A PF-INSERTION ANALYSIS OF *THAT**

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Minimalism leaves open the possibility of both LF insertion of phonetically silent material and PF insertion of semantically vacuous material. It is proposed that bridge verbs take bare IP complements even when followed by complementizer *that*. The C node into which *that* is inserted is created only on the PF side of the grammar, by morphological fission. This postsyntactic approach to *that* insertion correlates the possibility of *wh*-movement out of a complement clause with the optionality of *that* introducing the clause.

1. THEORETICAL BACKGROUND

In this paper I explore the possibility, left open by the standard minimalist architecture but not ordinarily pursued, that lexical insertion of phonological material with no semantic features can take place postsyntactically. More specifically, I will propose that *that* can be inserted in PF, where it demarcates the beginning of an embedded clause. Because *that* introduced in this manner does not head a CP, from the perspective of any syntactic operations the clause should be treated as an IP. I argue that such PF insertion of *that* does in fact exist, and that this approach to bridge verbs in English has certain advantages over alternatives. Although attempts to extend the account to other languages raise several serious problems, I feel, to paraphrase Chomsky (1957: 5), that only "by pushing a precise but inadequate formulation to an unacceptable conclusion" can we "gain a deeper understanding of the linguistic data."

1.1 LF OPERATIONS

The minimalist theory of syntax makes use of an array of lexical items chosen from the lexicon and drawn upon in constructing any given sentence. Items from this array, called the "Numeration" or "Lexical Array"

(LA), are accessed by operations known as "Select" and "Merge", which select and merge items from the Numeration at the highest node or "root" of the phrase structure tree. It thus has the effect of extending the tree, which can be regarded as an extension requirement on Merge, known as the "Extension Condition";[1] see Bobaljik and Brown (1997) as well as fn. 6 below for some discussion. One unresolved issue within this theory concerns the question of when access to the Numeration can occur. A standard view is that Select and Merge are restricted to the syntax proper so that, once Spell-Out takes place, phonological and semantic features are channeled into their respective interpretive components, PF and LF, and no more lexical insertion is possible. One overarching consideration here is Chomsky's "Principle of Full Interpretation", which essentially precludes introducing material with phonological content at LF or material with semantic content at PF, either of which would cause the derivation to crash. This perspective raises however an interesting possibility: What if one attempted to Merge material that did *not* contain uninterpretable features? So far as I can tell, nothing necessarily prohibits the insertion of phonologically silent material in LF or semantically vacuous material in PF.

The former possibility has received some attention in the literature. Chomsky (1995: 232) considers the possibility that Select can take place in LF, but not in PF:

> "Select is inoperative in the phonological component: no items can be selected from the numeration in the computation from Spell-Out to PF. The operation Select is available to the covert component, however ... but if an item with phonological features is selected, the derivation will crash at LF."

In other words, elements can be inserted in LF which have no phonological content but the opposite is not true: items with phonological content which have no semantic value cannot be inserted in PF. Later, however, Chomsky (1995: 293-294) argues that there can be no access to the Numeration even in LF, in order to prevent such utterances as:

(1) *Sam heard what? (without the echo interpretation)

In cases like this, Chomsky argues, if access to the Numeration were allowed in LF, then one could conceivably insert a phonologically null [+wh] C at the root. This would create a target for *what* (or at least its strong [+wh] feature) to move to, resulting in an acceptable sentence.

Although Chomsky's argument credibly applies for English,[2] there is evidence from other languages that LF Merge may indeed take place. Bošković (1998, 2000) provides data from spoken French, where sentences equivalent to English (1) are perfectly acceptable:

(2) David a fait quoi?
David has done what

Bošković argues quite convincingly that these *wh*-in-situ structures are acceptable because a phonologically null [+wh] C can be merged at the root in LF, and the [+wh] feature of *quoi* can then be checked off there.[3]

A further credible instance of LF insertion of silent material might be the phenomenon of "diary drop" described in Haegeman (1990) and Rizzi (1994). In this construction a pronominal subject can be missing even in non-null subject languages, such as English and French, as in the following examples cited by Rizzi (1994: 156):[4]

(3) a. ___ was so stupid!
b. ___ can't find the letter that I need.
c. ___ saw her at the party.

Rizzi notes that diary drop only applies at the root, hence the items in (4) are not grammatical:

(4) a. *How stupid ___ was!
b. *I can't find the letter that ___ need.
c. *She saw ___ at the party.

I take the diary drop construction to involve insertion of a null subject *pro* in LF. Since Merge is constrained by the Extension Condition, (3) but not (4) is possible, because the latter would involve merging *pro* in a way that would not extend the tree.[5] The French *wh*-in-situ construction in (2) and the English diary drop construction in (3) thus provide empirical evidence that Select and Merge (as well as Move) can take place in LF.[6]

Bošković 's analysis of French is in keeping with certain claims about phrase structure which I will also assume in this paper. Following his "Minimal Structure Principle" based on Law (1991), as well as proposals by a diverse list of syntacticians including Speas, Radford, Grimshaw, Doherty, Safir, and Chomsky, and finding its origins in Pesetsky's (1982) theory of selection, Bošković (1996, 1997) argues that only phrase structure

which is independently required is projected. The particular derivation of the Minimal Structure Principle put forward in Bošković (1997: 37-39), and which I adopt here for the sake of both concreteness and theoretical elegance, is encapsulated as follows:

(5) Only phrase structure motivated by the Numeration is projected.
    a. The Numeration contains lexical elements only.
    b. Functional categories are selected from the Lexicon as needed.
    c. Access to the Lexicon is a Last Resort operation.

In this paper I will be concerned with the claim in (5c) in particular.

The ideas in (5) represent an important departure from Chomsky's view of the Lexical Array as containing all the lexical material that will eventually be used in constructing any particular sentence. Chomsky (1998) explicitly bars access to the Lexicon at multiple points in the derivation.[7] Under both accounts the Numeration serves as the "reference set" for the purpose of calculating economy considerations, but the system in (5) permits differences in nonessential functional category material. For Bošković , most direct access to the Lexicon is going to be driven by features on substantive elements which need to be checked. This is also the case when a [+wh] C is introduced in LF to handle French (2), which clearly has the character of a Last Resort operation. If this C were not selected the derivation would crash, hence, although it would be more economical not to access the Lexicon, in this instance failure to introduce a [+wh] C leads to nonconvergence at LF. The analysis of *pro* insertion in LF in the diary drop construction is slightly different—since this is not a functional category, in Bošković's system it would have to be present in the Numeration all along. It therefore has no choice but to undergo Select and Merge although, as we have seen, this can be postponed until LF.

1.2. PF OPERATIONS

Given the above evidence that Merge should be allowed to take place in the LF component, so long as it has no impact on PF, the question demands closer attention of whether items can also be inserted in PF, again so long as they have no impact on LF. Chomsky (1995: 294), in attempting to rule out LF-insertion of phonologically null elements with strong features, adopts an economy principle to the effect that "α enters the numeration only if it has an effect on output." He adds that "with regard to the PF level, *effect* can be defined in terms of literal identity:

two outputs are the same if they are identical in phonetic form, and α is selected only if it changes the phonetic form." According to this view, two arrays count as distinct Numerations if they contain any phonetically different material, and thus cannot be compared as a single reference set, even if there are no LF differences associated with this phonetically different material. Several examples of this come immediately to mind. One might be two different cases in a language with morphological case, if these each have a way of being checked against some functional head. There are, for example, a variety contexts in Russian where either an accusative or a genitive complement to a verb is acceptable:

(6) Dobryj syn slušaetsja mamu/mamy
good son listens-to mother.acc/gen
'A good son listens to his mother.'

For Chomsky, either accusative *mamu* or genitive *mamy* would enter into LA, so that the two versions of (6) are simply completely different sentences. Similarly, to trivialize this point even further, one might have to claim that two sentences containing distinct pronunciations or allomorphs of some word cannot be compared, even if the two forms in question are in free variation (for me, at least):

(7) Julia dived/dove into the water.

In contrast to this, it seems to me that Bošković's system, unlike Chomsky's, should allow for comparison of sentences containing different forms of the same lexical item, as in (6) or (7), provided they both are convergent.

How this should work is not exactly clear, and has possible ramifications I do not pursue here. For example, one probably would not want preterit *dove/dived* to be able to compete with present tense *dives* in (7). Obviously, what is relevant to this latter distinction is the fact that the two different verb forms have different meanings, an LF distinction, so that which one was selected would have an effect on output. Additionally, if lexical items come complete with all features, then (5a) could be interpreted to mean accusative *mamu* and genitive *mamy* or even allomorphs *dived* and *dove* are different lexical elements, the former pair if case features on the item are sufficient to define an item, the latter pair if phonological form is (assuming all morphosyntactic features to be the same).

The conceptual problem here results from the fact that these differences can be regarded as resident on the lexical item itself. Fortunately, resolving

this issue is not going to be vital to my main argument, since there are also sentences which differ superficially in ways that exclusively involve PF properties of functional categories. I have in mind pleonastic elements or "expletives". Under Chomsky's view, an item such as expletive *it* or *there* indeed enters LA, since whether or not these are present has an effect on the PF representation, hence pairs of convergent sentences as in (8) and (9) cannot be compared for economy purposes:

(8) a. *It* strikes me as unlikely [that Elisabeth will enjoy the movie].
b. [That Elisabeth will enjoy the movie] strikes me as unlikely.

(9) a. *There* were [thirteen men] seated at the table.
b. [Thirteen men] were seated at the table.

The idea that expletives are in LA also plays a crucial role in Chomsky's (1998) argument that the derivation proceeds by constructing "phases", such as CP, from subset Lexical Arrays, in order to prevent the availability of a matrix clause expletive from blocking Move in a lower clause, assuming as he does "Merge over Move". Under Bošković's view, (8) and (9) should probably be regarded somewhat differently: whether or not *it* or *there* is selected is not a matter of what enters the Numeration in the first place, but rather of whether they are needed to make the sentence converge. If the associated phrases are in subject position, *it* and *there* will not be selected from the Lexicon, and if not, they will be.[8]

Another example of a pleonastic element is *of*, inserted, following the analysis of Chomsky (1981: 49-51), for the sole purpose of checking objective case on the complement of a [+N] element, i.e. a noun or adjective, as in (10):

(10) a. destruction *of* the city
b. proud *of* John

This kind of *of* is an "empty preposition devoid of semantic content", hence should have no impact on LF.

Presumably, *it*, *there* and *of* must be Merged into the tree in (8a), (9a) and (10) to check features which would otherwise not be checked. In (10) it is clear that these are case features. In (8a) and (9a) these are the features that require subject position to be filled in English, which formalize the so-called "Extended Projection Principle" in terms of strong "EPP" or "D" features. Hence, even in Bošković's system this secondary access to the Lexicon takes place in the syntax, and in particular before Spell-Out.

It is thus ordinary syntactic merger. Notice, however, that both approaches involve a certain degree of look-ahead. For Chomsky, the globality is particularly troublesome, since we must consider both PF and LF outputs at the beginning of the derivation in order to decide whether something enters the Numeration or not. For Bošković , (5c) still involves Last Resort, but this can I believe be accomplished locally, in that if the strong EPP feature is not checked as soon as possible, following Chomsky (1995) and Collins (1997), the derivation will cancel when the next step is taken.[9] Hence either some phrase moves up to subject position or an expletive is inserted. Note also that word order alone might constitute a PF effect for Chomsky, as in (11):

(11) At the table were seated thirteen men.

Collins (1997) treats instances of locative inversion such as (11), in which a locative PP moves to check off EPP features, as equally costly variants of examples where the nominal moves, as in (9b). In doing so, he rejects the entire global economy perspective of comparing derivations in favor of a local economy system whereby an evaluation is made at each step about what next step should be taken. When multiple possibilities exist, that is because each variant involves an equally costly operation. I regard adherence to local economy principles as highly desirable and look-ahead of the type which Chomsky's view of the Numeration entails as especially onerous.

The various instances of lexical insertion we have considered up to this point involve strictly syntactic operations.[10] Access to the Lexicon was considered to take place at the beginning of the derivation in creating the Numeration, in LF to merge certain contentful but silent elements, and also as a last step before entering PF to merge certain contentless but overt elements. All of these were required to be in the syntax proper. But can the Lexicon also be accessed on the PF side of the grammar? While Chomsky categorically rules out operations such as PF lexical-insertion or PF movement, I see no conceptual reason why this should be excluded by the theory of grammar in principle. In particular, in this paper I explore what strikes me as a reasonable opportunity to exploit PF lexical-insertion.

To do this, we will need an item with phonetic but not semantic content. The complementizer *that* is semantically vacuous, so can potentially be inserted in PF without violating the Principle of Full Interpretation, and it does not seem to be involved in any feature-checking relations. It is thus a good candidate for PF insertion. However, if inserted

only postsyntactically, *that* should not be able to interact with syntactic processes, since it is not present in the syntactic part of the derivation. In what follows I will argue that this is indeed the case, although certain factors obscure the disassociation between *that* and syntactic operations which should see it but apparently do not. Specifically, *that* is only inserted in PF after bridge verbs, such as *think*, *say* or *hope*, which I will claim can take bare IP complements, whereas after non-bridge verbs, such as *quip*, *whisper* or *murmur*, which must take full CP complements, *that* is syntactically active. My primary argument for this contrast will be the correlation between the possible absence of *that* and the possible extraction of a *wh*-phrase from out of the embedded clause.

2. SOME TRADITIONAL APPROACHES TO BRIDGE VERBS

In this section I examine the relevant facts about bridge and non-bridge verbs in English. There are generally acknowledged to be two classes of verbs taking clausal complements; cf. e.g. Chomsky (1977). The former, as in (12a), are called "bridge" verbs, the latter, as in (12b) are "non-bridge" verbs.[11]

(12) a. Billy thought that he saw a ghost.
b. Billy quipped that he saw a ghost.

As observed at least as far back as Erteschik (1973), these two verb classes contrast in terms of whether or not they permit extraction from their complements. This as shown in (13).

(13) a. What did Billy think that he saw?
b. ?*What did Billy quip that he saw?

Example (13a) illustrates the bridge verb phenomenon—metaphorically speaking, verbs of this class form a "bridge" across which the *wh*-phrase can escape from the embedded clause to the matrix clause. The standard assumption is that both types of verb take CP complements, but somehow the CP after bridge verbs can be ignored by *wh*-movement.

(14) a. What$_i$ did Billy think [$_{CP}$ that [$_{IP}$ he saw e_i]]?
b. ?*What$_i$ did Billy quip [$_{CP}$ that [$_{IP}$ he saw e_i]]?

In (14a), the presence of *that* has no effect on the movement of the *wh*-phrase out of the complement clause.

Interestingly, in the bridge verb context (12a) the complementizer *that* is optional:

(15) Billy thought he saw a ghost.

Whether *that* is present, as in (12a), or absent, as in (15), has no nonstylistic effect on interpretation. This is not especially surprising since, although *that* has phonetic content, it is semantically vacuous. Furthermore, unlike other comparable pleonastic elements such as *of*, *it* and *there*, *that* serves no discernible purpose in the syntax, it is one might say "grammatically vacuous" as well. It is thus technically not a pleonastic element, since *of*, *it* and *there* are forced by purely formal criteria, but *that* in (15) is optional, hence its appearance is orthogonal to formal criteria. It is simply what traditional grammar calls a "subordinating conjunction".

Now notice that *that* is just as semantically vacuous after the non-bridge verb in (12b) as it is after the bridge verb in (12a), so that one might expected the same range of possibilities in both contexts. However, for some reason *that* is required here. Compare (16) with (15):

(16) *Billy quipped he saw a ghost.

The complementizer *that*, although optionally present after bridge verbs, is obligatory after non-bridge verbs; (16) is only acceptable as reported speech (quoted direct discourse). This declarative pattern is moreover preserved in interrogative sentences as well. Compare the following with (13):

(17) a. What did Billy think he saw?
b. *What did Billy quip he saw?

The judgments are the same: *that* is optional after *think* but required after *quip*. However, whereas in the former case removing *that*, instead of causing (13a) to degrade, has absolutely no effect, in the latter case removing *that*, instead of improving (13b), makes it even worse. It is, in short, as if *that* were irrelevant to the derivation of the bridge verb sentences (13a) and (17a). On the other hand, for the non-bridge verb sentences *that* is always required, so that (17b) has more the status of (16) than (13b).[12] It thus seems we must treat the negative effects of extracting a *wh*-phrase and not pronouncing *that* as technically independent and possibly cumulative, although judgments are subtle.

The traditional Government and Binding account of the optionality of *that*, following Chomsky (1981: 243-248), involves "free deletion in COMP", which means that *that* can be deleted so long as no other conditions are violated. So, for example, (18b-d) are all acceptable noun phrases:

(18) a. *the house which that Jane built
b. the house ~~which~~ that Jane built
c. the house which ~~that~~ Jane built
d. the house ~~which~~ ~~that~~ Jane built

The reason (18a) is bad is because of the Doubly-Filled COMP Filter (DFCF), which rules out having more than one element in COMP—in current terms, C° and [Spec, CP] cannot both be filled with overt material. Assuming free deletion in COMP, then, what presumably goes wrong in (16) and (17b) under this proposal is that the empty category left behind by deleting *that* is not "properly governed" for purposes of the Empty Category Principle, although in (15) and (17a) it is. The presumed structures are as follows:

(19) Billy thought/*quipped [$_{CP}$ *e* [$_{IP}$ he saw a ghost]].

(20) What$_i$ did Billy think/*quip [$_{CP}$ e_i *e* [$_{IP}$ he saw e_i]]?

This would mean *think* somehow governs across CP, whereas *quip* does not.

I see a number of problems with this idea, regardless of how it is implemented. As stated, it is a stipulation about COMP, hence is not really related to the fact that *that* is semantically vacuous. If anything, this property should be relevant at LF, not PF, and this is indeed what Lasnik and Saito (1984, 1992) argue—even when pronounced, *that* is deleted in LF.[13] This follows from the notion that the complementizer *that* can be deleted without semantic effect—its presence or absence has no bearing on the interpretation of the sentence. Given the Principle of Full Interpretation of Chomsky (1995), we should in fact expect that *that* must be deleted in LF, since it is not interpretable at this level. On the other hand, this should have no impact on its PF properties. Furthermore, the assumption that traces after *think* satisfy the ECP whereas those after *quip* do not reduces to a stipulation about these particular verbs. But if *that* is never present at LF, and if the ECP is a matter of LF, then there should be no reason to discriminate verb classes in this regard.[14] In

short, the conceptually necessary absence of *that* at LF must be independent of its PF optionality after bridge verbs. Clearly, the complement structures in (19) and (20) must somehow be discriminated.

One way of implementing this idea within GB was to posit a rule of S'-deletion. Chomsky (1981: 66) proposed this a marked rule of English, which applied after certain verbs so that they could govern inside their complement clauses. By allowing exceptional government, S'-deletion had two essential effects: licensing of case in Exceptional Case Marking (ECM) contexts, such as (21), and circumventing Subjacency after bridge verbs.

(21) a. David believes [*her* to have taken the candy].
b. Everyone saw [*him* leaving the theater].
c. Elisabeth considers [*them* not worth the paper they are printed on].

If S'-deletion is construed as a syntactic process which literally removes S', then this must precede case assignment (or checking) in (21); see Franks (1983) for some discussion. Similarly, if elimination of S' is necessary to void Subjacency in examples where extraction takes place out of complements to bridge verbs, then it must precede *wh*-movement. However, as we have seen in examples such as (13a), *that* can still be present in PF. This is problematic, since once S' is identified with CP, we would not expect C° *that* to survive deletion of the CP projection. The S'-/CP-deletion mechanism thus leaves the post-deletion structure of the clause unclear.

An alternative inplementation within the GB paradigm, also proposed in Chomsky (1981: 303), was to change S' to S by an optional rule, which would subsume S'-deletion. In more current terms, this would mean changing CP to IP. The CP-to-IP rule would feed processes sensitive to government, so it would precede case marking to obtain (21) and also *wh*-extraction, to allow movement out of complements to bridge verbs. The complementizer *that*—presumably in I°—could be optionally deleted in PF, since its trace would now meet the ECP, assuming this is a matter of head government in PF, as noted in fn. 14. This approach still encounters problems, since it would need IP *not* to be a bounding node in English (movement still crosses two of them), just CP. However, this then lets in non-bridge verbs as well:[15]

(22) ?*What$_i$ did [$_{IP}$ Billy quip [$_{CP}$ e_i that [$_{IP}$ he saw e_i]]]?

One solution is to make what counts as a bounding node context sensitive, as suggested in Chomsky (1981: 305); this proposal raises its own set of problems, which I do not explore here.

Accounts of bridge verbs that seek to manipulate S'/CP in the course of the derivation are thus technically highly problematic, even within GB. Moreover, in a minimalist approach, where structure is built from the bottom up by successive applications of Merge at the root, such modification would have to be postsyntactic at best. Distributed Morphology mechanisms, as in Halle and Marantz (1993), could conceivably manipulate the features of CP, but even if this were invoked, it would be too late to mitigate restrictions on *syntactic* movement. We should in this context also ask what sense there is to positing *that* after bridge verbs, since this element (i) has no semantic effect on the sentence, (ii) fails to disrupt *wh*-movment and (iii) is only optionally pronounced. In other words, *that* is semantically and syntactically inert; it is only active in PF. Empirically, then, *that* has neither LF nor syntactic motivation, although it clearly plays some role in PF. It sole *raison d'être* in the syntax is theory internal: since complement clauses are CPs, and phrases have heads, *that* must be a C°.

3. AN ALTERNATIVE ANALYSIS

In this section I develop a PF-insertion account of *that* after bridge verbs. This proposal, although it straightforwardly correlates the optionality of *that* with the possibility of extraction out of bridge verb complements, will entail a number of problems of analysis for other constructions.

3.1. COMPLEMENT CLAUSES WITH AND WITHOUT *THAT*

There is good reason to believe that a complement clause without *that*, i.e., after a bridge verb such as in (15), really is a bare IP:

(23) a. Billy thought [$_{IP}$ he saw a ghost].
b. [$_{CP}$ what$_i$ did [$_{IP}$ Billy think [$_{IP}$ he saw e_i]]]?

As an IP, the absence of complementizer *that* in (23a) and the availability of unimpeded *wh*-extraction in (23b) are unsurprising. There is, as noted above in conjunction with the Minimal Structure Principle expressed in (5), a relatively large body of literature arguing that this is the correct

structure; the reader is referred to Doherty (1997) for a persuasive summary of the relevant arguments.[16]

There is similarly good reason to believe that a complement clause with *that* after a non-bridge verb, such as in (12b), really is a CP:

(24) a. Billy quipped [$_{CP}$ *(that) [$_{IP}$ he saw a ghost]].
b. *[$_{CP}$ what$_i$ did [$_{IP}$ Billy quip [$_{CP}$ (that) [$_{IP}$ he saw e_i]]]]?

This standard complement structure explains the obligatoriness of *that* in (23a) and the impossibility of *wh*-extraction in (24b), under fairly reasonable sets of assumptions about the licensing of phrase structure and how Subjacency should be implemented. First, I suppose that *that* is required, in order that the CP have some PF content, otherwise both head and specifier position would be empty, roughly following ideas about licensing of phrase structure in Speas (1994).[17] Next, it is possible that IP and CP are both bounding nodes, so that movement in (24) directly from e_i will be disallowed; stopping in the intermediate [Spec, CP] would encounter the same problem. The assumption that IP has bounding node status is also required to block *wh*-movement from inside DPs.

Unfortunately, it should also prevent direct *wh*-movement in the hypothesized bare IP structure in (23b), so a more fine-grained account of bounding nodes is required. Essentially, in order to make the analysis work, what we want is, first, to rule out COMP-to-COMP movement as an option, thereby forcing direct long distance extraction in (24b), and, second, formally to differentiate "one fell swoop" movement in (23b) from that of (24b). There are, I believe, various ways of implementing these insights to take advantage of the proposed IP vs. CP complement analysis. Here I describe one possible implementation in terms of Chomsky's (1986) theory of "barriers," where movement over even one barrier constitutes a Subjacency violation. First of all, we clearly do not want the lower IP in (23) to count as a bounding node. This is as expected, since, as a complement to *think*, it is "L-marked", hence not a "blocking category", hence not a barrier.[18] However, IP can become a barrier "by inheritance" by virtue of immediately dominating a lower "blocking category", namely VP. In Chomsky's barriers system, the way inheritance is avoided is through adjunction to VP, which leads to the derivation in (25):

(25) [$_{CP}$ what$_i$ did [$_{IP}$ Billy [$_{VP}$ e_i [$_{VP}$ think [$_{IP}$ he [$_{VP}$ e_i [$_{VP}$ saw e_i]]]]]]]?

No barriers are crossed in this derivation, as required.

Do these mechanisms also let in extraction out of complements to non-bridge verbs? They apparently did in Chomsky's (1986) system, although he does not discuss this particular issue. The reason is because his account of extraction out of complements to bridge verbs is identical to mine for non-bridge verbs, as follows:

(26) ?*[$_{CP}$ what$_i$ did [$_{IP}$ Billy [$_{VP}$ e_i [$_{VP}$ quip [$_{CP}$ e_i that [$_{IP}$ he [$_{VP}$ e_i [$_{VP}$ saw e_i]]]]]]]]?

The difference is that I take CP rather than bare IP complements as a point of departure, wanting to rule (26) out rather than allow it. There is however a straightforward way of accomplishing this, given the theory of improper movement laid out in Müller and Sternefeld (1993): the step adjoining *what* to the higher VP moves it from [Spec, CP]. This is an instance of "improper movement", which essentially disallows adjunction after movement to [Spec, CP].[19] If we bar this, we in effect bar all COMP-to-COMP movement. The derivation in (26) is then blocked as involving improper movement.

The problem with this is that we also want the alternative one fell swoop derivation in (27) to require movement over a barrier.

(27) ?*[$_{CP}$ what$_i$ did [$_{IP}$ Billy [$_{VP}$ e_i [$_{VP}$ quip [$_{CP}$ that [$_{IP}$ he [$_{VP}$ e_i [$_{VP}$ saw e_i]]]]]]]]?

However, the adjunction step voids the barrierhood of VP and also the inheritance of barrierhood by IP, and CP is presumably L-marked. It thus seems that the adjunction mechanism does not really buy us anything. So there must be some other difference between CP and bare IP complements. Since the desired effect is to allow movement over IP but not over a CP-IP complex, to get (23b) but not (24b), we might as well for the purposes of this paper just stipulate this.[20] What is needed is for IP to be a barrier when immediately dominated by CP, but not when it itself is a complement. How precisely this result is obtained is not crucial, just that there be a difference in terms of Subjacency.

It is surely also possible to express this difference in minimalist terms, although again my claims are independent of the exact formulation. From the perspective of Move, we might imagine that the *wh*-phrase cannot go further than the closest COMP, since this would be its Shortest Move, and from the perspective of Attract, we might imagine that the intermediate COMP presents a closer element with WH features (albeit [–wh]). Either way, COMP-to-COMP movement is inherently problematic for feature

driven movement, since it is unmotivated. That is, movement to an intermediate [Spec, CP] which does not itself check off any features (of the *wh*-phrase, assuming Move, or of the target, assuming Attract) should not exist. I am simply proposing that it in fact does not.[21] By the same token, (non-scope related) VP-adjunction should also not exist, since there is no non-local reason to make this move. In the absence of these intermediate landing sites, all we need assume to exploit the CP vs. IP difference is that a [+wh] C° attracts the closest *wh*-element down the tree, but that, for reasons left unresolved, a CP always constitutes an opaque domain.[22]

3.2. The basic proposal

Granted that bridge verbs can take IP complements and non-bridge verbs can take CP complements, and that the contrast in extractability is somehow derivative of this difference, the question remains of how to analyze bridge verbs when they take complement clauses preceded by *that*. The standard assumption is that these too are CPs. Here I will propose that they are actually IPs instead, at least in the syntax. Movement over CP (and DP), but not IP, causes a weak Subjacency violation.[23] This explains why *that* is syntactically inert after bridge verbs—it is simply not there. Syntactically, (12a), repeated as (28a), has the structure in (28b), not (28c), and in this respect is identical to (23), without *that*, rather than to (24), with *that*, even though in PF this sentence occurs with *that*.

(28) a. Billy thought that he saw a ghost.
b. Billy thought [$_{IP}$ he saw a ghost].
c. Billy thought [$_{CP}$ that [$_{IP}$ he saw a ghost]].

There is no debate about the assumption that non-bridge verbs always take CP complements. What this proposal entails is that bridge verbs always take IP complements. It seems to me that the categorial status of the complement clause, i.e. c-selection, should depend on the verb's s-selectional semantic properties. In this case, the Minimal Structure Principle will dictate that propositions are IPs unless required to be larger. Simple complement clauses are thus IPs. Embedded questions, as in (29a), are CPs, since there needs to be a CP projection in which to locate the WH operator; non-L-marked clauses are CPs, as in (29b), because, following Bošković (1997), empty I must be governed, hence when IP is not a

complement an overt C° is required; and apparently complements to non-bridge verbs, as in (29c), are also CPs:

(29) a. I wonder [$_{CP}$ what [$_{IP}$ you are doing]].
b. [$_{CP}$ that [$_{IP}$ you are always late]] bothers me.
c. Sue whispered [$_{CP}$ that [$_{IP}$ she knew the answer]]

What reason could there be for (29c)? Presumably, there is some semantic difference in the type of complements of bridge and non-bridge verbs. This conclusion strikes me as all but inevitable, given the fact that the class of bridge verbs is relatively constant across languages. Let us suppose that there is some kind of factive operator with non-bridge verb complements, and that this operator must be merged into [Spec, CP]. In order to circumvent the prohibition against contentless projections, a pleonastic head *that* appears in C°.

The next question is where the *that* comes from after bridge verbs, as in (28a). If the syntactic structure is as indicated in (28b), *that* must be inserted postsyntactically, on the PF side of the grammar. A somewhat similar suggestion was made by Lasnik and Uriagereka (1988: 97), who proposed that *that* is inserted at S-structure in a structure such as (30), obliterating the intermediate trace:

(30) [$_{CP}$ Who [$_{IP}$ you think [$_{CP}$ *t* [$_{IP}$ John saw *t*]]]].

Their account differs however from my PF-insertion one in that, for them, C° is present all along. They thus make the standard assumption that COMP-to-COMP movement can void Subjacency effects, but have no explanation for why this is possible only after certain verbs or why these are verbs with which *that* is optional.[24] For me, on the other hand, it is crucial that *that* be introduced into the structure after the syntax.

In order for this to be possible, the Lexicon must be accessible on the PF side of the grammar. Specifically, the element *that* is not part of the initial Numeration, but rather is drawn from the Lexicon, in accordance with (5), when needed. I imagine a two pass approach to lexical insertion, following the system in Franks (1986, 1995) as well as Halle and Marantz's general framework of Distributed Morphology, adapted to minimalism. Syntactic structures are built up through successive applications of Select and Merge to lexical items in the Numeration, but these items are *words*, i.e., bundles of morphosyntactic and semantic features, and not phonological feature complexes. The process of inserting literal *wordforms*, i.e. phonological feature structures, takes place postsyntactically, after the operation of all syntactic and morphological

rules; cf. also Zwart (1997). The latter apply in the morphological component that mediates between the syntax and the phonology proper. It is in this morphological component that the node is created into which the wordform *that* after bridge verbs is inserted (after non-bridge verbs there already is an empty C°). We can think of this as an optional morphological rule of "IP Fission", which fissions off from IP (or TP or AgrSP, in those systems) features that are comparable to those of a [–wh] C°, i.e. *that*.[25] Thus, from the perspective of the syntax *per se*, complements to bridge verbs can be bare IPs, although in their morphological structure, they are larger.[26, 27] Complements to non-bridge verbs, on the other hand, are always CPs, hence *that* is obligatory and A'-movement is degraded.

3.3. Other issues

This unorthodox analysis of English *that* raises a variety of questions of analysis, some of which I address in this section.[28]

Doherty (1997) argues that complement clauses without *that* are IPs (as claimed here), but that clauses with *that* are CPs (whereas for me only those with obligatory *that* are). Consider the fact that embedded topicalization, although marginal for many speakers, becomes completely unacceptable in the absence of a complementizer:

(31) a. ?I hope that this book you will read.
b. *I hope this book you will read.

The generalization seems to be that embedded topicalization forces the presence of a CP. The same is true with base-generated adjuncts to IP:

(32) Julia thinks *(that) in all likelihood David will invite Elisabeth.

The reason is presumably because adjunction to an argument is impossible, hence the IP must be embedded in a CP, which is why *that* in (31) and (32) is obligatory.[29]

Now note that embedded topicalization blocks *wh*-movement, whether or not *that* is present:

(33) a. Who do you hope John will give this book to?
b. Who do you hope that John will give this book to?
c. *Who do you hope this book John will give to?
d. *Who do you hope that this book John will give to?

In my system, but not Doherty's, (33b) and (33d) have different syntactic structures: the former is an IP complement, with *that* introduced postsyntactically, whereas the latter must be a CP, since topicalization forces the CP option. This explains the contrast in extractability of the *wh*-phrase.

Another place where *that* seems to be obligatory is when the complement clause is separated from the verb by material in the matrix clause:[30]

(34) a. I said to Amanda *(that) money can't buy happiness.
b. ?*What did you say to Amanda that money can't buy?
c. What did you say (that) money can't buy?

(35) a. I thought just now *(that) I saw Daniela.
b. ?*Who did you think just now that you saw?
c. Who did you think (that) you saw?

By hypothesis, *that* is required in these cases because the complement clause must be a CP, not an IP, so that *that* is a true complementizer, in C°. What forces this? As stated, according to Bošković (1997), empty I must be governed, and the presence of *to Amanda* in (34) or *just now* in (35) seems to disrupt government from the verb. Hence, an overt C° must be present.

Finally, a major question which must be left for future research concerns cross-linguistic variation. While the system which assumes bare IP complements and treats *that* as sometimes resulting from fission in the morphological component can be made to work for English, it remains to be seen whether similar mechanisms are appropriate for other languages. In general, this is problematic since in many languages embedded complementizers are obligatory, hence the option of a bare IP complement does not seem to exist. As Bošković (1997) shows, this is likely for French.[31] Yet French exhibits similar a contrast between bridge and non-bridge verbs:

(36) a. Qui_i dis-tu [que [$_{IP}$ Pierre a vu t_i]]
who say you that Pierre has seen
'Who did you say that Pierre saw?'

b. *Qui_i cries-tu [$_{CP}$ que [$_{IP}$ Pierre a vu t_i]]
who shout you that Pierre has seen
'Who did you shout that Pierre saw?'

If so, we ought to conclude that *dis* in (36a) has a bare IP complement, and that IP fission in French is obligatory, since *que* is. Adapting proposals in Pesetsky (1998), we might force this by requiring that, for French, the first pronounced word in an embedded clause must be a function word related to the main verb of that embedded clause.[32] Note that here we are assuming that CP, as in English, is a bounding node for French. This raises the additional question of how to treat apparent movement over *wh*-islands in French (and Italian), and puts us in the position of having to analyze this phenomenon in some other way. While I leave this too as a research problem, it is worth pointing out that the "variation in bounding nodes" theory has never sat well with the Principles and Parameters framework; cf. for example the discussion in Lightfoot (1989) and attached responses, especially those by Rizzi and by Freidin and Quicoli. Moreover, the presumed variation is found only in relative clauses in French and Italian, never with interrogative *wh*. It seems to me that the *qui* in examples such as (37), could be taken to indicate that there is in fact no overt movement out of CP:

(37) l'homme $[_{CP}$ OP que $[_{IP}$ je pense $[_{CP}$ qui$_i$ $[_{IP}$ t_i a été arrêté t_i]]]]

Instead of treating *qui* as a variant of *que*, with the complications that entails (cf. e.g. Haegeman 1994: 468), I suggest that the [–wh] relative clause operator is base-generated in place, so that it never actually moves over a CP.[33, 34]

4. Conclusion

In this paper, I have explored the possibility of access to the Select operation by inserting the semantically contentless complementizer *that* in the PF component. Specifically, I have suggested the following:

- in English, bridge verbs may c-select (bare) IP or (*that*) CP complements.[35]
- factive verbs necessarily select CP complements.
- *wh*-movement is felicitous over IP but degraded over CP.
- C° can be created postsyntactically, through morphological fission from IP
- *that* is inserted in the PF component

The most important outcome of this discussion is the idea that minimalist theory should countenance PF-insertion of semantically vacuous elements,

alongside LF insertion of phonetically silent elements. Interestingly, whereas the latter conforms to the Extension Condition, the former does not—it can apply in embedded contexts. The explanation for this is that all wordform insertion takes place on the PF side of the grammar, and the rule that introduces *that* at the beginning of a syntactic IP is really one of morphological fission, creating a new node with morphosyntactic features appropriate to the complementizer. Since no strong features are introduced, the position of *that* can be created acyclically. The postsyntactic account of *that* insertion thus explains the correlation in English between the possibility of *wh*-movement out of a complement clause and the optionality of *that* introducing it. However, whether this insight can survive the scrutiny of cross-linguistic investigation remains to be seen.

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NOTES

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1. As observed by Bošković and Lasnik (1999), there is considerable empirical overlap between the Extension Condition and the proposal in Chomsky (1995) that strong features must be eliminated before the next head up is merged into the structure. Following Lasnik (1999), who attributes the term to Juan Uriagereka (p.c.), I refer to this as the "virus" theory of strong feature checking.

2. There are however considerable conceptual problems, including the fact that, as Lasnik (1997) notes, nothing in the system developed in Chomsky (1995: ch. 4) actually rules (1) out if no [+wh] C is inserted in LF either.

3. See however Rooryck and Cheng (2000) for an alternative account.

4. My intuitions are that diary drop in English only applies with first person subjects; I use examples with *have* as auxiliary to avoid the "bare IP" question interpretation in (ii), which clearly favors second person but is not the same construction:

(i) a. ___ have exhausted myself working in the garden again.
b. ?*___ have exhausted yourself working in the garden again.
c. ?*___ has exhausted himself/herself working in the garden again.

d. ___ exhausted ourselves working in the garden again.
e. ?*___ have exhausted yourselves working in the garden again.
f. ?*___ have exhausted themselves working in the garden again.
(ii) a. (Have you) been working late again?
b. (Do you) want something to eat?
Rizzi however offers some French examples in the third person. Clearly, if diary drop involves merging *pro* in LF, then this is a matter of what strategies a particular grammar can make use of to identify the content of that *pro* at LF.

5. As Rizzi (1994) points out, early null subjects in the acquisition of English behave similarly.

6. Bošković notes that although Move in LF is not constrained by the Extension Condition, Merge always respects it and so must still expand the structure in LF. This is what prevents a phonologically null C from being inserted in an embedded clause. However, for the proposal in this paper to be viable, it is crucial that introduction of material in PF not be required to extend the tree. I see two reasons for this. First, one could argue, as I do, that this is not "merger" in its technical sense, but rather morphological fission (plus lexical wordform insertion) and so is not subject to the Extension Condition. Second, one could reject the Extension Condition in favor of a more discriminating requirement. Bošković and Lasnik (1999) do just this, arguing that Extension Condition effects reduce to the conception of feature strength in Chomsky (1995). Acylic insertion of a head with a strong feature will cause the derivation to cancel in both overt and covert syntax, assuming the virus theory. Normal LF movement, which checks *weak* features, causes no such problem, nor does (overt) head-to-head movement, although neither respect the Extension Requirement. Similarly, since creation of a C° node in the morphological component introduces no strong features, it can take place acyclically.

7. He writes: "If the derivation accesses the lexicon at every point, it must carry along this huge beast, rather like cars that have to replenish fuel supply constantly. Derivations that map LA to expressions require lexical access only once, and thus require operative complexity in a way that might well matter for optimal design."

8. Here again, it is possible to interpret Bošković 's (5a) such that all words are "lexical elements", including not only different forms of the same word but even purely functional heads, so long as they have PF content.

9. What constitutes "the next step" is no simple matter. For present purposes, I adopt Chomsky's idea that it means merging a new head and thus advancing to the next phrase up, although in matrix clauses branching off to PF via Spell-Out will also have to count, to avoid (i) and (ii).
(i) * ___ strikes me as unlikely [that Elisabeth will enjoy the movie].
(ii) * ___ were [thirteen men] seated at the table.

10. Emonds (1985: 176-191) also develops a theory that makes use of late lexical insertion. Since this insertion is "post-transformational" in that it necessarily applies after at least some transformations have taken place, it too is a syntactic rather than PF operation. Emonds' post-transformational lexical insertion is restricted to closed class lexical items and certain purely grammatical verbs, nouns and adjectives.

11. Non-bridge verbs are typically verbs that express "manner of speech". Doherty (1993: 57) provides sample sentences with the following verbs: *grieve, reflect, gloat, scream,*

squeal, whistle and *chuckle*. For further examples, see Doherty (1993) and the references therein.

12. Example (17b) seems slightly worse than (16). There are at least two explanations for this effect, providing (16) with an alternative analysis but making this analysis unavailable for (17b). First, (16) is acceptable as reported speech, as in (i):
(i) Billy quipped, "He saw a ghost."
Second, deriving (17b) would then have to involve extraction from inside reported speech.

13. They do this to explain why adjunct traces pattern like direct objects rather than subjects in not showing the *that*-trace effect. While their analysis will not carry over to my present proposals, it is worth noting that *that*-deletion in LF does not seem to discriminate between bridge and non-bridge verbs. That is, it always applies in (i), saving (ib) but having no effect in (ia), since argument traces according to Lasnik and Saito must be properly governed in the overt syntax.
(i) a. *Who did you propose that ___ should visit us next week?
b. When did you propose that Jennifer should visit us ___?
c. Who did you propose that Jennifer should visit ___ next week?
Although extraction is as always degraded after non-bridge verbs, it is in my opinion no worse for adjuncts, as in (iib), than for complements, as in (iic).
(ii) a. *Who did you whisper that ___ should visit us next week?
b. ?*When did you whisper that Jennifer should visit us ___?
c. ?*Who did you whisper that Jennifer should visit ___ next week?
Relative judgments are thus the same for bridge and non-bridge verbs.

14. Aoun et al. (1987), however, argue that the ECP really has two aspects: antecedent government, which must be met at LF, and head government, which must be met at PF. Although for them the status of an empty category in C° is a matter of head government, this once again boils down to a stipulation about different classes of verbs.

15. It also lets in "one fell swoop" *wh*-movement, as in the standard *wh*-island violation in (i):
(i) *who do $[_{IP}$ you wonder $[_{CP}$ why $[_{IP}$ Mary loves $e_i]]]$

16. Bošković (1995: section 2, 1997: section 2.3.2) also advocates the bare-IP analysis. He refers to Bowers (1987), Hegarty (1991), Law (1991), Li (1990) and Webelhuth (1992) for additional evidence for this analysis.

17. For (18d) there are two options: either there is a null operator in [Spec, CP] of the relative clause or, following Bošković (1997: 25-29), these are bare IP relative clauses, with the null operator adjoined to IP.

18. Chomsky (1986) actually exempts IP independently, by stipulation, although suggesting that it may be that IP is always L-marked by C.

19. Müller and Sternefeld (1993) use this prohibition, which they derive from their "Principle of Unambiguous Binding", to prevent scrambling after *wh*-movement. See also Cinque (1990) for discussion of eliminating *wh*-movement via adjunction.

20. Another brute force method of obtaining this result would be to employ the DFCF, but as a condition on steps in a derivation.

21. Boeckx (in progress) similarly argues against successive cyclic *wh*-movement, explaining apparent intermediate movement effects (which I put aside in this paper) in terms of Agree applied to the periphery of phases; cf. Chomsky (1998).

22. We probably also want DP to be an opaque domain, with apparent movement out of DPs really involving a maximal projection smaller than DP, just as in the CP case examined in this paper.

23. We can see that CP and DP must be bounding nodes by the following contrast, adapted from Haegeman (1994: 463):
(i) *the man $[_{CP}$ who $[_{IP}$ John made $[_{DP}$ the claim $[_{CP}$ that $[_{IP}$ he will invite $t]]]]]$
(ii) ?*the man $[_{CP}$ who $[_{IP}$ John wondered $[_{CP}$ when $[_{IP}$ he will invite $t]]]]$
(iii) the man $[_{CP}$ who $[_{IP}$ John claims (that) $[_{IP}$ he will invite $t]]$
In (i), rejecting COMP-to-COMP movement and assuming, following Aoun et al. (1987) and Bošković (1997) among others, that nouns do not govern, *who* crosses two bounding nodes, CP and DP. In (ii), on the other hand, only CP is crossed, and in (iii), assuming that the complement clause is an IP, with *that* introduced postsyntactically, none are.

24. Bošković and Lasnik (1999) make a similar proposal that the French complementizer *que* can be inserted acyclically, although for them too it is always inserted in the syntax. In this context, they argue against the Extension Condition as a principle of UG; see also fn. 1 above.

25. *That* is a "light" or minimal functional head, and it plays a similar role in the grammars of other languages. For example, as discussed in Franks and Bański (1999), in Polish ź 'that' is inserted in empty functional head positions to support certain phonologically dependent clitic elements.

26. This kind of discrepancy between morphology and syntax is not uncommon. For example, purely functional PPs such *to the women* in (i) are created in the morphological component, hence do not count for binding purposes; cf. Yadroff and Franks (1999) for discussion.
(i) I spoke to the women$_i$ about each other$_i$.

27. An interesting question I do not explore here is why IP Fission cannot apply to create examples such as (ii) from (i):
(i) Who$_i$ do you think t_i loves Mary?
(ii) ?*Who$_i$ do you think that t_i loves Mary?
For speakers who exhibit the "*that*-trace" effect, the morphological rule of IP Fission cannot apply when [Spec, IP] is empty. One possibility is that an IP with an empty Spec is pruned down in the morphology, to something smaller than IP (or TP or AgrSP), preventing the fission rule from applying. As noted by an anonymous reviewer, IP Fission must also be prevented from applying to infinitival IP complements. This will follow, I believe, in a fully articulated system, in that fission of *that* requires a [+fin] TP, just as C° cannot dominate *that* in true infinitival CPs as well.

28. An anonymous reviewer asks why nouns never take IP complements, either in English (i) or Spanish (ii).
(i) the rumor *(that) John won five million dollars in the lottery
(ii) el rumor de *(que) Juan había ganado cinco millones en la lotería

I suspect that this is universal, and follows from the s-selectional properties of nouns, but have nothing especially insightful to add on this point to the view expressed in Grimshaw (1990), Franks (1995) or Bošković (1997) that nouns never actually (properly) govern or assign theta-roles, thus the principles deriving c-selection from s-selection properties do not hold here.

29. The prohibition against adjunction to an argument is given in Chomsky (1986: 6); Doherty (1997: 201) makes use a similar restriction (although formulated in terms of semantic selection). Possibly, adjunction disrupts theta-role assignment.

30. As noted by Doherty (1997: 210), there are some exceptions, where main clause elements can intervene even in the absence of *that*. Judgments seem to vary.
(i) a. I think in general ?(that) people tend to like him.
b. They said last year ??(that) the economy would be better by now.
b. It seems to me ?(that) she's on the right track.

31. German presents a different range of problems. Overall, as in English, the class of verbs for which the possibility of *wh*-movement out of complement clauses exists corresponds to the class of verbs which can take complement clauses without a complementizer, although there are some discrepancies. More significantly, *wh*-movement out of V2 complement clauses is sometimes possible; cf. Vikner (1995). This is problematic if V2 necessarily indicates the presence of CP, assuming V2 to be I-to-C movement; see however Zwart (1997) for arguments that some V2 clauses are IPs. Needless to say, extending the analysis proposed here to a broader range of languages is beyond the scope of this paper.

32. Obviously, this raises the issue of what motivates IP fission in general. I believe that its purpose is to provide an element to demarcate the beginning of an embedded finite clause, in this way facilitating the mapping between syntactic and morphological, which I take to be policed by Optimality Theoretic desiderata, as implied by Pesetsky (1998) and further developed in Franks (2000).

33. An anonymous reviewer raises the important question of how the analysis relates to English relative clauses, as in (18), where it would not seem that IP Fission could apply. However, resurrecting optional deletion of *that* in relative clauses would seem to contradict the spirit of the insertion analysis for bridge verb clauses. Possibly, relative clauses are optionally CPs (with a *wh*-phrase) or IPs (with optional IP Fission, in English at least); except that, as the reviewer notes, extraction is blocked, much more strongly than expected simply on the grounds of DP being a barrier. Here I would follow Bošković (1997: 25-29) in taking these relative clauses to be bare IP, with a null operator adjoined to IP.

34. Labelle (1990) argues that French-speaking children's relative clauses involve predication rather than *wh*-movement. I would simply claim that this strategy persists in the mature grammar.

35. Their s-selectional properties canonically realize the complement clause as an IP, but that does not preclude the possibility of the clause being instantiated as a CP, when forced to by independent considerations. The CP possibility can be seen in the examples in (34) and (35). The disruptive effect of intervening material seems comparable to the impossibility of bare IP complements after nouns (cf. fn. 28), although precisely how to unify these phenomena remains elusive.

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