

WHERE AUXILIARY VERBS COME FROM*

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1. Central claim

This paper argues that the English auxiliaries *do*, *be*, and *have* make no semantic contribution to a sentence, but are inserted to support stranded inflectional heads. The choice among them is syntactic, depending on structural properties of the insertion context. During the syntactic computation, *have* is inserted to support a head with a TP complement, and *be* is inserted to support other stranded heads. At PF, *do* is inserted to permit the pronunciation of a Tense head not heading a TP.

2. Theoretical context and assumptions

I assume the general approach of the Minimalist Program, (Chomsky 1995 and subsequent work), along with Distributed Morphology (Halle and Marantz 1993 and subsequent work). Thus, syntactic representations consist only of formal features, with vocabulary items inserted post-syntactically. Syntactic operations are assumed to be feature-driven, either to value an unvalued formal feature or to check an uninterpretable feature. I further assume that functional heads such as Tense, Determiner, and Complementizer consist of both interpretable features, which determine their grammaticalized semantic content, and uninterpretable features, which encode their c-selectional, agreement, and EPP properties.

2.1 Features and vocabulary items of Infl

I assume the feature-geometric analysis of English Infl in Cowper (2005), slightly modified. The features of Infl are divided into three subgroups, encoding viewpoint aspect, narrow tense, and finiteness/mood, respectively, as shown in (1).

- (1) a. Finiteness/Mood: Proposition > Finite/Deixis > Modality
- b. Narrow Tense: Precedence
- c. Viewpoint Aspect: Event > Interval

The symbol > in (1) represents dependency, with the following feature dependent upon the preceding one. Proposition distinguishes propositions from

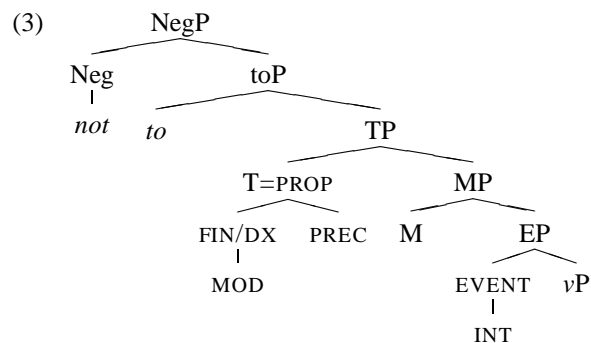
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bare events or states, and Finite licenses structural nominative case and agreement. Deixis anchors the clause to the deictic centre of the utterance (usually utterance time), while Modality encodes necessity or possibility. Precedence distinguishes past from non-past clauses. In viewpoint aspect, Event distinguishes eventive from stative clauses, while Interval distinguishes imperfective from perfective events. The vocabulary items of the English Infl system are shown in (2), along with the features that they spell out.

(2)	<i>-ing</i>	⇔	INT	<i>-es</i>	⇔	FIN/DX
	<i>-ed</i>	⇔	FIN/DX+PREC	<i>could, would, etc.</i>	⇔	MOD+PREC
	<i>-en</i>	⇔	PREC	<i>can, will, etc.</i>	⇔	MOD

2.2 Mapping to syntax - the articulation of Infl

I assume that the features of Infl map to an articulated syntactic structure, consisting of at least the projections shown in (3).



EventP, or EP, houses viewpoint aspect, and corresponds roughly to the similarly-named projection proposed by Travis (2010).¹ However, following Cowper (2005), I assume that EP appears only in eventive clauses, and is absent from stative clauses. MP, or Modal Phrase, hosts the lexical, or non-featural, content of English modals. In line with much work on modals, including that of Hall (2001), I take English modals to be portmanteau elements spelling out both lexical and inflectional content. In the spirit of Abusch (1985), I express the lexical content of the various modals with elements such as *woll*, *poss*, and *necess*. These elements move to T in the syntax, as will be discussed below.

TP in (3) hosts the features of Mood as well as Narrow Tense; in fact TP is a projection of the feature Proposition in (1). Only propositional clauses contrast

¹ Note that the version of EP used here differs from that used by Borer (2005), which appears above TP and does not distinguish events from states.

present and past, making Precedence a semantic dependent of Proposition. For familiarity, I nonetheless retain the standard label TP for this projection.

Finally, NegP hosts clausal negation. The analysis of auxiliary verbs to be proposed here makes it possible, and indeed necessary, that Neg merge as the highest element in the Infl system, above T and infinitival *to*. Space does not permit a full discussion of the merits of this move; suffice it to say that it has been argued (Zanuttini 2001) that Neg merges above T in a variety of languages, and that semantically, there is no reason to believe that clausal negation should not take scope over tense (Chierchia and McConnell-Ginet 1990: 232).

The structure in (3) raises the question of which head carries the EPP property of IP. I assume that the EPP property is true of the Infl system as a whole, and is realized on whichever projection is the last one to merge.²

3. Selection and feature-checking in Infl

It has been proposed (Adger 2010, Adger and Svenonius to appear) that Merge is triggered by a need to check categorial features. I take a slightly different view, that *s*-selectional properties trigger Merge, while category features are checked immediately on Merge. Some, but not all, interpretable features of inflectional heads assign a value to the element that checks their category feature.

The lowest Infl head, Event, carries a *c*-selectional feature [uV/uv], which can be checked either by V or by *v*. When Event bears the dependent feature INT, it also values V, so that V is ultimately pronounced with the participial suffix *-ing*. Thus, when INT is present, Event can be checked only by V, not by *v*.

M, T, and *to* all bear [uV], and thus must be checked by V. For M and *to*, this is all that needs to be said; both leave V unvalued, and it thus surfaces as a bare stem. The dependent features of T, however, affect whether and how T values V. When T bears both PREC and FIN/DX, it values the verb as a finite past-tense form. If PREC appears alone, V is valued as the past participle, while if FIN/DX appears alone, V is valued as a finite present-tense form.

MOD is somewhat different. It bears a *c*-selectional feature [uM], which must be checked by a lexical modal verb such as *woll* or one of the others listed above. In addition, [uM] is strong, forcing the lexical modal verb to move overtly to T. Since the lexical modals are a subset of the category V, [uM] will override the [uV] feature carried by a bare T head.

² See Potsdam (1997), who argues that Neg licenses ellipsis in (1). The subject *he* is thus in the specifier of NegP.

(1) Fred wants to take the car, but it's absolutely essential that he not.

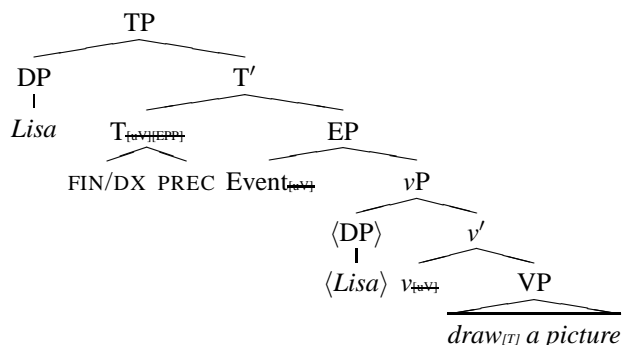
Neg carries the feature [uT]. In finite clauses, T moves overtly to Neg, so as to permit checking of Nominative case on the subject in spec/NegP.³

Two more elements affect the behaviour of auxiliary verbs in English: the passive light verb v_{PASS} , and the matrix interrogative complementizer $C_{[\text{Q}]}$. Light verbs in general bear [uV], which must be checked on Merge. Most do not value V, but the v_{PASS} does, causing it to be pronounced as the passive participle. $C_{[\text{Q}]}$ carries a strong [uT] feature, which attracts T, adjoining it to C.

Finally, a word needs to be said about the lexical verb, V. I assume that V has an unvalued inflectional feature that makes it available to check c-selectional features. As long as V remains unvalued, it can continue to check c-selectional features of higher heads as they merge. However, as soon as V is valued, it becomes inert and unavailable to check further features. If a derivation ends leaving V unvalued, it is pronounced by default as a bare stem.

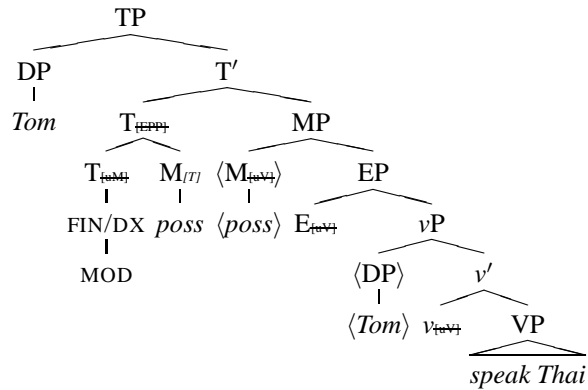
The examples in (4) and (5) show how c-selection works. Checked features are shown with a strike-through, and copies of moved constituents are shown in angle brackets. When a verb is valued on checking, the category that values it is indicated as a subscript in italics. It should also be borne in mind that the lexical items themselves are included only to make the structure easier to read; as stated earlier, only formal features are present during the syntactic computation.

(4) Lisa drew a picture.



³ I assume here that Nominative Case is the spelling-out of an uninterpretable T feature on DP, as proposed by Pesetsky and Torrego (2004).

(5) Tom can speak Thai.

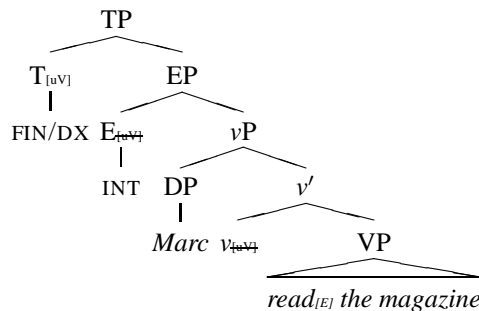


In (4), V checks [uV] on *v*, E, and T, is valued by T, and at PF is spelled out as *drew*. DP in spec/vP moves to spec/TP, checking EPP of T. In (5), T bears the feature MOD, and MP appears between T and EP. V checks [uV] on *v*, E, and M. None of these heads values V, which is pronounced as a bare stem. M moves to T, checking [uM] of T. T values M, which is pronounced as *can*. As before, DP in spec/vP moves to spec/TP, checking EPP of T.

4. Auxiliary *be*

The primary contexts of auxiliary *be* are passive and progressive clauses like those in (6). The derivation of (6b), up to the point where T merges, is shown below.

- (6) a. Sarah was hired.
b. Marc is reading the magazine.



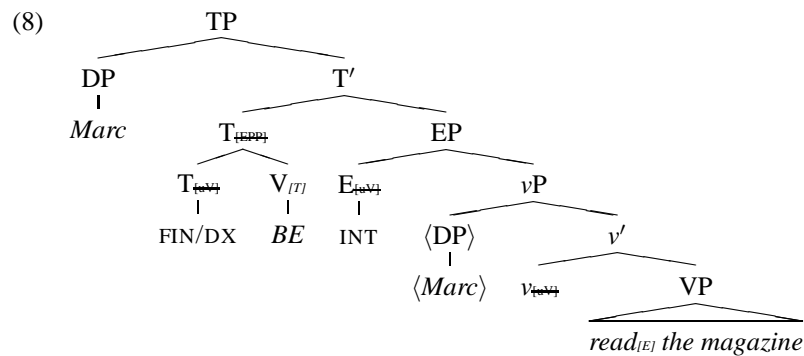
Here, V checks [uV] on *v* and E. Since E bears INT, it values V, making V unavailable for further checking. Thus, no verb is available to check [uV] of T. The derivation cannot proceed, since c-selection must happen immediately upon Merge.

Effectively, then, T is stranded in (6), in the sense that there is no verb in the structure that can check T's features, or realize any inflectional value that T may

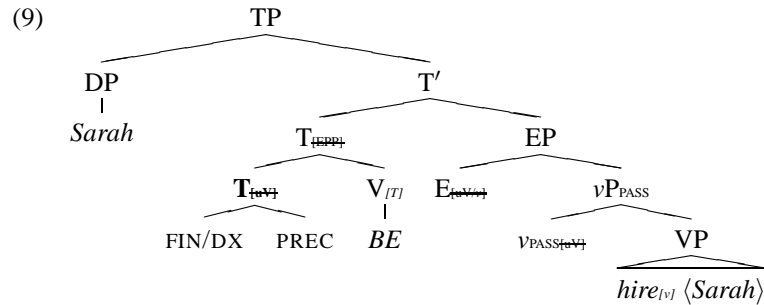
have to assign. Let us refer to this as being stranded on Merge, or Merge-stranded, as in (7a). This, I propose, is the trigger for the rule of BE-support, given in (7b).

- (7) a. **Stranded on Merge:** A head is Merge-stranded if it has an uninterpretable category feature that cannot immediately be checked.
 b. **BE-support:** The verb *be* is inserted in a Merge-stranded Infl head.

Once *be* is inserted, it immediately checks [uV] of T, and is valued by T. The subject DP moves to spec/TP, checking EPP of T, giving (8).

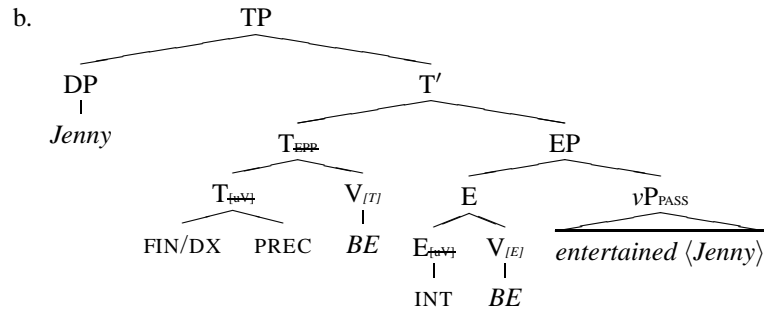


(6a) is similar, except that v_{PASS} values V. v_{PASS} itself checks [uV/V] on E, but cannot check [uV] of T. Be-support thus applies at T, as shown in (9).



(10) combines the situations in (8) and (9). V checks and is valued by v_{PASS} . E[INT] is merge-stranded, triggering *be*-support. *Be* checks and is valued by E, so that T is merge-stranded. *Be*-support applies again, giving the structure in (10b).

- (10) a. Jenny was being entertained.



Inserting *be* directly on stranded heads predicts, without further head movement, that if T moves to a higher head like Neg or C, *be* will also move, as in (11).

- (11) Ben isn't reading the magazine. / Is Ben reading the magazine?

5. Copular *be*

The literature is full of discussions of whether copular *be* should be treated as a lexical verb, or whether it simply supports otherwise stranded morphological elements (Eide and Åfarli 1999, Cann 2003, Schütze 2004, Progovac 2006, many others). Wherever copular *be* originates, it is clear that it sometimes ends up in an inflectional head. First, copular *be* moves to Neg and to C just as auxiliary *be* does. In this, copular *be* contrasts with lexical verbs (13a), which remain *in situ*.

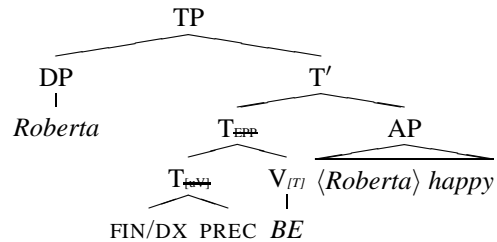
- (12) George isn't happy. / Is George happy?
 (13) a. *George seemsn't happy. / Seems George happy?
 b. George doesn't seem happy. / Does George seem happy?

Second, copular *be* is not deleted in ellipsis, as in (14), just like the auxiliary *be* in (15). Again, this contrasts with lexical verbs, as in (16).

- (14) a. Rint is ready to go, and Lisa is ⟨ready to go⟩ too.
 b. *Rint is ready to go, and Lisa does ⟨be ready to go⟩ too.
 (15) Rint is going to Paris, and Lisa is ⟨going to Paris⟩ too.
 (16) a. Philip seemed worried, but Tanya didn't ⟨seem worried⟩.
 b. *Philip seemed worried, but Tanya seemedn't ⟨worried⟩.

These data follow automatically if copular *be* is inserted by *be*-support, as in (17). With no verb in the sentence, T is Merge-stranded, triggering *be*-support.

(17) Roberta was happy.

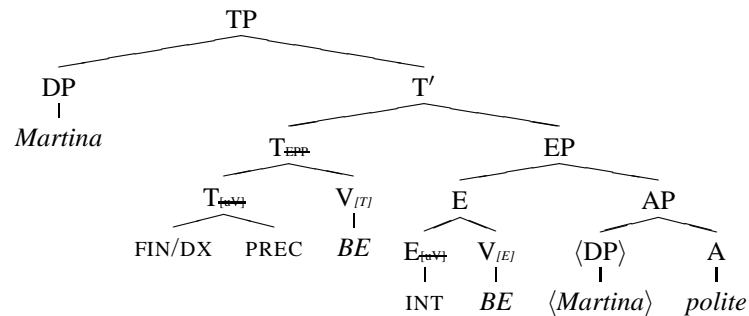


Some instances of *be* seem to carry more meaning than the one in (17). In (18), *be* seems to be both eventive and agentive. If all instances of *be* arise by the rule of *be*-support, an account will have to be given of such cases.

- (18) a. Martina was being polite.
b. Wayne was rude three times.

The first piece of the answer is that EP is present in these two sentences—in (18a) along with INT. In (18a), both E and T are merge-stranded. Since both heads value V, *be*-support applies twice, as shown in (19).

(19)



The difference between (18a) and (18b) is that in (18b), E lacks INT, and thus does not value *be*. *Be* remains available to check and be valued by T. For reasons that are not entirely clear, *be* moves overtly from E to T. This can be seen from the fact that it subsequently moves to Neg or to C, as in (20).

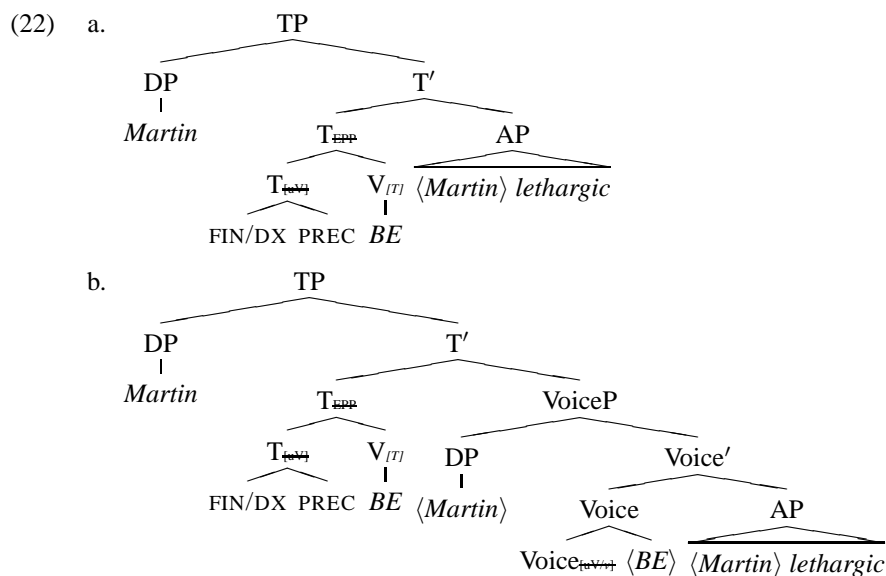
(20) Wayne wasn't rude even once today. / Was Wayne rude at all today?

The presence of E in such sentences accounts for the eventive interpretation. Agentivity in a copular sentence correlates fairly strongly with eventiveness, but not perfectly, as shown by the data in (21).

- (21) a. i. Martin was lethargic all day. (state, non-agentive)
ii. Martin was deliberately lethargic all day. (state, agentive)
b. i. The baby was sick twice, so I took her home. (event, non-agentive)

- ii. Billy was sick on purpose, but he cleaned it up. (event, agentive)

Following and slightly adapting Kratzer (1996), I assume that agentive external arguments are merged in, or moved to, the specifier of Voice.⁴ I further propose that Voice may merge in a clause that lacks a lexical verb, but that like other inflectional heads, Voice bears a [uV] feature. The difference between the (i) and (ii) examples in (21) is thus due to the presence or absence of VoiceP above AP, as in (22).



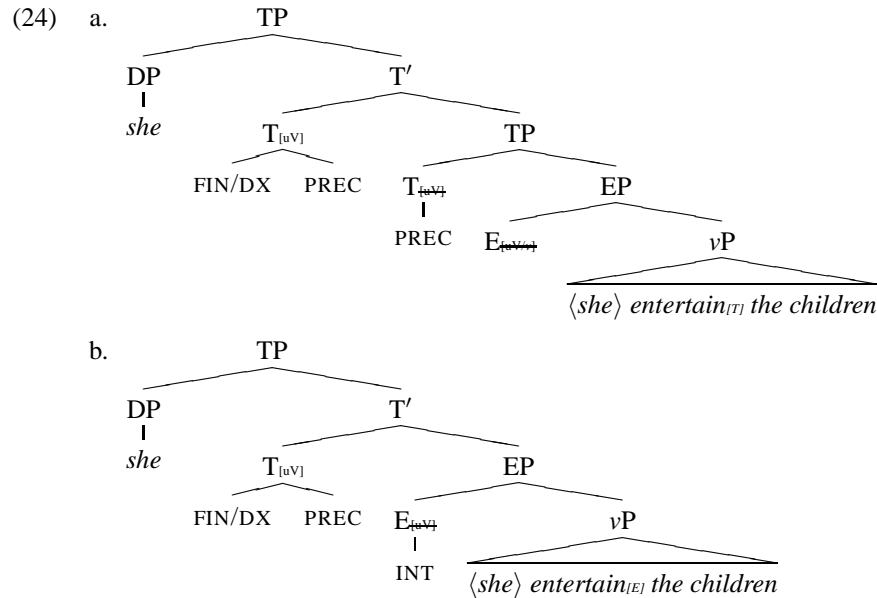
6. Auxiliary *have*

This section shows that the choice between the auxiliaries *be* and *have* is structural. Both are inserted to support Merge-stranded heads, but *have* is subject to an additional contextual restriction. Specifically, *have* is inserted only when the stranded head has a TP complement. This can be seen by comparing (23a) with (23b).

- (23) a. She had entertained the children.
 b. She was entertaining the children.

⁴ As noted by Jackendoff (1972), the thematic role of agent frequently combines with other thematic roles such as theme, source, goal, or location. This is expected if the specifier of Voice can be filled either by external Merge, giving a pure agent, or by Move/Internal Merge, adding agentivity to an argument originally merged in another thematic position.

Both sentences contain a single auxiliary verb and a participle. If both auxiliaries are inserted by a syntactic rule, then we must explain why *have* is inserted in the first case, and *be* in the second. The difference between the two sentences can be seen in (24). The structure in (24a) has two TP projections, while the structure in (24b) has only one.



In (24a), V checks [uV] of E and T and is valued by T; the higher T is Merge-stranded. In (24b), since E bears INT, V is valued by E and cannot check [uV] of T. T is thus Merge-stranded in both sentences. The crucial difference, which determines auxiliary choice, is that the stranded T in (24a) has a TP complement, while the one in (24b) does not. When a merge-stranded head has a TP complement, *have*, not *be*, is inserted, as stated in (25).

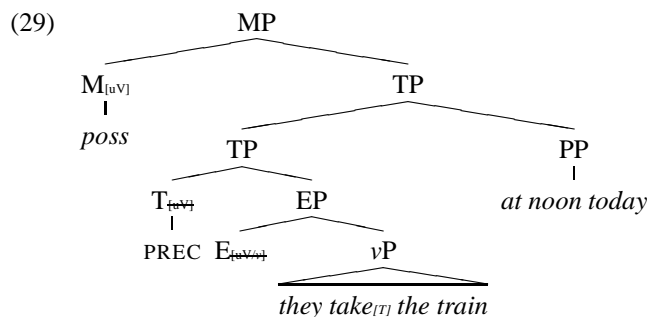
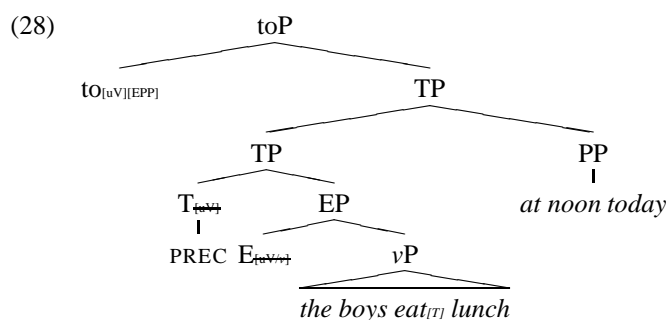
- (25) **Aux-Support:** *Have* is inserted in a Merge-stranded Infl head with a TP complement. *Be* is inserted in any other Merge-stranded Infl head.

This rule accounts for the appearance of *have* in perfect forms like (23a), and also in two superficially similar constructions that are not perfect, but rather simply nonfinite past forms. Consider (26) and (27).

- (26) a. We believe the boys to have eaten lunch at noon today.
 b. We believe that the boys ate lunch at noon today.
 c. We believe that the boys have eaten lunch (*at noon today).
- (27) a. They may have taken the train at noon today.

- b. It may be that they took the train at noon today.
 c. It may be that they have taken the train (*at noon today).

In both of these examples, the (a) sentence is closer in meaning to the (b) sentence, which contains a simple past tense complement, than to the (c) sentence, whose complement is in the perfect. The distinction is highlighted by the adverbial *at noon today*, which cannot appear with the perfect and is thus impossible in the (c) sentences. I conclude from this that *have* in the (a) sentences has nothing to do with the perfect. Rather, each of these sentences contains a Merge-stranded head with a TP complement, as shown in (28) and (29).



In both cases, V checks [uV] of *v*, E, and T, is valued by T, and is pronounced as a past participle. V is thus unavailable to check [uV] of a higher head, *to* in (28) and the modal *poss* in (29). Those heads are Merge-stranded, triggering Aux-support. Since the complement is TP, *have* is inserted rather than *be*.

7. T outside TP: DO-support

The conditions governing the insertion of auxiliary *do* are quite distinct from those triggering Aux-support. In this section, I show that *do* is inserted at PF to permit

the pronunciation of a T that does not head a TP.

Do is inserted when T moves to a higher head such as Neg or C. Assuming that Neg is merged above T, T moves to Neg in finite clauses so as to be local to C and permit nominative case to be checked on spec/Neg (cf. Pesetsky and Torrego 2004). In nonfinite clauses, T remains in situ, as illustrated in (30), and checks [uT] of Neg under Agree.

- (30) We expect the children [not to be talking when the curtain went up].

T-movement to $C_{[Q]}$ in a matrix question is triggered by strong [uT] of C. When Neg and $C_{[Q]}$ both appear, T moves first to Neg, and [T+Neg] moves to $C_{[Q]}$.⁵

There are two possible situations when T moves to Neg or to $C_{[Q]}$. T may already contain a verbal element, such as *be*, *have*, or a modal. In that case, the verbal element automatically moves with T, and is pronounced in Neg, or in C, as the case may be. The second possibility, which concerns us here, is that T does not contain a verbal element, as in (31).

- (31) a. She didn't entertain the children.
 b. Did she entertain the children?
 c. She entertained the children.

The structure below TP is identical in all three sentences in (31). We expect V to check [uV] of v , E, and T in all three, and to be pronounced as *entertained*. This expectation is fulfilled only in (31c); in the other two the verb is pronounced as a bare stem. Under a cyclic view of syntax, there is no obvious way to prevent checking between V and the heads up to and including T. Neg and C are merged above TP, after [uV] of T is checked. Somehow, movement of T breaks the already-established relation between T and V, preventing T from being spelled out on V, and stranding T.

Intuitively, the problem seems to be that the features of T cannot be realized without a verbal stem to host them. This problem arises only when T moves out of TP. Following a suggestion by D. C. Hall (p.c.), I propose a PF requirement that if T is not dominated by the TP it heads, it must be phonetically realized, whether or not it has been checked or has valued V. I also assume, standardly, that affixes cannot be pronounced unless they are attached to a stem. If this idea is on the right track then any moved T that does not contain a verbal element will be uninterpretable at PF. This gives us the environment for *do*-support, stated in (32).

⁵ Space does not permit a discussion of the differences in behaviour between *not* and *n't*, exemplified in (1).

- (1) a. Haven't you seen his new car?
 b. Have you not seen his new car?

I restrict attention here to the dependent form, *n't*, which moves with T when T moves past NegP to C.

- (32) **DO-support:** *Do* is inserted at PF to permit pronunciation of a T not heading a TP.

A sentence like (31b) would thus be derived as follows. When T Merges, it is checked by and values V. When C merges with TP, T moves to C, checking strong [uT] of C. After Vocabulary Insertion, the fact that T has moved out of TP makes the inflectional value of V unrecoverable, and the verb is pronounced, by default, as a bare stem. Since T is outside TP, it must be phonologically realized, but contains no stem to host its features. *Do*-support therefore applies at PF.

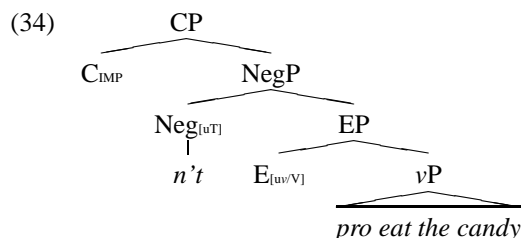
Do-support thus has a different status from *be*-support and *have*-support, in that it is not triggered in the syntax by the need to check features, but rather at PF by the need to pronounce a T that is not in TP.

7.1 Negated imperatives: T-support?

The account proposed here makes possible a simple account of an initially mysterious property of English negated imperatives. In declaratives and interrogatives, *do*-support applies only in the absence of other auxiliary verbs. However, in negated imperatives, *do* is required regardless of the presence of other auxiliaries or copular *be*, as shown in (33).

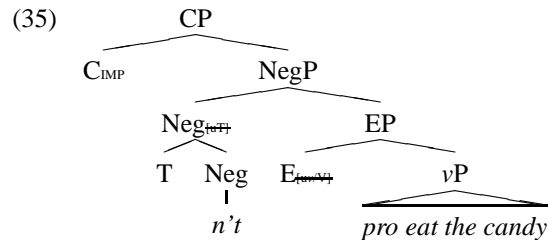
- (33) a. Don't eat the candy.
 b. Don't be eating candy when I arrive. (cf. *Be n't eating candy...)
 c. Don't be surprised when the bell rings. (cf. *Be n't surprised...)
 d. Don't be rude. (cf. Be n't rude.)

Suppose that imperative clauses lack TP, consisting of C_[IMP] with an EP complement. In negated imperatives, NegP appears between C and EP. Crucially, the same clausal NegP appears here as in declaratives and interrogatives, and its head thus has a strong [uT]. A sentence like (33a) thus has the structure in (34).



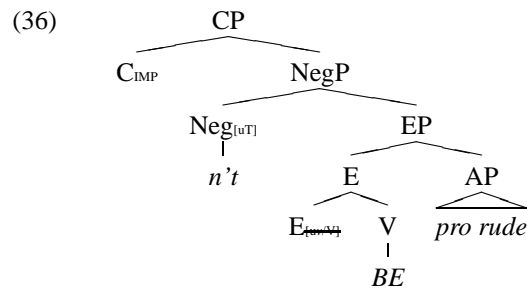
V checks [uV] of E in the ordinary way. When Neg merges, there is no T to check [uT] of Neg. The situation here is parallel to the one we saw earlier, where *have/be* was inserted to check [uV] of a Merge-stranded head. Here, the unchecked feature

is [uT], and a T head is thus inserted on the head, as in (35). The inserted T makes no semantic contribution; it is there only to permit feature-checking.



This structure satisfies all syntactic requirements. However, at PF, T runs afoul of the requirement that T not heading a TP must be pronounced. This situation triggers *do*-support, and the result is (33a).

The T-insertion rule proposed here automatically predicts that *do* is inserted in negated imperatives even when the clause contains an auxiliary or copular *be*. Consider the structure of (33d), shown in (36).⁶



As shown, *be* checks [uV] of E. Neg is Merge-stranded, and T is inserted to check [uT] of Neg. However, the inserted T is merely a dummy categorial head. It does not s-select or c-select, and thus does not enter into an Agree relation with *be*. At PF, *do* is inserted to permit pronunciation of T not heading TP.

If we assume, in the spirit of Laka (1990), that clausal negation and affirmative emphasis instantiate the same head, and further assume that both bear [uT], then emphatic *DO*-support, as in (37), follows automatically.

- (37)
- a. I haven't read the play, but I **do** know the actors reasonably well.
 - b. **Do** come in. We're happy to see you.
 - c. I don't know the answer, but I **have** thought about the question.
 - d. He **must** come to the party. He's so entertaining.

⁶ I have omitted VoiceP from this structure, as it makes no difference to the point at issue.

Inserted *do* exhibits the same initially puzzling pattern in emphatic imperatives as it does in negated imperatives, as shown in (38).

- (38) a. **Do** be quiet—we're trying to hear the birds.
 b. Please **do** be sitting perfectly still when the inspector arrives.

8. Consequences and further questions

We have seen that the conditions determining auxiliary verb insertion arise either during the syntactic computation (for *be*, *have* and T), or in the post-syntax (for *do*). It thus seems that some grammatical formatives are inserted during the syntactic computation, while others are inserted postsyntactically. This is an expansion of the range of possibilities available to Distributed Morphology. It would be worth exploring whether it might be possible to insert simply a dummy categorial head in the syntax, and spell it out postsyntactically as *have* or *be*. The problem that will have to be solved, under such an approach, is that the conditions determining the choice between *have* and *be* hold during the syntactic computation, and may not be recoverable in the postsyntax.

Another question raised by the analysis sketched here is that of the relation between auxiliary verbs and their main-verb counterparts. We saw that it might be possible to account for all instances of *be* with the rule of Aux-support, but both *have* and *do* have uses that cannot be assimilated to the analysis given here. In addition, the analysis is interesting to the extent that it can be shown to exemplify a cross-linguistic phenomenon. Further work is required to determine whether auxiliary verbs in other languages can be treated in a similar fashion.

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