaba Juan [ que le había dicho Pedro  
 what thought Juan that him had told Pedro  
 [ que había publicado la revista ]?  
 that had published the journal  
 ‘What did Juan think that Peter had told him that  
 the journal had published?’

(Torrego [60:109])

If T-to-C movement is triggered by an intermediate movement of a *wh*-phrase into [Spec, CP], which is independently motivated for the PIC, (16) does not provide evidence for  $uT$ .

Secondly, the absence of *do*-support in (17) follows independently and is not evidence for the absence of T-to-C movement in subject *wh*-movement. It has been argued that a subject *wh*-phrase moves in one fell swoop from [Spec, vP] to [Spec, CP] without making a stopover at [Spec, TP] and that there is no head of A-chain in the embedded [Spec, TP] (Chomsky [19], Holmberg and Hróarsdóttir [31]). If so, PF adjacency will not be disrupted and affixes in the embedded C can undergo affix-hopping onto V even if T-to-C movement takes place

for the successive cyclic movement of *who*.

- (19) [CP who<sub>i</sub> C<sub>{affix}</sub> [TP T [VP  $t_i$  [VP go to school]]]]  
 |—————| PF adjacent

Thus, there is no need to insert *do* to support stranded affixes, and (17) is excluded.

Finally, if the T-to-C movement realized as modal auxiliary movement is due to  $uT$  in C in BE examples such as (16), an empirical prediction is that modal auxiliary movement can generally be employed to check  $uT$  in non-*wh*-movement contexts as well. However, this prediction is not borne out. As P&T explicitly mention on p. 381, T-to-C movement is realized as modal auxiliary movement only when *wh*-movement takes place; in other contexts, T-to-C movement must be realized as *that*. This reasonably suggests that the T-to-C movement in (16) results from *wh*-movement, not from  $uT$  in C, since it is restricted to the specific contexts and is not a general option to satisfy  $uT$  in C. For P&T, this fact is explained only by stipulating, as they actually do (ibid.), that the only available T-to-C movement in non-*wh*-contexts is realized as *that*, which is an undesirable stipulation. As in English (12a, b), P&T’s analysis cannot account for the distributions of *that* and modal auxiliary movement.

In fact, P&T’s economy approach raises problems in dealing with *that-t* effects as well. Since subject *wh*-movement to intermediate [Spec, CP] precludes T-to-C movement for the checking of  $uT$  in C due to (8), the analysis predicts that *that-t* effects are universal. It has been pointed out since Mailing and Zaenen [41], however, that there are languages that do not show *that-t* effects. One such language is Italian. Consider (20):

- (20) Chi<sub>i</sub> credi [CP che  $t_i$  ama Sophia Loren ]?  
 who think-you that loves Sophia Loren  
 ‘Who do you think loves Sophia Loren?’

(Uriagereka [61:245])

Given that a subject *wh*-phrase undergoes movement to [Spec, CP] due to the PIC in these languages as well, then *that* (or its counterparts), which is assumed to be a reflex of T-to-C movement, should not appear in (20) and *that-t* should be universally excluded, which is empirically incorrect.

Next, P&T’s analysis cannot extend to ungrammatical cases like (21), where overt complementizers other than *that* are used. Such complementizers include *whether*, *if*, *like* and a complex complementizer *as if*. Consider the following examples:

- (21) a. \*Who<sub>i</sub> were you hoping [CP for  $t_i$  to stay]?

- b. \*Who<sub>i</sub> are you wondering [<sub>CP</sub> whether/if *t<sub>i</sub>* will substitute for Professor Smith]?  
 c. \*Who<sub>i</sub> does it seem [<sub>CP</sub> like *t<sub>i</sub>* lost the file]?  
 d. \*Who<sub>i</sub> does it seem [<sub>CP</sub> as if *t<sub>i</sub>* lost the file]?

It has been observed in the literature that overt complementizers in general show *that-t* effects (thus more generally, *Comp-t* effects) (Bresnan [10], Browning [11], Culicover [21] and Pesetsky [50]). Then it is not unreasonable to assume that the ungrammaticality of (21) is analyzed on a par with that of (1a). It is implausible, however, that semantically rich complementizers like *whether*, *like* and *as if* are realizations of a purely syntactic process of T-to-C movement. This argument is further supported by the fact that unlike *that*, the omission of such overt complementizers does not lead to grammaticality. Consider (22):

- (22) a. \*Who<sub>i</sub> were you hoping [<sub>CP</sub> *t<sub>i</sub>* to stay]?  
 b. \*Who<sub>i</sub> are you wondering [<sub>CP</sub> *t<sub>i</sub>* will substitute for Professor Smith]?  
 c. \*Who<sub>i</sub> does it seem [<sub>CP</sub> *t<sub>i</sub>* lost the file]?

If economy precludes T-to-C movement in subject *wh*-movement out of the embedded clause as P&T's economy-based account claims, then the examples in (22) would be expected to be grammatical as a more economical derivation compared with those in (21).

Finally, consider the assumption that *uT* in C can be checked by the subject with (already checked) *uT*. Since *uT* has an EPP property, the subject must be in [Spec, CP] in this case (see (6)). This predicts that if the subject is pronominal, it must be disjoint in reference from the matrix subject (Principle B of the Binding Theory) because the embedded [Spec, CP] position is considered as part of the matrix clause in terms of the Binding Theory. This is shown in (23), where the matrix subject *John* can bind the anaphor *himself* in the embedded [Spec, CP]:

- (23) a. *John* wonders [<sub>CP</sub> [which pictures of *himself*]<sub>i</sub> Mary likes *t<sub>i</sub>*].  
 b. \**John* thinks [<sub>CP</sub> that Mary likes [pictures of *himself*]].

But the prediction is not borne out. As (24) shows, regardless of *that*, the embedded subject *he* can be co-referential with the matrix subject (no Principle B violation), which suggests that the pronominal does not move to [Spec, CP] to satisfy *uT* in the embedded *that*-less clause.

- (24) John thinks [<sub>CP</sub> (that) he will marry Kate in the future]. (*John* =<sub>coref</sub> *he* possible)

Another piece of evidence which shows that the embedded subject does not move to [Spec, CP] in the *that*-less clause comes from scope relations. Consider an English example in (25). This sentence is ambiguous between two readings:

- (25) Someone likes everyone.  
 (some > every, every > some)

Compare (25) with a Greek counterpart in (26):

- (26) Kapios fititis stihiothetise kathe arthro.  
 some student filed every article  
 'Some student filed every article.'  
 (some > every, \*every > some)

(Alexiadou and Anagnostopoulou [1:505])

The Greek data is *not* ambiguous in scope, which allows only *some* > *every* reading. Alexiadou and Anagnostopoulou [1] argue that SVO in Greek is an instance of Clitic Left Dislocation and that a preverbal subject is not in [Spec, TP] (an EF in T is satisfied by V-to-T movement – see section 4). Suppose that a Clitic Left Dislocated element is in [Spec, CP] (or somewhere in the left periphery as suggested in Rizzi [54]), just like an A'-moved element like a topicalized/focalized phrase. Then an empirical generalization is that a quantifier in [Spec, CP] does not allow a quantifier within TP to take scope over it. That a quantifier in [Spec, CP] has disambiguating effects is corroborated by English data (27). Unlike (25), when the subject is *wh*-moved to [Spec, CP], the sentence becomes unambiguous, allowing only a single-pair answer (who > everyone):

- (27) Who loves everyone?

With this in mind, P&T's analysis predicts that scope relations in the embedded clause vary depending on the presence of *that* because in *that*-less clause, a subject quantifier moves to [Spec, CP], beyond [Spec, TP]. This prediction, however, is not borne out. As the following data shows, the embedded clause is ambiguous in scope even without *that*, just like (25):

- (28) John thinks [(that) someone likes everyone].  
 (some > every, every > some)

From these arguments, we can say that the embedded subject does not move to [Spec, CP] for the checking of *uT* in C in the *that*-less clause; instead, it stays in [Spec, TP] as conventionally assumed.

To summarize, we have seen that P&T's analysis of *that-t* effects faces non-trivial theoretical and empirical problems. Especially, they need to make assumptions that go against fairly standard assumptions in the literature and

whose *raison d'être* is quite questionable apart from the explanation of *that-t* effects and related matters they discuss. For these reasons, it can be concluded that P&T's T-to-C movement does not explain *that-t* effects in a principled way.

### 3-3-2 T-to-C Movement for Interface Requirements

We will now critically consider Roussou's proposal, which claims that T-to-C movement is required for interface requirements. We will see that her proposal also faces theoretical and empirical problems.

The first problem is concerned with the licensing part (i.e., lexicalization of Agr-feature), which Roussou says is a PF requirement satisfied via T-to-C movement. This analysis, however, is quite questionable. It is unclear why a *phonologically null* complementizer can lexicalize Agr-feature, if a PF condition requires this feature to be phonologically substantiated. Rather it is an overt complementizer, not a null complementizer, which lexicalizes Agr-feature for the required PF condition.

The second problem is concerned with the identification part (viz. interpretation of Agr-feature). Roussou argues that Agr-feature is a variable and that it must be linked to a *wh*-phrase externally Merged in the matrix [Spec, CP] via Agree. However, this Agreement relation between a *wh*-phrase and Agr-feature has to cross a phase boundary and is ruled out for the PIC, which Roussou assumes. Consider (1b). In this instance, the embedded C, to which the feature in question has moved via T-to-C, is rendered inaccessible upon the Merger of the matrix C, which makes the matrix VP domain, which includes the embedded C, invisible to computation. Thus, under Roussou's analysis, the value of Agr-feature would remain undetermined, which violates a requirement imposed by LF. This problem becomes clearer if the C to which Agr-feature has moved is more deeply embedded as in (29) below:

- (29) a. Who<sub>i</sub> did you say [<sub>CP</sub> that John thought [<sub>CP</sub> *t<sub>i</sub>* would visit Mary]]?  
 b. Who<sub>i</sub> do you think [<sub>CP</sub> that John said [<sub>CP</sub> that Susan believed [<sub>CP</sub> *t<sub>i</sub>* would visit Mary]]]?

T-to-C movement is inadequate in that it cannot bring Agr-feature to the computationally visible domain where identification Agreement can take place.

In addition to these problems with Roussou's T-to-C movement, there are other problems as well. Another problem related to identification is the operation Agree. Under Roussou's analysis, a *wh*-phrase in the matrix

[Spec, CP] is a probe, which seeks for Agr-feature, a goal which has moved to C from T in the embedded clause. However, this requires an unusual assumption on a probe-goal relation because a *wh*-phrase is not a head and cannot be a probe. One way to solve this problem would be to assume that a *wh*-phrase is a head (namely,  $D^0$ ), just like expletives (*it*, *there*), which probe for T from [Spec, TP] in which they are externally Merged (Chomsky [15, 17]). This assumption may be possible for simplex *wh*-phrases such as *who*, *what* under the Bare Phrase Structure Theory (Chomsky [14]). However, it is inadequate in cases where a *wh*-phrase is a full phrase (viz. DP) like (30):

- (30) a. [<sub>DP</sub> Which student]<sub>i</sub> do you think [<sub>CP</sub> *t<sub>i</sub>* will get the first prize]?  
 b. [<sub>DP</sub> Which work by Dr. Nelson]<sub>i</sub> do you think [<sub>CP</sub> *t<sub>i</sub>* will be evaluated most highly]?

Furthermore, it is unlikely that there is any uninterpretable feature in *wh*-phrases which is to be satisfied through this Agreement, which violates the Activity Condition. Then the mechanism of Agree that Roussou posits for the identification of Agr-feature is a special and specific device which is contrived for this particular purpose and is not motivated elsewhere.

Finally, there is a general problem in Roussou's proposal and it is concerned with long distance movement. As we have noted, Roussou, following Manzini and Roussou [42]), assumes that a *wh*-phrase is not internally but externally Merged to the matrix [Spec, CP]. This assumption, however, raises a question of how the evidence for successive cyclic movement is captured (e.g., Irish complementizer conversion (*aN-aL*) (McCloskey [43]) and anaphor binding (Barss [2], Nissenbaum [46])). If the external Merge of *wh*-phrases were posited, which leaves no intermediate copies/traces of movement, the evidence for these intermediate movement effects would be left unexplained. Roussou's analysis incorporates a questionable assumption on *wh*-movement and this calls the analysis into question.

To summarize, Roussou's proposal reinterprets the conjunctive formulation of the ECP in a minimalist perspective of interface requirements and tries to explain *that-t* effects through Agr lexicalization and Agr interpretation. We have pointed out that Roussou's implementation of T-to-C movement, which is employed for Agr-feature, is questionable. We can conclude that *that-t* effects are not accounted for under Roussou's proposal.

In this section, we have reviewed two proposals in which T-to-C movement plays a role in the account of *that-t* effects, and pointed out their problems. In the next section, we will consider an alternative proposal that is free from the problems we have pointed out.

#### 4. T-to-C Movement for EF Checking

In this section, we will claim that T-to-C movement in *that-t* effects is for the purpose of satisfying an EF in T. As we will see shortly, this analysis is theoretically and empirically preferable to the other proposals incorporating T-to-C movement.

Adopting the derivational model of Chomsky [18, 19], in which computational properties of T ( $\phi$ -features and an EF) are inherited from C, a phase head, when C is Merged with TP, Mizuguchi [45] claims that *that-t* effects follow from the failure of T-to-C movement, which leaves an EF in T unsatisfied in the derivation. Let's see how this T-to-C movement analysis of *that-t* effects works. Recall examples in (1), which are repeated below:

- (1) a. \*Who<sub>i</sub> do you think [<sub>CP</sub> that  $t_i$  will visit Mary]?  
 b. Who<sub>i</sub> do you think [<sub>CP</sub>  $t_i$  will visit Mary]?

Let us start with *that-t* effects in (1a). The derivation is summarized in (35) below. In the course of its derivation, the embedded CP is constructed, the head of which has uninterpretable  $\phi$ -features and an EF (A-properties) for Case/ $\phi$ -feature agreement and subject raising, as well as P(eripheral)-feature (A'-property), which drives successive cyclic movement of *who* to its edge (see (35a)). Since the goal of these features is *who* in [Spec, v\*P], C Agrees with the *wh*-phrase in both  $\phi$ -features and P-feature.<sup>4</sup> On the assumption that P-feature has an EF property, the *wh*-subject is internally Merged to [Spec, CP] as a result of its Agreement with C in this feature, which is an intermediate movement for the PIC. On the other hand, an EF in C, which cannot be satisfied via Agree unlike  $\phi$ -features (Lasnik [37]), is left unsatisfied and as a result, is inherited onto the embedded T.<sup>5</sup> This EF, however, cannot be satisfied through subject raising because the subject *who* has already moved to [Spec, CP] from [Spec, v\*P] and copies are unavailable for narrow syntax. Mizuguchi [45] argues, following Alexiadou and Anagnostopoulou [1], that there is another way for C<sub>HL</sub> to satisfy an inherited EF: that is, a head-to-head relation, which is one of the local relations that derivationally fall out from Merge/Move. He proposes, building on their proposal on EPP checking, that an EF in T can be satisfied

via T-to-C movement, which forms a local head-to-head relation with a C head as shown in (31a), just like V-to-T movement in null subject languages satisfies an EF in T as in (31b):

- (31) a. [<sub>CP</sub> C-T<sub>i</sub> [<sub>TP</sub>  $t_i$  [<sub>VP</sub> ... ]]]  
 b. [<sub>TP</sub> T<sub>i</sub>-V<sub>j</sub>-V<sub>i</sub> [<sub>VP</sub> ...  $t_j$  [<sub>VP</sub>  $t_i$  ... ]]]

As evidenced by (32), C, like D, can satisfy an EF in T and is considered as having the same properties as D.<sup>6</sup> This is further corroborated by the historical fact that C elements, cross-linguistically, are grammaticalized from D elements (Roberts and Roussou [56]; Hiraiwa [30]), one instance of which is shown in English examples in (33) (the demonstrative *that* → the complementizer *that*):

- (32) a. [<sub>TP</sub> [<sub>CP</sub> That-C John is honest]<sub>i</sub> T<sub>i</sub> seems to appear to be  $t_i$  obvious to Mary].  
 b. [<sub>TP</sub> [<sub>CP</sub> What C John wrote]<sub>i</sub> has-T<sub>i</sub> not been reported  $t_i$  to the committee].  
 (33) a. *that* (book)  
 b. I think *that* John is a smart guy.

One piece of evidence for this mode of EF checking is found in Yiddish. As the following data (34a) shows, an inflected verb in T must move to C in the embedded clause when the subject *mir* 'we' remains in situ in [Spec, v\*P]. As shown in (34b), if this movement is blocked by an overt complementizer *az* 'that' in C, ungrammaticality results for an unsatisfied EF. On the other hand, when the subject moves to [Spec, TP] as in (34c), T-to-C movement is not required or in fact, excluded:

- (34) a. Vos<sub>i</sub> hot er nit gevolt [<sub>CP</sub> zoln<sub>j</sub>-C  
 what has he not wanted should  
 [<sub>TP</sub>  $t_j$  mir leynen  $t_i$ ]]?  
 we read  
 'What did he not want us to read?'  
 b. \*Vos<sub>i</sub> hot er nit gevolt [<sub>CP</sub> az [<sub>TP</sub> zoln mir  
 leynen  $t_i$ ]]?  
 c. Vos<sub>i</sub> hot er nit gevolt [<sub>CP</sub> az [<sub>TP</sub> mir<sub>j</sub> zoln  $t_j$   
 leynen  $t_i$ ]]?

(Diesing [23:71-72])

The above examples demonstrate that T-to-C movement in (34a) has a function of EF checking, just like subject raising, as is proposed in Mizuguchi [45].

However, this mode of EF checking cannot be employed for the satisfaction of an inherited EF in (1a) because *that* is in C and T-to-C movement is blocked (= (35b)) (cf. Yiddish (34b) above).

- (35) a. [<sub>CP</sub> that-C<sub>{u $\phi$ , EF/P}</sub>] [<sub>TP</sub> will-T [<sub>v\*P</sub> who v\* [<sub>VP</sub> visit Mary]]]]



- b. Agree(C, *who*) + Move *who* to [Spec, CP]  
 [CP  $who_i$  that-C<sub>{uφ, EF/P}</sub> [TP will-T<sub>{EF}</sub> [v\*P  $t_i$  v\*  
 ↑ \_\_\_\_\_] \*T-to-C movement  
 [VP visit Mary]]]]

The outcome is that the inherited EF in T remains unsatisfied in the derivation and the derivation crashes when the TP in the embedded CP phase undergoes Transfer at the matrix v\*P phase because an unsatisfied EF is an illegitimate object at the interfaces. Mizuguchi [45] argues that this explains the ungrammaticality of (1a), hence claiming that *that-t* effects follow as a consequence of derivational computation.

Let us next consider (1b). The absence of *that-t* effects is now straightforward. The derivation of the embedded clause of (1b) is summarized in (36). In this instance, there is no overt element in C which blocks T-to-C movement unlike (1a). Even if *who* has moved in one fell swoop from [Spec, v\*P] to [Spec, CP] via its Agreement with C (= (36a)) and subject raising is not available for EF checking, an inherited EF in T can be satisfied via T-to-C movement (= (36b)). In the embedded clause, the derivation is thus computed as a convergent derivation. As a result, *that-t* effects are not observed.

- (36) a. [CP C<sub>{uφ, EF/P}</sub> [TP will-T [v\*P *who* v\* [VP visit Mary]]]]  
 b. Agree(C, *who*) + Move *who* to [Spec, CP]  
 [CP  $who_i$  C<sub>{uφ, EF/P}</sub> [TP will-T<sub>{EF}</sub> [v\*P  $t_i$  v\* [VP  
 ↑ \_\_\_\_\_] T-to-C movement  
 visit Mary]]]]  
 c. [CP  $who_i$  C<sub>{uφ, EF/P}</sub>-will-T<sub>{EF}</sub> [TP  $t_j$  [v\*P  $t_i$  v\* [VP  
 visit Mary]]]]

To summarize, Mizuguchi proposes that T-to-C movement has a function of EF checking and that *that-t* effects follow from an unsatisfied EF for the failure of this movement due to the overt complementizer *that*.

In addition to *that-t* effects in (1a), this proposal can also account for ungrammatical examples such as (21), where overt complementizers other than *that* induce *that-t* effects, which we have noted are problematic for P&T's analysis:

- (21) a. \*Who<sub>i</sub> were you hoping [CP for  $t_i$  to stay]?  
 b. \*Who<sub>i</sub> are you wondering [CP whether/if  $t_i$  will substitute for Professor Smith]?  
 c. \*Who<sub>i</sub> does it seem [CP like  $t_i$  lost the file]?  
 d. \*Who<sub>i</sub> does it seem [CP as if  $t_i$  lost the file]?

The ungrammaticality of (21) is straightforwardly captured under the analysis of *that-t* effects that resorts to

T-to-C movement for EF satisfaction. Since the embedded C is overtly filled, T-to-C head movement will be blocked and an inherited EF in T will be left unsatisfied. Furthermore, subject raising to [Spec, TP] cannot be employed for EF checking since, as we have discussed, a subject *wh*-phrase has moved to [Spec, CP] directly from [Spec, v\*P]. Thus the ungrammaticality of (21) is explained on a par with that of (1a). *Comp-t* effects, including traditional *that-t* effects, fall into the general derivational scheme in (37) and receive a uniform explanation under the proposed analysis ("OC" in (37) represents "overt complementizer").<sup>7</sup>

- (37) a. [CP OC-C<sub>{uφ, EF/P}</sub> [TP T [VP *Wh*<sub>(Subject)</sub> v [VP  
 ... ]]]]  
 b. Agree(C, *Wh*) + Move *Wh* to [Spec, CP]  
 [CP *Wh*<sub>(Subject) $i$</sub>  OC-C<sub>{uφ, EF/P}</sub> [TP T<sub>{EF}</sub> [vP  $t_i$  v [VP  
 ↑ \_\_\_\_\_]  
 ... ]]]] \*T-to-C movement

As we have seen, Mizuguchi [45], like Roussou [57], argues that the failure of T-to-C movement results in *that-t* effects. However, the purposes of this movement are different. For Roussou, the movement is required for the lexicalization and interpretation of Agr-feature selected in T, which she says are attributable to interface requirements. For Mizuguchi, T-to-C movement is required for narrow syntax, viz., for EF checking. It is not difficult to see that the problems we have noted for Roussou's approach do not arise under Mizuguchi's and that Agr-feature is eliminated in favor of an (arguably) indispensable EF.<sup>8</sup> Furthermore, since T-to-C movement is not for the checking of *uT* in C, the problems we have pointed out for P&T's approach do not arise, either.

We have argued that T-to-C movement in *that-t* effects is for the satisfaction of an EF in T, as recently proposed in Mizuguchi [45], and have seen that this analysis can overcome the theoretical and empirical problems we have noted for the previous two analyses. Given that *that-t* effects follow from an unsatisfied EF in T for the failure of T-to-C movement, then a prediction is that if the relevant feature can be satisfied with mechanisms other than T-to-C movement, *that-t* effects will not appear even when T-to-C movement is blocked for overt complementizers. We will see that Mizuguchi's T-to-C movement analysis is empirically endorsed and that it can also explain cross-linguistic variations with *that-t* effects.

Three pieces of evidence will be given below. The first case is the one in which an expletive can be Merged

to [Spec, TP]. For instance, consider Yiddish. In this language, an expletive *es* can be Merged to [Spec, TP] when a *wh*-subject is moved as in (38):

- (38) Ikh veys nit [<sub>CP</sub> ver [<sub>TP</sub> es iz gekumen]].  
 I know not who Expl is come  
 ‘I don’t know who has come.’  
 (Diesing [23:68])

Interestingly, in *that-t* contexts, if the expletive is Merged, *that-t* effects will not appear even if an overt complementizer *az* ‘that’ is present.<sup>9</sup> Consider (39):

- (39) a. ?Ver<sub>i</sub> hot er moyre [<sub>CP</sub> az [<sub>TP</sub> es  
 who has he fear that Expl  
 vet <sub>t<sub>i</sub></sub> kumen]]?  
 will come  
 b. \*Ver<sub>i</sub> hot er moyre [<sub>CP</sub> az [<sub>TP</sub> vet <sub>t<sub>i</sub></sub> kumen]]?  
 ‘Who does he fear will come?’  
 (Diesing [22:137])

On the assumption that expletives are Merged to [Spec, TP] for an EF in T, the contrast in (39) can be attributed to whether or not the feature is satisfied. Since *that-t* effects are absent if an EF is satisfied with *es*, (39a) suggests that *that-t* effects are due to an unsatisfied EF in T and that T-to-C movement plays a role in EF checking in grammatical cases like (1b) and its Yiddish counterpart in (40).

- (40) Ver<sub>i</sub> hot er moyre [<sub>CP</sub> vet <sub>t<sub>i</sub></sub> kumen]?  
 who has he fear will come  
 ‘Who is he afraid will come?’

The second case comes from null subject languages, some instances of which are Italian, Spanish, and Greek. Arguing that rich verbal agreement in these languages has exactly the same status as pronouns and hence has nominal or D properties, Alexiadou and Anagnostopoulou [1] claim that V-to-T movement satisfies an EF in T (see (31b)), which is at least confirmed by a V-initial, surface order of these languages (VSO/VOS). As the following examples demonstrate, null subject languages do not show *that-t* effects:

- (41) *Italian* (= (20))  
 Chi<sub>i</sub> credi [<sub>CP</sub> che <sub>t<sub>i</sub></sub> ama Sophia Loren]?  
 who think-you that loves Sophia Loren  
 ‘Who do you think loves Sophia Loren?’  
 (Uriagereka [61:245])

- (42) *Spanish*  
 Quién<sub>i</sub> dijiste [<sub>CP</sub> que <sub>t<sub>i</sub></sub> salió temprano]?  
 who said-you that left early  
 ‘Who did you say left early?’  
 (Perlmutter [49:103])

- (43) *Greek*  
 Pjos<sub>i</sub> nomizis [<sub>CP</sub> oti <sub>t<sub>i</sub></sub> telefonise ]?  
 who think-2s that telephoned  
 ‘Who do you think called?’  
 (Roussou [57:40])

Null subject languages make it explicit that if an EF in T is independently satisfied via V-to-T movement, *that-t* effects do not appear even if T-to-C movement is blocked for an overt complementizer. Then we can see from the above data that an unsatisfied EF is the cause of *that-t* effects and that T-to-C is employed for the satisfaction of an inherited EF in T in grammatical examples such as (1b).

Finally, it has been pointed out that *that-t* effects do not appear in English if a non-subject *wh*-phrase is moved out of the embedded clause. Consider (44):

- (44) a. Who<sub>i</sub> do you think [<sub>CP</sub> that John will visit <sub>t<sub>i</sub></sub>]?  
 (= (4a))  
 b. How<sub>i</sub> do you think [<sub>CP</sub> that John will explain the fact <sub>t<sub>i</sub></sub>]?

The object *who* and the adjunct *how* have moved in (44a) and (44b), respectively. In these examples, T-to-C movement is blocked for *that*, just like (1a); yet *that-t* effects are absent. Note that in (44), unlike in (1a), the subject *John* is in [Spec, v\*P] when T starts probing after the feature inheritance of  $\phi$ -features and an EF from C, and the inherited EF can be satisfied via subject raising upon  $\phi$ -feature Agreement between T and *John*. The examples in (44) show that when an EF in T is independently satisfied, an overt complementizer does not affect the grammaticality of *wh*-movement out of the embedded clause. This argues for a view that an unsatisfied EF is a culprit for *that-t* effects and endorses the claim that T-to-C has a function of satisfying an EF in T in examples like (1b).

To summarize thus far, we have considered three pieces of evidence from various languages. The empirical data persuasively demonstrate that *that-t* effects do not appear even when T-to-C movement is blocked due to the presence of an overt complementizer if an EF in T can be satisfied with other grammatical strategies. Thus, we can conclude from this discussion that a role of T-to-C movement in the account of *that-t* effects is to satisfy an unsatisfied EF in T, as proposed in Mizuguchi [45]. As we have seen, this proposal can also accommodate cross-linguistic variations with *that-t* effects and explains why *that-t* effects are observed only in subject *wh*-movement.

### 5. Focusing and *That-t* Effects

In this section, we will consider examples where *that-t* effects disappear due to focus and further endorse the proposed analysis. Kandybowicz [34] argues that nuclear pitch accentuation (intonation focus) on an embedded predicate or auxiliary will have mitigating effects on *that-t* phenomena, giving the following examples (an element with intonation focus is capitalized below):

- (45) a. A: I didn't think that John would survive.  
 B: √Well then, who do you think that WOULD?  
 b. √/?Who do you think that WROTE Barriers (as opposed to say, *edited* it)?  
 (Kandybowicz [34:222])

It is important to note that intonation focus does not always have mitigating effects on *that-t* phenomena. Consider (46), where focusing anything other than an embedded predicate/auxiliary (say, an object and an adjunct) does not improve *that-t* effects:

- (46) a. ??/\*Who did you say that wrote BARRIERS yesterday?  
 b. \*Who do you say that wrote Barriers YESTERDAY?  
 (Kandybowicz [34:223])

It is argued that the well-formedness of (45) is nothing surprising and that Mizuguchi's analysis of *that-t* effects, together with other independently motivated assumptions, straightforwardly captures (45) and the contrast between (45) and (46). Let us start with (45). On the assumption that focus (interpretation) implies an abstract focus projection in syntax, (45) has a focus phrase (FocP) as one of its clausal elements, with a focused element being feature-checked by a focus head via Agree in Focus feature. Following Rizzi [54], we assume that this FocP comes between C and TP, and the clausal architecture is represented as follows:<sup>10</sup>

- (47) [CP C [FocP FOC [TP T [VP v [VP V ... ]]]]]

It should be noted that there is no overt element in the focus head which blocks head movement to it. Since a focus projection is part of CP (fn.10), it can be said that its head, like C, has the same properties as D. This means that T-to-Foc movement can satisfy an EF in T, just like T-to-C movement. Then even though C is filled with an overt complementizer *that* and T-to-C movement is blocked, a focus head is available for EF checking and an EF in T can be satisfied via T-to-Foc movement; the

presence of *that* in C is thus irrelevant. This explains the absence of *that-t* effects in (45). Consider the derivation of the embedded clause of (45b) in (48):

- (48) a. [CP that-C<sub>{uφ, EF/P}</sub> [FocP Foc [TP T [v\*P who v\*-WROTE<sub>j</sub> [VP t<sub>j</sub> Barriers]]]]]  
 b. Agree(C, *who*) + Move *who* to [Spec, CP]  
 [CP who<sub>i</sub> that-C<sub>{uφ, P}</sub> [FocP Foc [TP T<sub>{EF}</sub> [v\*P t<sub>i</sub> v\*-WROTE<sub>j</sub> [VP t<sub>j</sub> Barriers]]]]]  
 ↑ \_\_\_\_\_  
 T-to-Foc movement  
 v\*-WROTE<sub>j</sub> [VP t<sub>j</sub> Barriers]]]]]  
 c. [CP who<sub>i</sub> that-C<sub>{uφ, P}</sub> [FocP Foc-T<sub>k+EF}</sub> [TP t<sub>k</sub> [v\*P t<sub>i</sub> v\*-WROTE<sub>j</sub> [VP t<sub>j</sub> Barriers]]]]]

On the other hand, grammaticality is not improved in (46), even though it also has focused elements and hence has a focus projection just like (45). To explain the ungrammaticality, we must consider how focus is syntactically expressed in (46). Given that phases are gateways to the interfaces via cyclic Transfer (Spell-Out), it is not unreasonable to assume that each phase, whether it is C or v\*, is a self-contained system expressing scope/discourse (so-called A') properties on the one hand and morphological and/or argument (so-called A) properties on the other. Put differently, C phase and v\* phase are symmetric in their derivational architecture (cf. Hiraiwa [30]). Then v\* should include scope/discourse properties (i.e., focus, topic, etc) as well as morphological and/or argument properties such as φ-features, theta features. Thus, the following structure is deducible from the minimalist assumptions:<sup>11</sup>

- (49) [CP C [TP T [v\*P v\* [FocP Foc [VP V ... ]]]]]

It is argued that "low" FocP in (49) is a focus associated with v\*P phase and is one element of a functional projection constituting v\*P, expressing VP/predicate-internal focus. On the other hand, "high" FocP in (47) is part of CP phase and expresses VP/predicate-external focus. This explains the symmetry between the clause-internal left periphery at v\*P and the clause-external left periphery at CP.<sup>12</sup>

With independently motivated focus projections in (47) and (49) in mind, it is claimed that what differentiates (45) and (46) is the position of FocP: in (45), FocP is located between CP and TP as we have argued in (47); on the other hand, it is placed between v\*P and VP in (46) as shown in (49). "Low" FocP in (49) is motivated in (46) because the focused elements are placed in VP; if the FocP in (46) were "high" FocP as in (47), the Foc head would not be able to find the focused elements in VP as its

goal due to the PIC, which bans search across phasal boundaries, except for phase edges of the next lower phase (see (3) above). On the other hand, “high” FocP is available in (45) because V moves to  $v^*$ , which is part of the next higher phase and hence can be searched for by high Foc.

Thus, FocP must be low in (46) as represented in (49). The consequence of this, however, is that there is no empty head with D properties in (46) to which T can move to satisfy its stranded EF. In addition, downward movement of T to low Foc is derivationally precluded. This explains why *that-t* effects are not mitigated in (46) unlike in (45), even though focused elements are found in both cases and FocP is present as one element of clausal architecture.

In this section, we have argued that with independently motivated assumptions on focus projection, Mizuguchi’s analysis of *that-t* effects with head movement (T-to-C movement) can also account for the absence of *that-t* effects in (45) as well as the absence of focusing or mitigating effects on *that-t* phenomena in (46).<sup>13</sup> On the other hand, P&T [51] and Roussou [57] cannot explain focusing effects on *that-t* effects in (45), and the contrast between (45) and (46): as for P&T, the economy condition precludes T-to-C movement and *that* as a reflex of this movement cannot be realized; as for Roussou, the complementizer blocks T-to-C movement for the lexicalization and interpretation of Agr-feature.

## 6. Conclusion

In this paper, we have considered a role of T-to-C movement in the explanation of *that-t* effects. It has been much argued that T-to-C movement has important effects on syntactic derivations.<sup>14</sup> Given that  $C_{HL}$  must have a mechanism to capture a movement property of language, the resort to T-to-C movement lives up to the minimalist standards of explanation and can give a principled explanation to *that-t* effects. We have reviewed three proposals and considered their theoretical implementation of T-to-C movement in the account of *that-t* effects. We have argued that although P&T’s [51] and Roussou’s [57] proposals may be ingenious and may offer accounts of *that-t* effects along the minimalist guidelines, they face non-trivial problems that unfavorably impair their proposals. We have argued that T-to-C movement has a function of satisfying an EF in T and that *that-t* effects come from an unsatisfied EF in T for the failure of this movement, as

recently proposed in Mizuguchi [45]. We have seen that the proposed analysis can not only overcome the theoretical and empirical problems inherent in the previous two analyses; it also accounts for variations with *that-t* effects and focusing effects on *that-t* phenomena. We thus conclude that the T-to-C movement approach proposed in Mizuguchi [45] is the most viable in minimalist attempts to explain *that-t* (more generally, *Comp-t*) effects.

## Acknowledgments

This paper is a sequel to Mizuguchi [45] and expands some of its portions, especially its Appendix, though the two papers can be read independently. Interested readers are advised to refer to my earlier work for more detailed discussion. I thank Terje Lohndal for comments and suggestions on my earlier paper.

## Notes

1. There are dialects of English where *that-t* effects are not observed (Pesetsky [50], Sobin [58] among others). In this paper, we focus on Standard English.
2. Ishii [32] claims that *that-t* effects can be explained with the PIC if the Vacuous Movement Hypothesis is assumed. But this analysis is called into question in Mizuguchi [45].
3. “*u*” attached in front of a feature in curly brackets stands for “uninterpretable” and the uninterpretable features which have been checked are struck through (~~u~~).
4. This is not what Chomsky [18, 19] has in mind; he assumes that  $\phi$ -features are inherited to T in subject *wh*-movement. See Mizuguchi [45:fn.6] for justification for this non-inheritance derivation.
5. Lohndal (p.c.) points out, referring to Richards [52], that the inheritance of  $\phi$ -features is required in any case if phase theory is maintained. The strength of this argument, however, depends on how phase theory is conceived. We leave this topic for another occasion.
5. This EF is traditionally called the “EPP” (feature). In our theoretical framework, the traditional EPP (feature) is considered as a specific instance of an EF (cf. Chomsky [19:157]).

On the minimalist assumption that movement is generally driven by an EF, it follows that there are two EFs in C: one is associated with A-features ( $\phi$ -features) and the other is associated with A'-features (e.g., Q-feature, P-feature). We assume that the movement of *who* at the stage of (35a) satisfies only one of the two EFs in C (i.e.,

the one associated with P-feature), as a result of which the other is inherited to T. Since an EF is a selectional feature, each selection of an EF triggers Merge/Move.

6. See Bošković [8] for the argument that the CPs in (32) are not topics (as claimed, say, in Koster [36], Stowell [59]) but true subjects, just like DP subjects. Thus, CPs can satisfy an EF in T.

7. Under the proposed analysis, examples like (22) are excluded for different reasons. See Mizuguchi [45:fn.14] for details.

8. There is much recent research that questions an EF (EPP feature) as an independent mechanism in syntax (Bošković [7] and Epstein and Seely [26] among others). At the moment, however, it is still controversial whether this conclusion is correct (Lasnik [37, 38]) and the jury is still out on this. If the analysis presented here is on the right track, it provides another argument for the view that an EF (the EPP feature) plays a non-trivial role in syntactic derivations, being part of the design specifications of language.

9. Similar examples are found in French, Swedish and Danish, and they also argue for the same conclusion. See Mizuguchi [45] for details.

10. The cartographic inquiries (Belletti ed. [5], Cinque ed. [20], Rizzi [54] and Rizzi ed. [55]) have made it clear that C, T and V are only first approximations and can have much richer structures than have been assumed. We follow Rizzi [54] and Chomsky [16, 17] in assuming that FocP is part of CP and that several projections including FocP make up what is called “CP.”

11. For independent arguments for this low predicate-internal focus position, see, e.g., Belletti [3, 4] and Jayaseelan [33].

12. Provided that  $v^*$  is only a collection of richer structures just like C, there is a possibility that low FocP comes not below but above  $v^*P$  as in (i), just as high FocP comes above Finite Phrase (FinP), which is another functional head in C, in the clause-external left periphery:

(i)  $[_{CP} C [_{TP} T [_{FocP} Foc [_{v^*P} v^* [_{VP} V \dots ]]]]]]$

In this paper, since other functional categories of  $v^*$  are irrelevant for our purpose and the parallelism between CP and  $v^*P$  in left periphery is highlighted, we assume (49), instead of (i).

13. Kandybowicz [34] claims with examples such as (45) and (46) that *that-t* effects fall under the domain of the syntax-phonology interface, rather than narrow syntax. The discussion in this section, however, argues that a

purely narrow syntactic explanation is possible for *that-t* effects. Furthermore, we have shown, though briefly in this paper, that cross-linguistic variations with *that-t* effects are successfully accounted for under the proposed analysis. Thus it is too hasty to conclude that *that-t* effects are exclusive properties of the syntax-phonology interface.

14. A more dominant view in the recent minimalist literature is that head movement is not a property of narrow syntax (e.g., Boeckx and Stjepanović [6], Chomsky [16], Grodzinsky and Finkel [28]). But it has also been much argued that head movement has narrow syntactic and semantic consequences (e.g., den Dikken [24], Donati [25], Gallego [27], Lechner [40], Miyagawa [44], Ogawa [47], Zwart [62]). Then at least in some cases, head movement must take place in syntax. It can be said that the commonly held assumption is still controversial and that the jury is still out on the status of head movement as a phonological process.

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