From economy to locality: *do*-support as head movement

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Abstract:

Since the early days of Minimalism, locality and economy have been two of the dominant topics of investigation in syntactic theory, and in many domains of inquiry, the two have become finely intertwined. Often explanations of empirical phenomena switch from using the terms of one to explain problems for the other. This article makes such a contribution, explaining an outstanding problem for well-established economy conditions – namely, Last Resort *do*-insertion – partly in terms of an independently attested locality constraint, Attract Closest. Specifically the article argues that *do*-support involves movement of *v*, and that syntactic locality constraints and morphological conditions on the pronunciation of *do* conspire to provide *do*-support's apparently Last Resort nature. Evidence comes from the construction known as "British *do*;" I show that evidence for separating this construction from standard *do*-support is not compelling, and instead motivate a reanalysis of *do*-support with the attempt to give standard *do*-support and British *do* (and its quirks) a unified explanation. In doing so the article dispenses with the problematic violation of Inclusiveness that comes with standard "Last Resort" accounts of *do*-support, and it provides a solution for other empirical problems along the way.

1. Introduction

Since the early days of Minimalism, locality and economy have been two of the dominant topics of investigation in syntactic theory, and in many domains of inquiry, the two have become finely intertwined. Often explanations of empirical phenomena use the terms of one domain to explain problems for the other; for example, Fox (2000) explains the locality constraints on Quantifier Raising in terms of Scope Economy, removing an outstanding problem for accounts of locality in A-bar dependencies. In this article, I intend to make a contribution in the other direction, explaining an outstanding problem for well-established economy conditions – namely, Last Resort *do*-insertion – partly in terms of an independently attested locality constraint, Attract Closest. Specifically the article argues that *do*-support involves movement of *v,* and that syntactic locality constraints and morphological conditions on the pronunciation of *do* conspire to provide *do*-support's apparently Last Resort nature and its exceptions.

The paper is structured as follows. Section 2 summarises the standard account of *do*-support and outlines its problems. Section 3 discusses previous analyses of the phenomenon of "British *do*," discussing the problem it poses for the Last Resort analysis, showing that an ellipsis analysis is to be preferred, specifically an analysis in which British *do* involves raising of *v* to a lower inflectional projection. The section concludes that there are no reasons to exclude British *do* from the standard *do*-support paradigm. Section 4 argues for an analysis where all *do*-support involves *v*-raising, first entertaining a model similar to that of Embick & Noyer (2001) before rejecting it in favour of an alternative analysis. Section 5 concludes.

2 The analysis of *do*-support
2.1 Last Resort insertion

The insertion analysis of *do*-support has its roots in Chomsky (1957), and the economy-based explanation in modern Minimalism has been developed most explicitly by Chomsky (1995) and Lasnik (2000) among others, building on Pollock's (1989) analysis of verb raising. *Do*-support is the standard English phenomenon where the dummy verb *do* appears bearing tense and agreement morphology in certain environments: *do* appears in the presence of sentential negation, T-to-C movement and VP-ellipsis when there is no auxiliary verb to bear the morphology in these environments. The basic paradigm is in (1)-(3):

(1) a. Rab will leave.
    b. *Rab not left.
    c. Rab didn't leave

(2) a. When will Rab leave?
    b. *When Rab left?
    c. When did Rab leave?

(3) a. Rab has left, and Morag has, too.
    b. *Rab left, and Morag, too.
    c. Rab left, and Morag did, too.

It is typically assumed that *do*-insertion is restricted to these environments as a Last Resort in the absence of V-raising to T, in order to prevent T from remaining unaffixed; economy conditions thus prevent *do*-insertion when it is not required. This explains the ungrammaticality of *do*-insertion in (4):

(4) a. *Rab did will leave.
    b. *When did Rab will leave?
    c. *Rab has left, and Morag did, too [interpreted as "Morag has left, too"]

Finally, *do*-support appears in simple declarative sentences if *do* is stressed, and ungrammatical if unstressed. The classic analysis, from Chomsky (1957), is that an emphatic projection ΣP intervenes between the affixes on T and the main verb, much like NegP in negated sentences; it thus follows from the modern economy-based approach that the non-emphatic *do* is ungrammatical because it is not necessary:

(5) a. Rab DID leave.

b. *Rab did leave [non-emphatic 'did']

In the economy approach (i.e. Chomsky 1995), Last Resort operations are typically "language-particular" and part of the non-core syntax; by standard definitions of economy conditions, a non-core operation should only occur if it is necessary, since a comparable derivation without this operation would be lest costly and hence preferred. Thus *do*-support seems to provide evidence for Last Resort operations as a reflex of derivational economy.

2.2 Problems

Unfortunately, this particular economy explanation is inconsistent with other, more central economy conditions that have been proposed in the recent work of Chomsky (2000, 2004). As pointed out by Haddican (2007a), *do*-insertion as a Last Resort operation constitutes a violation of Inclusiveness, which prevents the introduction of material into a computation that was not present in the initial Numeration. Chomsky (2000: 104) points that Inclusiveness is necessary for the definition of competing derivations in economy metrics, and as such it is the condition upon which economy-based accounts are constructed. From the perspective of recent Minimalist work, then, the Last Resort insertion analysis of *do*-support is fundamentally flawed at the theoretical level.[1] In addition, diachronic and synchronic variation in the distribution of *do*-support indicates that the Last Resort analysis is flawed at the empirical level. Schütze (2004) reports a number of phenomena from English dialects and related Germanic variants in which *do*-support seems to be able to freely appear in the non-emphatic form, as in (5b); for example, sentences like (5b) are attested and acceptable in South-Western dialects of British English (Klemola 1998).

 These empirical and theoretical problems have led to a number of attempts at reanalysing *do*-support and related phenomena, such as Haddican's (2007a) analysis of *do*-support in Basque and Schütze's (2004) account of the aforementioned variation in Germanic. In what follows I develop an alternative analysis motivated by a phenomenon known as "British *do*." This is a construction found in British dialects of English, in which a superfluous *do* appears at the edge of what appears to be a VP-ellipsis site after a modal or auxiliary. The *do* in these examples has no lexical semantic content, like standard *do*-support, and it occurs optionally, in that British dialects vary freely between this and the standard *do*-less VP-ellipsis cases. This is demonstrated below:

(6) a. Rab should leave, and Morag should do, too.
 b. Rab has left, and Morag has done, too.

This presents a strong empirical challenge to the Last Resort analysis of *do*-support.

 Some previous analyses of British *do* (Schütze 2002, Baltin 2006, Haddican 2007b) have argued that it should be treated as a separate phenomenon from the standard *do*-support in VP-ellipsis, the latter two arguing instead that it is a verbal proform like *do so*. In what follows I will show that the arguments for this analysis are not compelling. Instead I will argue that the *do* in examples like (6) is the same *do* that appears in standard VP-ellipsis, and I will use this insight to motivate a reanalysis of *do*-support (similar in some respects to that of Embick and Noyer 2001) as head movement of little *v*. I then show how this can account for the standard paradigm, as well as other diachronic variations in the distribution of *do*.

3. The analysis of British *do*
3.1 British *do* is a proform

The argument the proform analysis of British *do* is based on the observation that it behaves like *do so* (which is available in most dialects of English) in some situations where it does not behave like VP-ellipsis. *Do so* has traditionally been understood to be a proform (Ross 1970, Johnson 2001), since it seems to lack the internal structure of a VP-ellipsis. Thus wh-extraction (7) and inverse scope readings (8) are possible with VP-ellipsis, but impossible with *do so* and British *do*:

(7) a. Although I don't know which book Fred will read, I do know which book Tom will.
    b. *Although I don't know which book Fred will read, I do know which book Tom will do.
    c. *Although I don't know which book Fred will read, I do know which book Tom will do so.

(8) a. Some man will read every book, and some woman will, too. ∃>∀, ∀>∃
    b. Some man will read every book, and some woman will do, too. ∃>∀, *∀>∃
    c. Some man will read every book, and some woman will do so, too. ∃>∀, *∀>∃

This indicates that British *do*, like *do so* and unlike VP-ellipsis, does not allow for A-bar extraction. Baltin (2006) argues that *do* and *do so* also disallow A-extraction, on the basis of their incompatibility with passives:

(9) a. The steak was eaten by Bill, and the fish was, too.
    b. *The steak was eaten by Bill, and the fish was done, too.
    c. *The steak was eaten by Bill, and the fish was done so, too.

Assuming that the ban on A-extraction is caused by the lack of internal structure in both *do so* and British *do*, Baltin (2006) concludes that British *do* must be a proform.

3.2 British *do* is not a proform

In later work, Baltin (2007) showed that British *do* does in fact accommodate A-chains, in raising and unaccusative constructions; in this respect, it patterns with ellipsis and not *do so*:

(10) a. John might seem to enjoy that, and Fred might, too.
    b. John might seem to enjoy that, and Fred might do, too.
    c. ??John might seem to enjoy that, and Fred might do so, too.

(11) a. The river will freeze solid, and the lake will, too.
    b. The river will freeze solid, and the lake will do, too.
    c. ??The river will freeze solid, and the lake will do so, too.

This leads Baltin to propose an alternative analysis of British *do* as a sub-form of VP-ellipsis, combined with a more articulated version of the *v*P shell as containing both a *v*P and a VoiceP projection.

However, as Carson Schütze (p.c.) points out, the incompatibility of *do so* with unaccusatives and raising does not necessarily diagnose the impossibility of A-chains. Rather, *do so* is incompatible with these environment because it requires a volitional non-stative predicate as its antecedent; this is confirmed by (12), which shows that *do so* is in fact compatible with raising predicates and unaccusatives when this requirement is satisfied:

(12) a. John appeared from out of nowhere, and Mary did so too.
    b. Mary arrived at the last possible moment, and John did so too.

Thus the data from A-movement does not provide a knock-down argument against the proform analysis of British *do* (see also Hallman 2004).

      Nevertheless, what this does show that *do so* differs from British *do* in that it is more restricted in its distribution, in that *do so* places restrictions on the thematic structure of the verb in the parallel construction (its antecedent), while British *do* has no such requirement. The fact that British *do* is incompatible with the passive must be due to some other syntactic issue than thematic structure, since we can see that subject experiencers are fine with British *do*, while passivized object experiencers are not:

(13) a. Rab will enjoy this, and Morag will do, too.
    b. *Rab was irritated by this, and Morag was done, too.

(13a) demonstrates that the VP related to the *do*-constituent (anaphorically or otherwise) must be able to assign an experiencer theta-role; since (13b) is still unacceptable, we can surmise that theta-role assignment is not the cause of its ill-formedness. In this respect, then, British *do* is different from the proform *do so*.[2]

      Here I present four sources of evidence against the proform analysis. The first source of evidence is from binding: Condition B diagnostics (modeled on Kennedy 2004) indicate that the gaps in British *do* constructions pattern with standard VP-ellipsis and against the proform *do so* with respect to the presence of internal structure:

(14) a. *Kim takes care of him$_i$ because he$_i$ won't.
    b. *Kim takes care of him$_i$ because he$_i$ won't do.
    c. Kim takes care of him$_i$ because he$_i$ won't do so.

On the assumption that ellipsis is PF deletion that is subject to semantic parallelism conditions (Merchant 2001), the ungrammaticality of (14b) indicates that the gap that follows *do* is an ellipsis site containing "take care of him;" if *do* were a proform, we would expect alleviation of the binding violation like we see with *do so*.[3]

      The second source of evidence is an expanded scope paradigm: looking at the ways in which subjects and objects scope in the three test structures, it appears that what is diagnosed by the data from inverse scope in (8b) is the impossibility of reconstruction, rather than extraction, in British *do* sentences. Johnson and Tomioka (1998), Hornstein (1995), Fox (2000) and many others have argued that object>subject scope readings are produced by a combination of object QR and subject reconstruction. Thus the absence of object>subject readings does not directly diagnose the lack of QR; rather, this could plausibly be precipitated by a ban on subject reconstruction.

This appears to be the case with the British *do* sentences. Quantified objects can marginally take wide scope over sentential negation with British *do* sentences, in parallel with VP-ellipsis and unlike *do so* anaphora, indicating QR (and hence extraction) is not a problem for British *do* sentences:[4]

(15) a. Rab won't finish two thirds of the exam. Morag won't, either. ?2/3 > ¬
    b. Rab won't finish two thirds of the exam. Morag won't do, either. ?2/3 > ¬
    c. Rab won't finish two thirds of the exam. Morag won't do so, either. *?2/3 > ¬

Given (15) and (8), we can predict that British *do* sentences will pattern against VP-ellipsis with respect to the availability of inverse scope readings with sentential negation and quantified subjects. Somewhat remarkably, this prediction is fulfilled, as we can see for the different subject QPs in (16)-(18):

(16) a. Every boy won't finished the exam, and every girl won't, either. ∀>¬, ¬> ∀
    b. Every boy won't finished the exam, and every girl won't do, either. ∀>¬, ??¬>∀
    c. Every boy won't finished the exam, and every girl won't do so, either. ∀>¬, ¬>∀

(17) a. Two thirds of the boys won't pass the exam. Two thirds of the girls won't, either. 2/3>¬, ¬> 2/3
    b. Two thirds of the boys won't pass the exam. Two thirds of the girls won't do, either. 2/3>¬, ??¬> 2/3
    c. Two thirds of the boys won't pass the exam. Two thirds of the girls won't do so, either. 2/3>¬, ¬> 2/3

(18) a. A boy won't finish the exam, and a girl won't, either. ∃>¬, ¬>∃
    b. A boy won't finish the exam, and a girl won't do, either. ∃>¬, ??¬>∃
    c. A boy won't finish the exam, and a girl won't do so, either. ∃>¬, ¬>∃

Furthermore we can see that British *do* patterns against both VP-ellipsis and *do so*, indicating that this anti-reconstruction is peculiar to that construction, and that we may still maintain that *do so* does in fact prevent extraction.

Regardless of the analysis of what causes these anti-reconstruction effects, the data in (16)-(18) significantly underwhelms the argument that British *do* prevents extraction and must therefore be analysed as a proform. If British *do* somehow prevents reconstruction, the data from wh-extraction can also be explained, since it is well-known that wh-extraction always requires some degree of reconstruction, as attested by well-known Condition C effects (see Chomsky 1995, Fox 1999, Takahashi and Hulsey 2009, Thoms 2011b for discussion):

(19) *Which corner of John's$_i$ room was he$_i$ sitting in?

The inability to reconstruct in British *do* sentences may thus explain the ungrammaticality of wh-extraction (and other kinds of extraction), on the assumption that blocking obligatory reconstruction can lead to some sort of problem with the wh-chain. The availability of extraction, contrasted with its non-availability in *do so* sentences, thus provides further evidence for British *do* as an ellipsis site rather than a proform.

The third source of evidence for this analysis of British *do* comes from restrictions on the morphological form of *do*. (6) shows that British *do* can appear at different points in the inflectional layer, bearing the *-0* morpheme in (6a) and the *-en* morpheme in (6b); in this respect, its distribution is similar to auxiliary and copular *be* in VP-ellipsis:

(6) a. Rab should leave, and Morag should do, too.
    b. Rab has left, and Morag has done, too.

(20) a. Rab will be late, and Morag will be, too.
     b. Rab has been singing all day, and Morag has been, too.

What is interesting is that British *do* also patterns with be in its inability to appear next to an ellipsis site in the *-ing* form; both contrasts strongly with *do so*, which readily occurs in the *-ing* form:[5]

(21) a. *Rab is being an idiot, and Mary is being, too.
     b. *Rab is throwing a TV out the window, and Morag is doing, too.
     c. Rab is throwing a TV out the window, and Morag is doing so, too.

This restriction on the *-ing* form is typically understood as an ellipsis licensing phenomenon (Johnson 2001; see Thoms 2011a for a recent account of this restriction), so this seems to indicate again that what we see in British *do* sentences is an ellipsis phenomenon.

Finally, the fourth source of evidence comes from the fact that British *do* seems to be able to appear in pseudogapping, unlike the verbal proform *do so* (Schütze 2002):

(22) a. Doesn't the election worry you? It would do me.
     b. *Doesn't the election worry you? It would do so me.

Although examples like (22a) can sound a little strained, perhaps as a reflex of the general markedness of pseudogapping,[6] it contrasts strongly with the *do so* example, which is totally unacceptable. We should note that these examples seem to give further indication that British *do* does not categorically disallow extraction, since it is typically assumed that pseudogapping is derived by moving the argument DP out of the VP before VP ellipsis.[7]

To summarise, we can see that none of the arguments for dismissing British *do* as a proform, rather than an instantiation of *do*-support, are compelling. There is clear evidence to indicate that British *do* sits on the edge of an ellipsis site, just as standard *do* does in VP-ellipsis. If we bite the bullet and take them to be different instantiations of the same general phenomenon, the Last Resort account is lost. Nevertheless, in what follows I will argue that by facing this problem head-on, and considering parallels between *do*-support and other auxiliaries in VP-ellipsis, we can develop a better analysis of *do*-support that accounts for the ellipsis facts, the standard paradigm and a number of the other outstanding 'exceptions,' all while unburdening the analysis of its reliance upon Last Resort insertion.

3.3 British *do* and verb floating

Once we acknowledge that British *do* involves VP-ellipsis, it becomes apparent that, taken as instantiations of the same general phenomenon, British *do* and standard VP-ellipsis *do*-support mirror exactly the behaviour of the other auxiliaries and raising verbs in English. As is well known, the auxiliaries have and be are found in T and can raise to C:

(23) a. Rab is not running the marathon.
　　 b. Rab has not ran a marathon before.
　　 c. Is Rab running the marathon?
　　 d. Has Rab ran a marathon before?

They can also optionally appear below the highest auxiliary in VP-ellipsis constructions; in what follows, I refer to this optional appearance of a verb in the lower inflectional layers in VP-ellipsis as "verb floating" (after Thoms 2011a):

(24) a. Rab will be running late, and Morag will (be), too.
　　 b. Rab should have arrived by now, and Morag should (have), too. [8]
　　 c. Rab might have been fired, and Morag might (have (been)), too.

Floating is not just restricted to the auxiliaries, however; rather, any verbs that can raise to T can also float. Main verb *be* raises in English, and it can float:

(25) a. Rab is not a fool.
　　 b. Is Rab a fool?
　　 c. Rab might be a fool, and Morag might (be), too.
　　 d. Rab might have been a fool, and Morag might (have (been)), too.

In British English, unlike American English, the possessive/copular *have* can raise to T and (for many dialects) further to C:[9]

(26) a. I haven't any money left. *OK BrE; *AmE*
　　 b. I've a copy of *Lolita* you can borrow. *OK BrE; *AmE*
　　 c. Rab has a copy of *Lolita*, hasn't he? *OK BrE; *AmE*
　　 d. Have you any money left? *%OK BrE; *AmE*

(27) shows us that, when *have* can raise, it is able to float above ellipsis:

(27) a. Q: Do you think Rab has a copy of *Lolita*?
　　　　 A: I think he has. *OK BrE; *AmE*
　　 b. Q: Do you think Rab has a copy of *Lolita*?
　　　　 A: He should have. *OK BrE; *AmE*
　　 c. Q: Do you think Rab would have had a copy of *Lolita* with him?
　　　　 A: I guess he would have had. *OK BrE; *AmE*

The data thus indicates that verbs can float because they can raise. We may assume (with Thoms 2011a) that floating verbs have raised into their surface positions in the inflectional layer, where they merge with the relevant inflectional affixes and license ellipsis at their right edge.

We can see that the distribution of *do* is the same as the other raising verbs, in that it can appear in T, it can raise to C, and it can survive ellipsis either as the sole auxiliary or as a floating verb:

(28) a. Rab does not believe me.
　　 b. Why does Rab believe me?
　　 c. Rab believes me, and Morag does, too.
　　 d. Rab will believe me, and Morag will do, too.
　　 e. Rab should have believed me, and you should have done, too.

Since a verb's ability to float is tied to its ability to raise from a lower position, I propose that the *do* we see in these environments is a raising verb like the others: that is, it raises from a lower position whenever it appears in T, in C, or in a floating position. I follow Stroik (2001), Embick and Noyer (2001) and Baltin (2007) in assuming that *do* is the spellout of little *v* (when it is not head-adjoined by the main verb V). British *do* is thus understood as an example of *v*-floating, and standard *do*-support occurs when *v* raises to T or C. It is worth noting that, if we were to deny that British *do* and *do*-support involve the same morpheme, we would be missing a clear generalization regarding the elements that appear in T/C and those that float above ellipsis. In what follows I will argue that the subsequent assumption, that *do* is raised *v*, also allows us to explain the 'Last Resort' distribution of the standard paradigm as well as the anti-reconstruction effects in British *do* sentences.

4. Explaining the paradigm

In this section I discuss ways in which *v*-raising may explain the *do*-support paradigm. The first pass assumes that *v* only raises when it is not adjacent to T, as in Embick and Noyer (2001); the second pass, taking British *do* and VP-displacement into account proposes that *v* always raises to a sand that it only spells out as *do* when it is not adjacent to V at morphology. I argue that this second version provides the best account for the *do*-support paradigm and also opens the prospect of explaining other *do*-support phenomena as well.

4.1 First pass: adjacency between T and v

Let us assume that *v* bears the same interpretable V-feature found on the auxiliaries. This feature can check the uninterpretable V-feature on T when the heads T and *v* are sufficiently local; we will call this locality 'adjacency' for now,[10] and the adjacency required for feature-checking in this configuration is such that either there are no intervening projections between *v* and T (NegP/ΣP), or *v* and T are in a head-head adjunction relation after head movement or intervening auxiliaries (adverbs are transparent for adjacency relations since they are adjuncts; see Bobaljik 1995). Ellipsis of the *v*P[11] and attraction of T to C also ensure that T is not adjacent to *v*. The derivation crashes when T's uninterpretable V-feature is not checked, and *v* only moves when it needs to move (under the less-than-strict definition of adjacency used here), due to derivational economy. Crucially, *v* only moves to T if it is the closest verbal head that can check T's uninterpretable V-feature, due to the locality condition Attract Closest. The relevant scenarios are schematized below.

(29) a. Rab sings *The Wizard*.

[TP subj [T' T [*v*P *v* [VP V]]]] *T and v are adjacent: no v-movement,* do *does not appear*

       b. Rab does not sing *The Wizard*.

[TP subj [T' T [NegP not [*v*P *v* [VP V]]]]] *T and v are not adjacent as not intervenes: v has to raise to T, hence* do *appears*

       c. Rab DOES sing *The Wizard*.

[TP subj [T' T [ΣP Σ [*v*P *v* [VP V]]]]] *T and v are not adjacent as Σ intervenes: v has to raise to T, hence* do *appears*

       d. Which Black Sabbath Song does Rab sing?

[CP wh [C' C+T [TP subj [T' t$_T$ [*v*P *v* [VP V]]]]]] *T and v are not adjacent as T has moved to C: v has to raise, hence* do *appears*

       e. Rab sings *The Wizard* and Morag does, too.

[TP subj [T' T ~~[*v*P *v* [VP V]]~~]] *T and v are not adjacent as v in vP is within a deletion site: v has to raise to T, hence* do *appears*

       f. Rab is not singing/has not sang *The Wizard*.

[TP subj [T' T [NegP not [AuxP be/have [*v*P *v* [VP V]]]]]]] *T and v are not adjacent, but the auxiliary is closer, so the aux raises to T:* do *does not appear*

Thus the *v*-raising account seems to deal with the standard paradigm without too much difficulty or stipulation.

      Note that this account can be extended to the case of imperatives. In modern standard English, imperatives require *do*-support whenever there is negation, regardless of whether or not there are other verbs present that can typically raise:[12]

(30) a. Do not read that book!
     b. *Read not that book!
     c. Read that book!

(31) a. Do not be late!
     b. *Be not late!
     c. Be on time!

We can see from these examples that when there is no negation, T and the verbs are adjacent and hence there is no *do*-support. However, when negation occurs, neither the main verbs of the raising verb be can raise to T to check its V-feature. We may assume that the V-feature on T in imperatives is in fact a V-IMP feature, and that whereas this feature was borne on the auxiliaries in older versions of English like Early Modern English (see e.g. Roberts 1993), this has been lost over time as a reflex of morphological change (just as the features that allow for raising have been lost on main verbs and on possessive have in some dialects), and now only *v* bears this V-IMP feature. This means that, when negation occurs in an imperative, only *v* can value this feature, and hence only *v* can move to T over negation to check this feature. This seems to be a direct violation of the Head Movement Constraint in cases like (31), but this need not concern us in light of the view that the HMC as it is known is only a manifestation of some sort of locality restriction on feature-checking, like Attract Closest (see Roberts to appear); thus, if *be* doesn't value the V-IMP feature, then there is no minimality violation in moving *v* over it, since the V-IMP feature on C attracts the closest head that bears the relevant feature.[13]

4.2 A second pass: adjacency between *v* and V

The idea that *do*-support is a form of *v*-raising is not new: Embick and Noyer (2001; henceforth E&N) make very similar proposals, arguing that *do*-support is a reflex of a "strict selectional restriction on T;" this means that "T must be in an immediately local relationship with *v*," where immediately local means either T has a *v*P sister or it is part of the same morphological word (i.e. *v* is head-adjoined to T by head movement).[14] However, it seems that E&N's account may run into problems in trying to account for some of the simplest cases. Consider the case of T-to-C movement, where *do* appears in C:

(32) What does Rab sing?
     [CP What [C' C+T [TP Rab [T' t [*v*P *v* [VP sing]]]]]]

In this example, it would seem that the "strict selection restriction on T" is satisfied at the point where T is merged, since its immediate complement is *v*P. The immediately local relation between T and *v*P is disrupted when C is merged, as T moves to C; however, we would surely expect that the satisfaction of the selectional restriction on T would not be undone by movement, since this does not seem to be how selectional restrictions work (see Landau 2007 for relevant discussion). A more obvious counter-example to E&N's proposal comes from British *do*, since we can see that *do* appears in some projection that is lower than T in these situations.

Now, to explain British *do* in the system proposed in the previous section, it is perhaps natural that we should appeal to some degree of stipulation to get the difference between standard North American English and British English, since the availability of British *do* does not correlate with a significant number of differences between the dialects. As we saw above, one difference that it does resemble is the difference between the dialects in the ability of another verbal form to below the lowest auxiliary in ellipsis, namely possessive *have*. We can surmise that the difference is that British English allows for raising to the lower projections in the inflectional layer, and to capture this fact we can propose that the lower inflectional projections (which we may call -*0*P and -*en*P) can sometimes bear an uninterpretable V-feature, just like T[15]; *v* and possessive *have*, being able to raise generally in this dialect, can thus raise out of the ellipsis site to check this feature.

We may wonder, then, why this lower *do* only seems to occur in ellipsis sites, and why the following do not occur in British English:

(33) a. *Rab will do leave.
     b. *Rab has done leave.

This is a serious problem, and it does not follow without additional stipulation, for example, that checking an uninterpretable V-feature on a lower inflectional projection forces ellipsis. This is an unwelcome and unexplained stipulation (a version of which would be required if E&N's system were to account for this data), and it is one that we would do well to avoid.

However, we should note that British *do* does not just show up in ellipsis sites; rather, it can also be found in other situations where the VP is not pronounced in its natural position, such as VP-displacement. VP-displacement in the absence of other auxiliaries forces *do*-support in standard dialects, (34), and the construction also allows for pronunciation of extraneous *do* below auxiliaries in British dialects, (35):[16]

(34) a. Rab said he was going to win the race and win the race he did.

    b. Rab said he was going to win the race and win the race he has.

    c. Dominate Generative Grammar though it does, this theory makes a number of wrong predictions. (Bruening 2010)

(35) a. Rab said he will win the race, and win the race he will do.

    b. Rab said he was going to win the race and win the race he has done.

None of these examples can be handled by E&N's account: the selectional restriction on T to have a vP complement would be satisfied here prior to A-bar extraction of the VP constituent, and we would expect that that would still obtain after extraction of the VP; this might be corrected by assuming that it is vP that is displaced and not VP, but if this happened then v would not be in the base position to raise to T. However, these examples would also seem to be a problem for the account outlined in the previous section for very similar reasons: if VP has been displaced, then vP should still be adjacent; if vP has been displaced, v will not be able to raise to T, unless it does so before vP is displaced, which would appear to be in violation of constraints on derivational economy.

    We can see, then, that British *do* can generally appear when v is not adjacent to the lexical verb V, either because it has been moved by VP-displacement, or it has been deleted by ellipsis. With this in mind, we may surmise that the relevant adjacency relation is not the one between v and T, but rather the one between v and V. Thus we can propose that v *only spells out as* do *when it is not adjacent to V at morphology; if* v *and V are adjacent at morphology, they spell out as the lexical verb V*. This derives the full paradigm in (29) and the imperative data, since we can see that in every case where *do* appears, it is not adjacent to V. Importantly, this also explains the British *do* data in ellipsis and VP displacement, since again *do* only appears when it has raised out of v+V and is not adjacent to V at spellout. To account for *do*-support in standard ellipsis and VP-displacement, we may thus propose that v always raises to satisfy T's v-feature when it is attracted by its V-feature in the absence of closer elements bearing that feature; this simplifies the picture significantly, effectively bringing v into line with *have* and *be*.[17]

    As it happens, a very similar proposal about the spellout of v and V exists in Hallman (2004) and is implicit in Stroik (2001), where it is developed for accounting for the proform *do so*; they assume that the *do* in *do so* is a spellout of v when it is not adjacent to a V, and that *so* is a VP-proform. I will refrain from discussing these analyses of *do so* here due to constraints on space, but will simply note that this assessment of the relationship between v and V has some independent motivation. This morphological operation could be implemented technically as an instance of the morphological operation Matushansky (2006) calls m-merger, where two adjacent (but not head-adjoined) heads X and Y are merged in morphology to form an X+Y head-adjunction complex; we know that v+V complex standardly spelled out as V, so if v and V were adjacent and able to undergo m-merger we would predict that this would also spell out as V. On the explanatory side, we might speculate that the necessity of applying m-merger to v and V when they are adjacent is a reflex of a deeper economy principle; for example, Emonds (1994: 168) suggests that "the most economic realization of a given deep structure minimizes insertions of free morphemes", and Schütze (2002: 17) glosses this as "use as few words as possible." I will remain agnostic on whether this is what we see with *do*, since such a proposal

may make a number of predictions that cannot be surveyed in this article, but it seems that this would be the right way to go.

This proposal also seems to be more promising from the view of cross-linguistic variation. To explain the difference between English and verb raising languages like French, we would simply state that it is v and not v+V that raises in English; this may be because English v cannot pied-pipe the lexical verb with it when it is attracted to T.[18] To explain the cases where non-emphatic *do* is in fact allowed in different dialects of English, such as those discussed in Schütze (2004), we would appeal to a relaxation of the morphological restriction on the pronunciation of v separately from V, rather than some sort of relaxation of the economy conditions that normally restrict v from raising when it is already adjacent to T. Effectively, the points of variation in verb movement and *do*-support would reduce to morphological factors (presuming that pied-piping is such a phenomenon), getting the variation where we would expect to find it.

This approach also has two additional benefits. The first benefit is that it allows us to explain the fact that *do*-support does not occur with wh-subject questions, while it occurs obligatorily with wh-object questions and yes-no questions:

(36) a. Who sings?
    b. *Who does sing?

(37) a. *Which Black Sabbath song Rab sings?
    b. Which Black Sabbath song does Rab sing?

(38) a. *Rab sings? (as yes-no question)
    b. Does Rab sing?

It is typically assumed that T-to-C occurs either to check some feature on C, or because the null C head is affixal (see Adger 2003, Chomsky 1995; for an intriguing alternative, see Pesetsky and Torrego 2001), and this has formed the background for the discussion above. The problem is why this does not occur with wh-subjects, (36), and numerous authors have tried to solve this in different ways, either by proposing that wh-subjects do not move to Spec,CP (Lasnik and Saito 1992), or by assuming wh-subjects do move but *do*-support is omitted to avoid a *that*-t effect (Koopman 1983). Each of these solutions have their own problems, however: the non-movement account has to introduce unwelcome asymmetries in different kinds of wh-extraction, and the movement account has to appeal to notions of government that have been left behind in recent work (e.g. see Kandybowicz 2006 for a recent explaining away of *that*-t effects).

We can dispense with these problems with the present approach to *do*-support by assuming that all wh-questions have T-to-C movement for feature-checking; thus the highest auxiliary would always move from T to C,[19] and in cases with no other auxiliaries this would be v. The paradigm in (36)-(38) is explained by the fact that in (36), but not (37) and (38), v would remain adjacent to V at PF, since in the latter two situations the subject in Spec,TP would disrupt adjacency. Hence v is always in C in non-embedded interrogatives, but it is only pronounced as *do* when it is non-adjacent with V, as assumed here.[20]

The second additional benefit is that the present account allows us to explain the fact that, at points in the history of English where *do* was able to appear in non-emphatic contexts, it could only do so when there were no other auxiliaries present.

Thus examples like (36a) are attested in Early Modern English and earlier Englishes, but (36b,c) are not (Denison 1985):

(36) a. Rab does sing.
    b. #Rab does be singing. (cf Rab is singing)
    c. #Rab does have sang. (cf. Rab has sang.)

In the present account, *v* only ever raises to T when there are no closer auxiliaries that can also check the feature in T, due to the locality condition Attract Closest; unlike the condition on spelling out *v* in T, this is not amenable to morphological variation. This cannot be accounted for by simple *do*-insertion analyses, or analyses that propose that *do* is a spellout of a stranded T (i.e. Omaki 2007), since we would expect that each of the examples in (36) would be on a par, contrary to fact.

4.3 The remaining issue: explaining the semantic effects of British *do*

One last thing that needs to be explained is the fact that *v*-raising in British *do* blocks reconstruction, but it does not do so in other situations. This is a strange phenomenon, and one that does not submit easily to an elegant explanation. However, here I would like to propose (following Baltin 2007 and Aelbrecht 2010 in some respects) that this might be accounted for by exploiting the fact that *v* is a phase head. The explanation here avails itself of the technology of den Dikken's (2007) "Phase Extension" theory, although I assume that a similar explanation could potentially be provided by a similar theory of phasehood and locality. Insofar as this explanation is successful, it provides further evidence for the claim that British *do* involves *v* raising to some point in the inflectional layer, and for den Dikken's theory of locality as well.

    Analysing restrictions on extraction in predicate inversion constructions, den Dikken (2007) proposes a theory of locality called "Phase Extension," in which he proposes that

> syntactic movement of the head H of a phase α up to the head X
> of the node β dominating α extends the phase up from α to β; α
> loses its phasehood in the process, and any constituent on the
> edge of α ends up in the domain of the derived phase β as a result
> of Phase Extension. (den Dikken 2007: 1)

In the case of *v*-movement to T, then, we would expect that TP will become a derived phase (just as it necessarily would in French and other verb-raising languages). Here I will assume with Boeckx and Hornstein (2008) that reconstruction requires an Agree relation to hold between the higher and lower copies, and I will also assume (as is standard) that the Agree relation obtains only within the locality domain of a phase.

    Consider then the situations where *v* appears in T and in C with wh-movement in the standard cases:

(37) a. [TP subj [T' T+*v* [*v*P t$_{subj}$ [*v*' t$_v$ [VP V]]]]]
    b. [CP wh [C' C+T+*v* [TP subj [T' t$_{T+v}$ [*v*P t$_{wh}$ [*v*' t$_v$ [VP V t$_{wh}$]]]]]]]]

In (37a), the subject can reconstruct to the base position because an Agree relation can obtain between the two copies: *v*-movement to T extends the phase and the subject's

derived position, Spec,TP, is at the edge of the phase, so they are within the same locality domain and Agree can obtain. A very similar situation obtains in (37b), where movement of T+v to C extends the phase further, thus bringing the wh-phrase into the edge and making the copies of wh-movement sufficiently local (see den Dikken 2007 for discussion of the details of Phase Extension).

Now consider the situation with British *do*, where v moves to a lower position in the structure and no further (I call this position XP to avoid committing to a specific analysis):

(38) a. [TP subj [T' T [XP X+v [vP t_{subj} [v' t_v [VP V]]]]]]
    b. [CP wh [C' C+T [TP subj [T' t_T [XP X+v [vP wh [v' t_v [VP V]]]]]]]]

In these situations, the phase head v moves to X, making XP a phase and removing the phasehood of vP. Now, in this situation, the elements in the edge of vP, namely the subject in (38a) and the wh-element in (38b), are within the lower phase, whereas their matching copies are in the higher phase. As a result, an Agree relation cannot obtain between the copies, and hence reconstruction is impossible.[21] This derives the fact that British *do* blocks reconstruction, and it requires an analysis where v moves to its surface position.

5. Conclusion

We have seen that the distribution of English *do*-support can be derived from assuming that *do* is a spellout of v. The apparently last resort nature of *do*'s distribution is explained thus: v only spells out when it is not adjacent to V, as when v is adjacent to V in morphology, they undergo m-merger and are spelled out as V; v moves to satisfy V-features on T, C and sometimes other inflectional heads (in the case of British *do*); thus *do* only occurs when there are no other auxiliaries that can check the attracting feature, due to the locality condition Attract Closest. The explanation of dummy *do* is thus in terms of locality rather than economy, and it does not suffer from the theoretical and empirical difficulties suffered by the Last Resort insertion account.

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[1] It is worth pointing out that Inclusiveness does not rule out all analyses that appeal to Last Resort insertion. For example, Schütze (2001) analyses a number of cases where semantically empty items like nominal one or adjectival so are inserted as a Last Resort in certain environments. However, these examples only constitute the realization of a particular set of nominal features as a default vocabulary item at Vocabulary Insertion; as such, they do not involve insertion of any lexical items, or more importantly insertion of grammatical features, during the course of the derivation. This is in contrast with Last Resort do-support, which necessarily involves the insertion of a lexical item that is capable of checking features on T that would not have been checked otherwise.

[2] The fact that A-movement is in fact allowed with do so, albeit under constrained circumstances, may lead us to surmise that it is not in fact a proform either, but rather an ellipsis phenomenon that is subject to extra semantic parallelism constraints. These constraints may be brought about by the presence of so, which is argued to be a proform in itself. Such a research program is pursued by Baltin and van Craenenbroeck (2009), but for the remainder of the paper I assume do so to be a proform in line with traditional views, for the sake of clarity; the empirical characteristics discussed herein would thus be part of the explanatory burden of Baltin and van Craenenbroeck's proposals.

[3] The acceptability of (14c) indicates that, whatever the status of verbal proforms like do so, they cannot involve full LF copying of the recovered structure, at least not if binding Condition B is represented at LF (Chomsky 1995; cf Hicks 2009).

[4] The wide scope readings for (15a,b) require us to set up a specific context, for example one in which Rab and Morag have both missed the first two units of a three-unit class. The important thing is that these readings are equally marginal for (15a) and (15b), and this contrasts with (15c), which seems to preclude this reading altogether.

[5] Baltin (2007) reports data that indicates that British do can in fact appear in the -ing form, and Schütze (2004) cites related data from the Quirk et al (1985) descriptive grammar. However, I have tested numerous speakers across the relevant dialects (19 with formal questionnaires, and many more informally) and they have unanimously judged the -ing forms to be ungrammatical (all of the formal questionnaires rated the -ing forms at 1 or 2 on a 1-5 scale of acceptability, 1 being strongly ungrammatical, and the overwhelming majority rated them 1). I surmise that speakers who accept -ing forms of do would also allow for -ing forms of be; this seems to be supported by the fact that the contexts that seem to allow for quasi-acceptable being forms would also allow for quasi-acceptable doing forms:

(i) Q: Why don't you sit quietly? (Quirk et al 1985: 875)
   A: ??I AM doing!

(ii) Q: Why won't you be quiet?
   A: ??I AM being!

The important thing here is that the availability of the *–ing* form tracks its availability in bona fide cases of ellipsis, and that it contrasts strongly with *do so*, which readily appears in the *–ing* form.

[6] See Lasnik (1999) for general discussion, and Levin (1986: 54) for discussion of limitations on the number of auxiliaries that can occur with pseudogapping. Haddican (2007b) notes that judgments on British *do* in pseudogapping are subject to some variation.

[7] Furthermore, the data here may also impact upon whether or not the DP movement in pseudogapping is Heavy NP Shift (Jayaseelan 1990) or A-movement to AgroP (Lasnik 1999). The HNPS analysis would have no problem explaining the word order in (22b); however, the A-movement analysis would need to determine the position of do in these constructions and where it is relative to the AgroP projection.

[8] For reasons that are not clear, auxiliary *be* seems to be more readily deletable than auxiliary *have*. While deletion in examples like (24b,c) is more or less optional, there is a stronger tendency for preservation of have in examples like (i):

(i) Rab must have arrived, and Morag must ??(have), too.

[9] We can rule out the possibility that copular *have* is allowed to float because speakers conflate it with the homophonous auxiliary by looking at the behaviour of another main verb have, "eat-have." This verb cannot raise in British or American English, and consequently it cannot float in any of these dialects:

(i) a. I have potatoes with my steak every week.
    b. *I haven't potatoes with my steak every week.
    c. *I've potatoes with my steak every week.
    d. Rab has potatoes with his steak every week, *hasn't he?
    e. *Have you potatoes with your steak every week?

I assume that this is related to the fact that "eat-have" has a full argument structure, unlike copular *be* and *have* and the auxiliaries.

[10] A potential problem with this account is that it uses the notion of adjacency, effectively a morphological definition from Bobaljik (1995), to describe a locality configuration for narrow syntactic feature-checking. I set this problem aside for now; it is dispensed with in the alternative account discussed below.

[11] A question arises here about why ellipsis would block adjacency for feature-valuation. One explanation could involve assuming that this kind of feature-valuation is in effect a PF phenomenon. Since the uninterpretable feature on T here forces movement, it is assumed (following Chomsky 2001, Pesetsky and Torrego 2001) that this feature also has an 'EPP-subfeature.' If we were to assume that the satisfaction of an EPP requirement on a head involves satisfaction of its p-selection (phonological selection) requirement (Landau 2007), phonological deletion would prevent this p-selection satisfaction. One could envisage other similar explanations of course (see below for discussion of a particularly promising alternative), but the important thing here is that deletion should prevent the relation between T and *v* that obtains normally. This seems relatively uncontroversial; nevertheless, it is dispensed with as a potential issue in the revised account that follows.

[12] I exclude possessive *have* because it does not work in imperatives with or without negation, for semantic reasons.

[13] Other accounts of this phenomenon, such as Emonds (1994), suggest that *do* appears in these imperatives due to some paradigm gap, in that *do*-support is provided when there is no allomorph of *be* that can appear in T. While this may explain the case where *n't* occurs on be, like **ben't late*, it doesn't extend so easily to examples like (31b). It also fails to explain the fact that *do*-support doesn't occur in other situations where there is a paradigm gap with be, such as the "*amn't* gap" (see Embick and Marantz 2008 for discussion):

(i) a. *Amn't I a silly boy?
   b. Aren't I a silly boy?
   c. *Don't I be a silly boy?

[14] The evidence they present for this analysis from VP-negation may not wholly compelling, as Carson Schütze (p.c.) has indicated that the restrictions they identify may be due to factors unrelated to *do*-support.

[15] Thus in situations where there is VPE but no British *do*, we can say that the lower projections have not been endowed with this optional strong feature. This explains the fact that these cases do not have the same sematic effects as those seen in the British *do* cases (as discussed in section 4.3). The same optionality is seen in whether or not possessive *have* raises.

[16] Note that the data in (35) provide another strong counter-example to the proform account of British *do*. Proform *do so* cannot occur in these contexts:

(i) a. *Dominate Generative grammar though it does so, this theory makes a number of wrong predictions.
   b. *Rab said he was going to win the race, and win the race he did so.
   c. *Dominated tennis though he has done so, Roger Federer's reputation is still not settled.

It also provides a strong counter-example to the generalization that British *do* completely disallows extraction. Quite why A-bar extraction of a VP should be allowed but a wh-phrase should not is unclear; I expect that this will be related to the fact that these kinds of movement exhibit very different reconstruction properties (Huang 1993).

[17] This way of explaining things is certainly more suitable in the context of the theory of ellipsis licensing presented in Thoms (2011a), since that account assumes that all of the affixes in the affix hopping system are present as projections in the inflectional layer and that intervening affixal projections prevent adjacency for the checking of strong features on the raising verbs; the account requires a set of stipulations that could be dispensed with if we just assumed that *v* always raised to T when it was able to.

[18] This seems to allow excorporation out of the *v*+V complex, a form of excorporation that is not widely reported elsewhere in the literature. An alternative analysis would be to reject the idea that V-to-*v* raising is obligatory in English, and to propose instead that the difference between French and English lies in the presence or absence of this form of verb movement.

[19] An additional piece of independent evidence for this claim comes from adverb placement in wh-subject questions. A high adverb like *probably* can occur to the left or the right of auxiliary *be* in declaratives, but in wh-subject questions it can only occur to the left of the adverb.

(i) a. John (probably) is (probably) going to have to report this issue.
   b. Who (*probably) is (probably) going to have to report this issue?

This is explained if we assume that the auxiliary has undergone T-to-C movement
[20] An alternative analysis is proposed in Thoms (2010), where it is assumed that verb movement is not in fact driven by uninterpretable feature-checking, but affixation alone. Insofar as the explanation there is successful, it provides further support for treating *do*-support as a form of verb movement rather than Last Resort insertion.
[21] We are required to assume that the subject is able to extract prior to *v*-movement, or via the specifier of XP. In the former case, *v*-movement would have to be counter-cyclic, and in the latter case the copy left in the edge of XP would have to be inert for reconstruction.