

Phase-Constrained Obligatory Late Adjunction

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Abstract. It has sometimes been argued that adjuncts can merge late. This paper provides a new argument for, and analysis of, late adjunction. *Exactly* (or *precisely*) can adjoin to a *wh*-phrase, and *wh*-movement can affect either the entire adjunction structure (*What exactly is it?*) or only the host (*What is it exactly?*). *WH-exactly* can be generated VP-internally, but surprisingly—and despite appearances—*exactly* cannot be stranded VP-internally. The paper argues that this can be understood if adjuncts merge late obligatorily, at the phase level: for H a phase head with complement XP, all adjunction within the HP phase must occur immediately before XP spellout. Further predictions of this analysis are shown to be correct. The larger picture that emerges is one in which the syntax prioritizes satisfying featural requirements: if so, it is not surprising that it waits until the last possible moment (within each phasal subderivation) to add in adjuncts.

Keywords. Late adjunction; late merger; phases; *exactly*-stranding; derivational timing; phasal spellout.

1. Introduction

Since Lebeaux 1991, there has been considerable interest in the hypothesis that syntactic structures are not always built in a completely cyclic, bottom-up fashion, but rather, some syntactic

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elements—in particular, adjuncts—can be merged in late, or countercyclically (Nissenbaum 1998, Sauerland 1998, Fox & Nissenbaum 1999/2006, Stepanov 2000, 2001, Fox 2002, 2017, Bošković 2004, 2016:14, Henderson 2007, Abe 2018, Davis 2019a, Safir 2019, Haddad to appear, a.o.).

Lebeaux proposed this hypothesis to account for an interaction between \bar{A} -movement and Condition C (Chomsky 1981, 1986b). Consider the following two Condition C-violating sentences:

- (1) a. *He_i resented an inspection of John_i's office.
b. *He_i resented an inspection near John_i's office.

When a phrase containing an R-expression that would violate Condition C in its base position undergoes \bar{A} -movement to a position above the R-expression's would-be binder, the Condition C effect remains if the R-expression is inside an argument, but is called off if the R-expression is inside an adjunct:¹

- (2) a. ?*Which inspection of John_i's office did he_i resent?
b. Which inspection near John_i's office did he_i resent?

In (2-a), *John* is contained in the argument of *John's office*, and the Condition C violation is not amnestyed. In (2-b), *John* is contained in the adjunct *near John's office*, and the would-be Condition C violation is amnestyed. Lebeaux's analysis of this phenomenon is summarized (using updated

¹The judgments in (2) are mine. The empirical picture here, though, is complex and characterized by substantial idiolectal variation (Bianchi 1999:129; Safir 1999; Stepanov 2001:95–96; Henderson 2007; Gluckman 2014:8–9; Longenbaugh 2017; Sportiche 2017:28, 2019:1 [fn. 1]; Abe 2018:92, fn. 2; and references cited there). Adger, Drummond, Hall, and Van Urk (2017) and Bruening and Al Khalaf (2019) show that, in many idiolects (henceforth “lax idiolects”), \bar{A} -movement can bleed Condition C even when the crucial R-expression is inside a complement (i.e., sentences such as (2-a) are acceptable). Bruening and Al Khalaf (Sect. 5) propose that, in idiolects that penalize sentences such as (2-a) (henceforth “strict idiolects”), this is the case not because complements obligatorily reconstruct for Condition C, but because the relevant speakers, in judging these sentences, are influenced by a pragmatic bias. As Bruening and Al Khalaf acknowledge, though, their investigation of this putative bias is highly preliminary; furthermore, they do not explicitly spell out what it is. Therefore, their hypothesis is not yet a full-fledged alternative to the standard Lebeaux analysis as an explanation for the unacceptability of sentences such as (2-a) in strict idiolects. Of course, proponents of the Lebeaux analysis, myself included, have to loosen it somehow to account for lax idiolects. Safir (1999) argues that \bar{A} -chains generally allow vehicle change (Fiengo & May 1994): an R-expression within a moved phrase XP can (in the lowest copy of XP) be replaced by a pronoun at LF. Safir (1999) and, following him, Henderson (2007) propose that, when an R-expression within a complement is forced to reconstruct, inducing a Condition C violation, this indicates that vehicle change has been blocked for some reason. If this is so, then strict idiolects block vehicle change in the complement cases more robustly than do lax idiolects, for reasons that remain to be determined.

terminology) in (3).

- (3) a. An argument of a head H must merge with (a projection of) H in the base position of HP.
- b. An adjunct to a phrase HP may merge with HP in a derived position of HP (i.e., may merge with a non-lowest copy of HP). *Late adjunction*

The relevant derivations are given below.

- (4) a. *[which inspection of John_i's office]_k did **he**_i resent [which inspection of **John**_i's office]_k? *Condition C
- b. [which inspection near John_i's office]_m did **he**_i resent [which inspection]_m? no Condition C violation

This paper argues that a different phenomenon—adjunct stranding in English—provides additional evidence for late adjunction, and yields new insights into how, and precisely when in the derivation, this operation is carried out. In particular, the paper argues (in agreement with Stepanov 2001) that adjuncts are *obligatorily* merged late; unlike that work, however, it further argues that late adjunction is phase-constrained (cf. Abe 2018):

(5) **Phase-Constrained Obligatory Late Adjunction**

For H a phase head and XP its associated spellout domain (= complement), adjunction within the HP phase must occur immediately before spellout of XP.

The paper is organized as follows. Section 2 introduces the phenomenon of *exactly*-stranding (stranding of the adverb *exactly* and similar adverbs). Section 3 argues that, although *exactly* can be adjoined to a *wh*-phrase within VP, *exactly* cannot be stranded within VP (contrary to initial appearances). Section 4 develops an analysis of this puzzling distributional pattern in terms of

Phase-Constrained Obligatory Late Adjunction ((5)). Section 5 tests a prediction of the analysis—namely, that *exactly* should be strandable at phase edges (both the ν P edge and the CP edge)—and shows that this prediction is correct. Section 6 shows that, as required by the analysis, instances of *exactly* stranded clause-finally are outside of VP. Section 7 concludes the paper by summarizing the analysis and considering the question of why adjunction is obligatorily late in the manner described in (5).

2. The phenomenon: *exactly*-stranding

The adverb *exactly*² can immediately follow a *wh*-phrase (Urban 1999; McCloskey 2000:63–64, fn. 8; Stroik 2009:47; Davis 2017:3):

- (6) a. {Who(m)/What} *exactly* did she blame?
b. {When/Where/Why/How} *exactly* did she hide the donuts?
c. {How many grapes/How much frosting} *exactly* did he eat?
d. {What/Which} pretzel *exactly* did he sell for a million dollars?

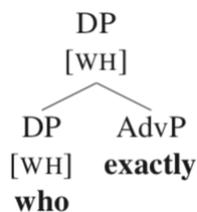
For convenience, this type of [*wh*-phrase + *exactly*] structure will be referred to here as WH-*exactly*, and the *wh*-phrase with which *exactly* is associated will be referred to as its *wh*-associate.

McCloskey (2000:64) suggests that perhaps *exactly* is a head that takes a *wh*-phrase as its complement, and WH-*exactly* is derived by moving this complement to the specifier of *exactly* (call this the Head Analysis). I propose instead, however, that WH-*exactly* is derived by right-adjointing *exactly* to the *wh*-phrase (call this the Adjunct Analysis):³

²Also *precisely*. *Exactly* can be replaced by *specifically* in many of the sentences in (6), but not all. This paper illustrates the relevant phenomena with *exactly* throughout.

³On what can adjoin to a *wh*-phrase, see McCawley 1992. Two strands of evidence favor the Adjunct Analysis over the Head Analysis. First, the Adjunct Analysis explains why *exactly* is optional in WH-*exactly*. To account for this on the Head Analysis, it would have to be ensured that any head H that could select an XP (X being a syntactic category)—and hence a *wh*-XP, as a special case—could also select an *exactly*P in which the complement of *exactly* was a *wh*-XP (and that only such Hs could). This would violate the locality of selection, since H would effectively be selecting the *wh*-XP across an intervening head (*exactly*). It would also have to be ensured that any YP that could host a ZP adjunct—and hence a *wh*-ZP adjunct, as a special case—could also host an *exactly*P adjunct in which the complement of *exactly* was a *wh*-ZP (and that only such YPs could). Even if the locality-of-selection problem could be circumvented by some technical device, this augmented Head Analysis would miss the generalization that WH-*exactly* phrases and the corresponding *wh*-phrases without *exactly* have the same distribution.

(7)



When an adjunction structure such as (7)⁴ is built, *wh*-movement can apparently affect the entire adjunction structure, as in (6), or just the *wh*-associate, as in (8) below. In the latter case, the adverb is *stranded*. (See Bell 2012 for an investigation of the extent to which adjunction hosts are visible to syntactic operations.)⁵

Secondly, and relatedly, the Adjunct Analysis also explains why a *WH-exactly* phrase seems to bear the same categorial feature as the corresponding *wh*-phrase without *exactly* (judging by the distributional matchup between the two types of phrases). On the Head Analysis, by contrast, the head of *WH-exactly* is *exactly*. Therefore, assuming that *exactly* is an adverb, *WH-exactly* would be expected to uniformly distribute like an AdvP, but it does not ((6a,c-d)). The Head Analysis could be revised to deal with this problem by positing that *exactly* (in this use) bears an unvalued category feature, which it values by probing its complement, but such an additional complication is unnecessary on the Adjunct Analysis.

⁴The adoption of this structure here entails that the analysis developed below rejects the Adjunction Prohibition, which bans adjunction to arguments (Chomsky 1986a:16, following a suggestion of Kyle Johnson's; McCloskey 1992, 2006; Motapanyane 1994; Bošković 1997, 2003, 2004; a.o.). This ban is partly motivated by the conjecture that, if an argument hosted an adjunct, θ -assignment would be disrupted. If this is so, then in (i), V cannot assign XP_a a θ -role.

- (i) [VP V [XP_b YP XP_a]] (YP adjoined to XP; subscripts added purely for ease of exposition)

However, V can assign a θ -role to XP_b, the entire adjunction structure, in which case XP_b will count as the argument (semantically and syntactically). This conclusion is only strengthened once it is recalled that, on the assumptions now standard, " θ -assignment" is not a discrete syntactic process, but one of many consequences of type-driven semantic composition in the semantic component (Heim & Kratzer 1998, ch. 3). Given this, structures such as (i) are unproblematic, so long as all the constituents are of appropriate semantic types.

⁵*Exactly* and *precisely* can also immediately precede their *wh*-associates, as in {*Exactly/Precisely*} *what did she devour?* It turns out that *exactly*-WH has a subtly different semantics/pragmatics than *WH-exactly* and *WH ... exactly* (with stranding):

- (i) [Context: A is distraught because his bosses have criticized him severely. His friend B asks...]
- a. What exactly did they say to you?
 - b. What did they say to you exactly?
 - c. [Ⓢ]Exactly what did they say to you?

In this context, (i-a) and (i-b) are perfectly ordinary. The question in (i-c), on the other hand, is callous in this context: it subjects A to an interrogation. As pointed out to me by Amy Rose Deal, (i) suggests that an *exactly*-WH question genuinely insists on an exact answer (hence why (i-c) seems callous and interrogatory in the context given), whereas *WH-exactly* and *WH ... exactly* questions do not (surprisingly).

That (i-b) patterns with (i-a) rather than with (i-c) strongly suggests that *WH-exactly* can be broken up by moving the *wh*-associate, stranding *exactly*. Whether *exactly*-WH can also be broken up in this way is unclear. Perhaps it cannot,

- (8) a. {Who(m)/What} did she blame exactly?
 b. {When/Where/Why/How} did she hide the donuts exactly? [etc.]

3. An odd generalization: *exactly* cannot be stranded within VP

Consider the following minimal pair:

- (9) a. What exactly did she devour?
 b. What did she devour exactly?

In (9-a), *what exactly* moves from the postverbal direct object position. In (9-b), *exactly* seems to occur precisely there (having been stranded by *what*). The null hypothesis about how (9a-b) are derived is the following. In both sentences, the adjunction structure [DP [DP *what*] *exactly*] is merged as the complement of V. In (9-a), the whole adjunction structure undergoes *wh*-movement. In (9-b), only the adjunction host does; the adjunct itself (*exactly*) is stranded in its base position.

This section will show that the null hypothesis is incorrect: *exactly* can never be stranded within (big) VP, despite initial appearances. When it seems to have been, it is actually in a high position in the right periphery of the clause.

3.1 Exactly-stranding in triadic clauses

WH-*exactly* can be generated as the linearly earlier internal argument of a triadic predicate:

- (10) a. Muriel put WHAT exactly on the table?! *Echo question*
 b. Who put what exactly on the table? *Multiple question*

On the null hypothesis, it should be possible to move *what* in a configuration like (10-a) and strand *exactly* exactly where it is in the linear string. This is indeed possible, but the result, though acceptable, is marked ((11-a)), as indicated by the diacritic ^M below. In the default/unmarked

and hence (i-b) can only be derived from the structure underlying (i-a). Perhaps, though, *exactly*-WH can be broken up, stranding *exactly*, but (i-b) does not have the same effect as (i-c) in the context given precisely because it has an alternative parse on which it is derived from the structure underlying (i-a) (i.e., it is structurally ambiguous). Because it is unclear whether or not *exactly*-WH can serve as the input to *exactly*-stranding, *exactly*-WH will be set aside here.

version of the sentence, *exactly* occurs clause-finally ((11-b)).

- (11) a. ^MWhat did Muriel put exactly on the table?⁶
 b. What did Muriel put on the table exactly?

The null hypothesis explains why (11-a) is possible, but not why (11-b) is possible—let alone why the latter is unmarked and the former marked.

The markedness contrast in (11) is not peculiar to those sentences, or to the particular lexical items chosen: the phenomenon is general. One more example of it follows:

- (12) a. Chester attributed WHAT exactly to malevolent conspiracies?!
 b. Who attributed what exactly to malevolent conspiracies?
 c. ^MWhat did Chester attribute exactly to malevolent conspiracies?
 d. What did Chester attribute to malevolent conspiracies exactly?

3.2 Exactly-stranding in triadic clauses with a final low adjunct

The puzzles laid out in Section 3.1 will become more tractable once an even more surprising paradigm has been examined.

When a *vP*-internal WH-*exactly* constituent is followed by not one but two other low *vP*-internal constituents, an unexpected fact is observed: it is, in many idiolects, no longer possible to move the *wh*-associate alone, stranding *exactly* in situ (compare (13a-b) with (13-c)).

- (13) a. Muriel put WHAT exactly on the table with great care?!
 b. Who put what exactly on the table with great care?
 c. *What did Muriel put exactly on the table with great care?
 d. What did Muriel put on the table with great care exactly?

⁶Sentences such as (11-a) have a distinctive prosody: the PP following *exactly* is prosodically detached or delayed to some degree. (By contrast, (11-b) can be pronounced in a highly prosodically integrated manner.) These facts, some of which were pointed out to me by Amy Rose Deal, will fall into place to some extent soon.

The echo question in (13-a) and the multiple question in (13-b) show that a ν P-internal WH-*exactly* constituent can be followed by two other ν P-internal constituents. Sentence (13-c) attempts to move the *wh*-associate in such a configuration (in this case *what*), stranding *exactly* in its base position. Surprisingly, the result is severely degraded; for me it is fully unacceptable. *Exactly* can be stranded clause-finally, however ((13-d)).⁷

The pattern exemplified in (13), which will serve as crucial evidence for the analysis to be developed below, is general and robust. Three more examples of this pattern are given below.

- (14) a. Harvey gave WHAT exactly to the president to annoy you?!
b. Who gave what exactly to the president to annoy you?
c. *What did Harvey give exactly to the president to annoy you?
d. What did Harvey give to the president to annoy you exactly?
- (15) a. Ms. Winston sent WHO exactly to the principal without a second thought?!
b. Who sent who exactly to the principal without a second thought?
c. *Who did Ms. Winston send exactly to the principal without a second thought?
d. Who did Ms. Winston send to the principal without a second thought exactly?
- (16) a. Gertrude threw WHAT exactly against the wall in a fit of rage?!
b. Who threw what exactly against the wall in a fit of rage?
c. *What did Gertrude throw exactly against the wall in a fit of rage?
d. What did Gertrude throw against the wall in a fit of rage exactly?

⁷A note on the data: these judgments, as well as almost all the other judgments in the paper, have been presented before the six audiences mentioned in the acknowledgments footnote. At those presentations, and in my many informal discussions of these phenomena with colleagues, I have encountered almost no disagreement with the contrasts reported here, though there is idiolectal variation with regard to how strong the degradation is in sentences such as (13-c) (in particular, there are many idiolects in which such sentences are degraded but not fully unacceptable). However, I have encountered a few idiolects in which such sentences are acceptable. The main body of the paper will focus on the more restrictive idiolects in which (13-c) and similar sentences are degraded or unacceptable. See the Appendix for some discussion of how the more liberal idiolects (in which such sentences are acceptable) might be understood in the context of the analysis developed below.

Some speakers have informed me that they permit (13-c) on an interpretation on which *exactly* modifies *on the table*. This paper, however, is concerned exclusively with parses/interpretations on which *exactly* is construed with a *wh*-phrase (e.g., a hypothetical interpretation for (13-c) identical to that of (13-d)).

3.3 Intermediate proposal: *exactly* cannot be stranded within VP

The beginning of Section 3 laid out the null hypothesis about sentences such as *What did she devour exactly?*—namely, that an *exactly* that seems to have been stranded in its base position indeed has been. Sections 3.1–3.2 provided data that tell against this null hypothesis, but that are also rather puzzling. How should the patterns of (un)acceptability just examined be understood?

I propose that the following generalization holds:

(17) *Exactly* cannot be stranded within (big) VP.

(When it seems to have been, it is actually in a high right-peripheral position.)

If (17) is correct, it will have to be derived from more fundamental principles, of course. But before that is done, let us briefly see how it accounts for the data in Sections 3.1–3.2.

The generalization in (17) accounts for the data in Section 3.2 straightforwardly. The (c)-sentences in that section attempt to strand an object-associated *exactly* to the left of a PP internal argument and a clause-final adjunct. On standard Larsonian assumptions (Larson 1988, 1990), this means stranding *exactly* within [Spec,VP], hence within VP. Those sentences are therefore correctly ruled out by (17). The (d)-sentences strand *exactly* clause-finally, and are acceptable; this can be easily accommodated under (17) on the plausible assumption that a clause-final *exactly* (to the right of vP/VP-level adjuncts) is outside of and higher than VP. (This is in fact not just plausible but correct, as will be shown in Section 6.)

What about the data in Section 3.1? The minimal pair in (11) is repeated below:

- (18) a. ^MWhat did Muriel put exactly on the table? (= (11))
 b. What did Muriel put on the table exactly?

On the assumption just mentioned that a clause-final *exactly* is higher than VP, (18-b) is perfectly compatible with the generalization in (17). Example (18-a), on the other hand, initially appears to pose a problem. In (18-a), a direct-object-associated *exactly* is stranded to the left of a PP

argument. On standard Larsonian assumptions, this seems to indicate that *exactly* is stranded within [Spec,VP], violating (17)—yet the sentence, though marked, is acceptable.

But there is a plausible alternative analysis of (18-a): *exactly* is stranded in the same VP-external position as in (18-b), and the PP argument *on the table* extraposes to its right. This analysis makes (18-a) compatible with the promising generalization in (17). It also sheds some light on why (18-a) is marked and (18-b) is unmarked: plausibly, this is a reflex of the former's more complex derivation. Finally, it sheds at least some light on the distinctive and marked prosody of (18-a) (fn. 6), insofar as this too can be linked to the PP-extrapolation posited, as seems plausible.⁸

4. Analysis: Phase-constrained obligatory late adjunction

The generalization in (17), then—namely, that *exactly* cannot be stranded within VP—seems to be correct. In conjunction with the plausible assumption that clause-final *exactly* is VP-external, it accounts for what initially appeared to be intricate and puzzling patterns of (un)acceptability. The next question, then, is: *Why* should *exactly* be unstrandable within VP? (This situation is particularly odd given that WH-*exactly* can be *generated* within VP, as in echo questions and multiple questions [Section 3.2].)

I propose that the key to understanding this peculiar situation is the following:

(19) **Phase-Constrained Obligatory Late Adjunction** (= (5))

For H a phase head and XP its associated spellout domain (= complement), adjunction within the HP phase must occur immediately before spellout of XP.⁹

For this proposal to succeed, it must (at least) explain why, when WH-*exactly* is generated within

⁸In order for the generalization in (17) to fully account for the unacceptability of sentences such as (13-c) **What did Muriel put exactly on the table with great care?*, it must be impossible to strand *exactly* in the VP-external right-peripheral position and extrapose both the PP argument (solid underline) and the adjunct (dashed underline) to the right of *exactly* in order-preserving fashion. See the Appendix for discussion. On PP-extrapolation and related matters, see Neeleman and Payne to appear.

⁹As mentioned above, this proposal is similar to Stepanov's (2001) proposal, which also has the consequence that adjuncts are obligatorily merged late. There are also similarities between this proposal and Abe's (2018) proposal and between this one and Bošković's (2004) analysis of the unfloatability of quantifiers in certain syntactic positions. The differences between these previous analyses and the one developed here will be discussed in fn. 17 and Section 5.1.2, after the Phase-Constrained Obligatory Late Adjunction analysis has been developed.

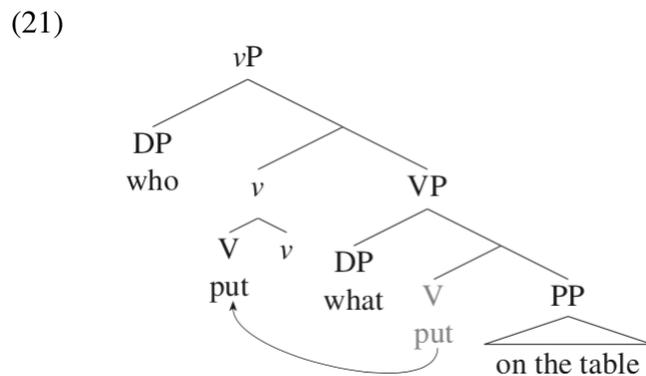
VP, *not* moving the *wh*-associate is licit, but moving it is illicit. The next two subsections show how the proposal in (19) explains this state of affairs.

4.1 Derivation A: WH-exactly is generated within VP, and the *wh*-associate does not move

Consider the derivation of the following multiple question:

(20) Who put what exactly on the table with great care? (= (10-b))

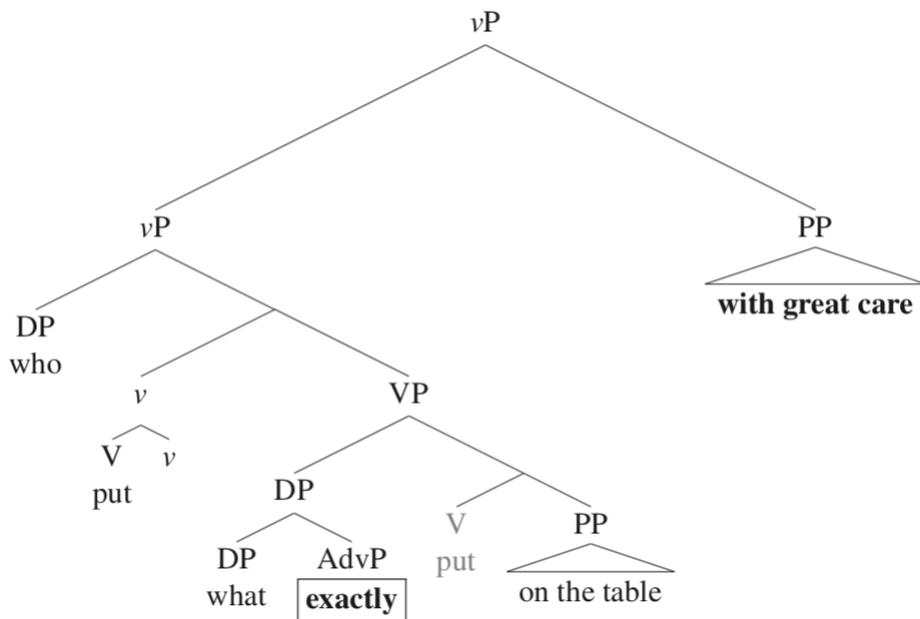
First, the following structure is built up:



By this point, the first phase head (*v*) has already been merged into the structure. Immediately before the complement of this phase head (namely, VP) is spelled out, adjunction within the *v*P phase takes place, in accordance with (19). In this derivation, *exactly* is adjoined to *what*, and [_{PP} *with great care*] is adjoined to *v*P:¹⁰

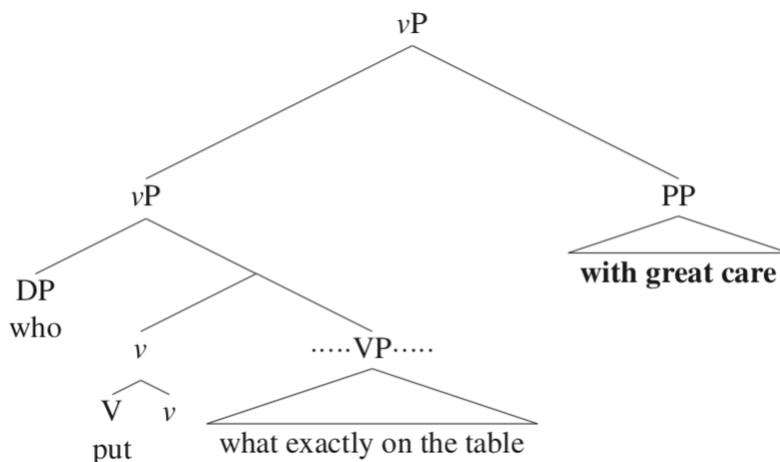
¹⁰The analysis is not affected in any significant way if [_{PP} *with great care*] in (20) is not a *v*P-adjunct but an “innermost complement” of V in a strictly Larsonian VP-shell structure (Larson 1988, 1990). If the latter analysis of this PP is correct, then it is not an adjunct and is not merged late.

(22)



Immediately after adjunction takes place within the vP phase, VP (the complement of the phase head v) is spelled out, with the DP -adjunct *exactly* inside it ((23)), in accordance with (19). (VP 's having been spelled out is indicated in (23) by the dots around the VP label.)

(23)



And the derivation continues, ultimately converging.

The derivation of echo questions such as (13-a) is identical in relevant respects.

4.2 Derivation B: WH-exactly is generated within VP, and the wh-associate illicitly moves

As discussed above, when WH-*exactly* is generated within VP and the *wh*-associate does not move (i.e., *exactly* is not stranded), the derivation converges. This is predicted by Phase-Constrained Obligatory Late Adjunction, as was just shown in Section 4.1.

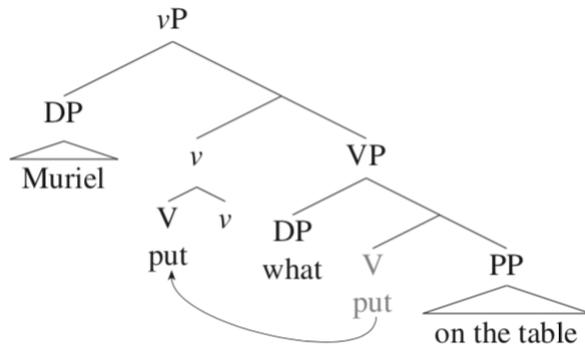
As we have seen, however, generating WH-*exactly* within VP and moving the *wh*-associate, stranding *exactly*, is impossible:

(24) *What did Muriel put exactly on the table with great care? (= (13-c))

Our next task, then, is to show how Phase-Constrained Obligatory Late Adjunction can account for this as well. To do that, let us try to derive (24) and see what goes wrong.

First, the following structure is built up:

(25)



Suppose, counterfactually, that at this point we wanted to both move *what* to the vP edge (in order to subsequently move it to [Spec,CP]) and adjoin *exactly* to *what* in the latter's base position. (In reality, this is precisely what is impossible.) How could this be done? Three ways come to mind that seem possible a priori.

Possibility A: Adjoin, then move. One way would be to adjoin *exactly* to *what* (in the latter's base position) and then move *what* to the vP edge, stranding *exactly*. This, however, is ruled out on the current analysis. Phase-Constrained Obligatory Late Adjunction has the consequence that adjunction within the vP phase *immediately* precedes spellout of VP. Therefore, if *exactly* is

adjoined to *what* in the latter's base position in (25), *what* is effectively trapped. Immediately after adjunction takes place within the vP phase, VP (containing the adjunction structure *what exactly*) is spelled out. As a result, *what* never has a chance to move to the vP edge.¹¹

Possibility B: Move, then adjoin. It is also conceivable a priori that *what* could move to the vP edge and then *exactly* could adjoin to the lower copy of *what* (the one in its base position, [Spec,VP]). I propose, however, that adjunction to non-highest copies is ruled out by Least Tampering, understood as follows:

(26) **Least Tampering**¹²

Given a choice of operations applying to a syntactic object α , select one that minimally changes $@(\alpha)$.

$@(X)$: the set of c-command relations in X.

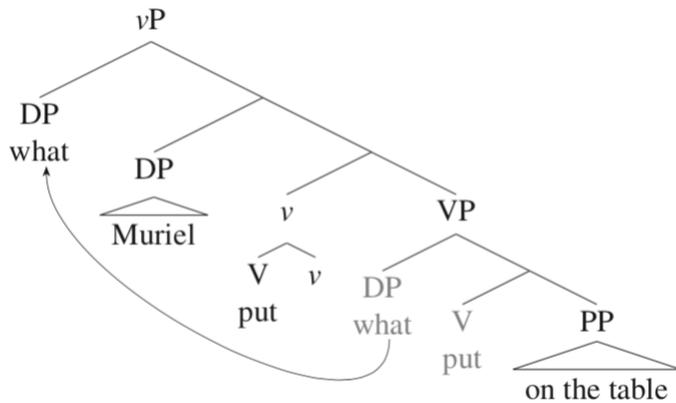
To see why, let us consider this hypothetical “movement + adjunction to lower copy” derivation in greater detail. First, *what* would move to the vP edge:

¹¹We need not stipulate that adjunction literally triggers spellout. It is sufficient to posit that, when the first adjunction operation within a phase HP occurs, this serves as a signal to the syntax that it has moved on to the last portion of the HP subderivation (before spellout)—namely, the adjunction portion. Thus, it is possible to add in more adjuncts or to spell out the complement of the phase head H, but the opportunity to carry out other operations within the HP phase (such as movement) has passed.

I assume the Strong Phase Impenetrability Condition (PIC₁) (Chomsky 2000): for a phase HP, the complement of H is not accessible to operations outside HP. The analysis developed here would be difficult to reconcile with the Weak Phase Impenetrability Condition (PIC₂) (Chomsky 2001), according to which the complement of H becomes inaccessible when the next phase head above H (call it Z) is merged in (see Citko 2014:33ff.): if the complement of H were spelled out when Z was merged in, then Phase-Constrained Obligatory Late Adjunction would presumably have to require that all adjunction within HP immediately precede the merging in of Z, but such a requirement would probably require lookahead to enforce, and would therefore be suspect.

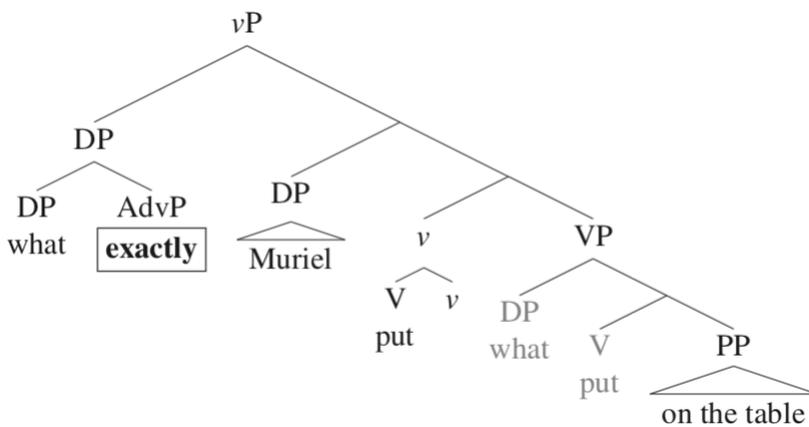
¹²This version of Least Tampering is modified from Stepanov's (2001:102, (16)) version, which is itself modified from Chomsky's (2000:137, (59)) version. The main change in (26) is that it says “minimally changes $@(\alpha)$,” whereas Stepanov's version says “does not change $@(\alpha)$.” X in (26) is a syntactic object. For further discussion of Least Tampering, see Stepanov 2001:101–102, Freidin 2016:691–693, and references cited there. The formulation of Least Tampering in (26) is transderivational; it is adopted here with the aim of explaining in a principled way why adjunction to non-highest copies is apparently not permitted. If, however, a principled nontransderivational analysis of this state of affairs turns out to be possible, it can be adopted in place of (26) without affecting the overall analysis developed in this paper. One such alternative analysis is discussed in fn. 15 below (but rejected there for a combination of empirical and conceptual reasons).

(27)



Next, *exactly* would adjoin to *what*.¹³ But it could in principle adjoin to either the higher or the lower copy of *what*. Suppose it adjoined to the higher copy:

(28)



Then, the following new c-command relations would be added to $@(vP)$:¹⁴

¹³The adjunction of [PP *with great care*] to vP is suppressed here for convenience, without affecting the analysis.

¹⁴The c-command relations are notated as they are in (29) for maximum readability. More formally, $@(X)$ (where X is a syntactic object) can be modeled as a set of ordered pairs $\langle Y, Z \rangle$ (such that Y c-commands Z). Hence, the adjunction shown in (28) adds to $@(vP)$ the c-command relations $\langle \text{what}, \text{exactly} \rangle$ and $\langle \text{exactly}, \text{what} \rangle$.

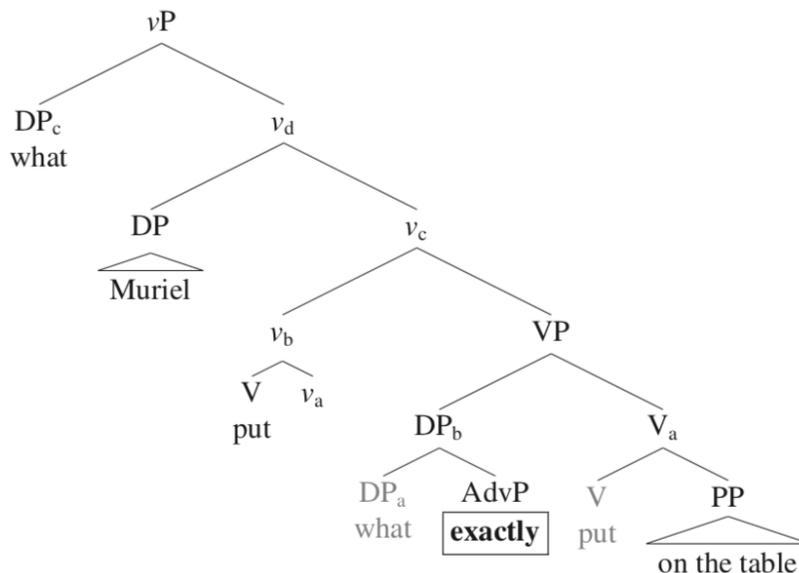
I assume (contra Stepanov 2001:104–105) that an adjunct and its host c-command each other—surely the optimal assumption given the theoretical desirability of assimilating adjunction to ordinary Merge to the extent possible, in line with minimalist goals (see Hornstein & Nunes 2008:62, fn. 6, and Chomsky, Gallego & Ott to appear for relevant discussion). I also assume for concreteness that, in (28), none of the c-command relations involving [DP *what exactly*] (as opposed to [AdvP *exactly*] and the higher [DP *what*]) count as new.

The analysis assumes that Least Tampering (which exerts pressure against changing the c-command relations inside already built structure) applies to the largest constituent that has been built (thereby exerting the greatest effect it can), and for this reason, it is vP rather than the *wh*-DP itself that is evaluated for Least Tampering in (28) (and (30) below). The analysis also assumes that DP is not a phase, at least in English, and therefore the smallest phase within which

- (29) a. [DP *what*] \gg [AdvP *exactly*] (“ \gg ” = ‘c-commands’)
 b. [AdvP *exactly*] \gg [DP *what*]

But now suppose instead that *exactly* adjoined not to the higher copy of *what* but to its lower copy, as in (30) (where the subscripts are provided purely for ease of exposition).

(30)



Then, the following new c-command relations would be added to @(*vP*):

- (31) a. [DP-_a *what*] \gg [AdvP *exactly*]
 b. [AdvP *exactly*] \gg [DP-_a *what*]
 c. V_a \gg [AdvP *exactly*]
 d. v_b \gg [AdvP *exactly*]
 e. [DP *Muriel*] \gg [AdvP *exactly*]
 f. [DP-_c *what*] \gg [AdvP *exactly*]

As can be seen by comparing (31) with (29), adjoining *exactly* to the lower copy of *what* creates *exactly* can be adjoined late to *what* in (28) is the *vP* phase. See Section 5.3 below for further discussion of this assumption and some independent evidence for it.

many more new c-command relations within ν P than adjoining it to the higher copy of *what* (6 vs. 2 in this case). Therefore, Least Tampering ((26)) forces the latter option, and in fact rules out adjunction to non-highest copies more generally.¹⁵

Possibility C: Move and adjoin simultaneously. Finally, it is conceivable a priori that, in (25), *exactly* could adjoin to *what* and *what* could move to the ν P edge simultaneously. (On simultaneous operations, see Chomsky 2008, a.o.) If this happened, then immediately after adjunction took place within the ν P phase (i.e., after *exactly* adjoined to *what*), VP would be spelled out, owing to Phase-Constrained Obligatory Late Adjunction. But because *what* would move to the ν P edge at the same time as it received an adjunct in its base position, it would move just early enough to escape VP spellout.

In other words, it would be possible to both adjoin *exactly* to *what* in the latter's base position ([Spec,VP]) and move *what*, stranding *exactly* within [Spec,VP] (i.e., within VP). But this is precisely what empirically seems to be impossible. I therefore suggest that syntactic operations cannot apply simultaneously (contra Chomsky 2008). That hypothesis not only rules out the unwanted derivation just described but also is theoretically attractive on independent grounds. Every derivational theory of syntax posits that some operations are nonsimultaneous (i.e., some opera-

¹⁵Even more generally, for a phase HP, Least Tampering favors adjunction to constituents that are as high as possible within HP (e.g., the higher copy of *what* in the example just discussed; of course, the categories of the adjunct and host must be compatible). This prediction would be well worth testing in other domains.

A possible alternative to the Least Tampering analysis just developed would be a multidominance analysis on which [_{DP-a} *what*] and [_{DP-c} *what*] in (31) are in fact a single syntactic object with two occurrences (or, differently put, with two different mothers). On such an analysis, the *exactly* adjoined to *what* would be spelled out in the higher of the two positions of [_{DP} *what exactly*]—i.e., within [Spec, ν P]—because a syntactic object is generally spelled out in the highest position it reaches in the (overt) syntax (unless particular PF constraints dictate otherwise). (For the same reason, the host *what* would be spelled out in its highest position: [Spec,CP].) Although this alternative provides an elegant account of why it is not possible to move *what* to the ν P edge and then adjoin *exactly* to its “lower copy,” it faces a serious problem: as pointed out by Larson (2016:13–15), multidominance analyses in general cannot (without highly stipulative additional assumptions) account for Lebeaux-type argument/adjunct asymmetries, which were what initially motivated the late-adjunction hypothesis. Consider (2-b), *Which inspection near John_i's office did he_i resent?* If [_{DP} *which inspection*] is a single syntactic object with three occurrences—one in [Spec,CP], one in [Spec, ν P], and (in the lower spellout domain) one in the complement position of V—then when [_{PP} *near John's office*] is adjoined late to [_{NP} *inspection*], *John* will be c-commanded by *he* (in two of the three occurrences of the *wh*-DP), which should induce a Condition C violation, contrary to what is observed. Moreover, this problem cannot be solved by stipulating that only the highest occurrence of a multidominated element counts for binding purposes, because Condition C is violated (in strict idiolects; see fn. 1) when the crucial R-expression in a Lebeaux-type configuration is contained within an argument rather than an adjunct, as in (2-a) *?*Which inspection of John_i's office did he_i resent?* See Larson 2016:13–15 for further discussion.

tions precede others). If simultaneous operations were allowed, a theoretical problem would arise: it would have to be explained why just those operations which were simultaneous were simultaneous, and likewise, *mutatis mutandis*, for the nonsimultaneous operations. If, by contrast, operations are strictly ordered (i.e., cannot be simultaneous), the theoretical problem does not arise.¹⁶

4.3 *Interim conclusion*

Exactly cannot be stranded within (big) VP—i.e., it is not possible to both adjoin *exactly* to a *wh*-phrase inside VP (call this step “Adjoin”) and move the *wh*-phrase to the *vP* edge, stranding *exactly* within VP (call this step “Move”).

The three conceivable derivations that might involve both of these operations are all ruled out for principled reasons. *Adjoin, then Move* is ruled out by Phase-Constrained Obligatory Late Adjunction. *Move, then Adjoin (to lower copy)* is ruled out by Least Tampering. Finally, *Move and Adjoin simultaneously* is ruled out because syntactic operations cannot apply simultaneously, if the discussion in Section 4.2 is on the right track.

But although a *wh*-associated *exactly* cannot be stranded within VP, *WH-exactly* can be generated within VP. When this happens, Phase-Constrained Obligatory Late Adjunction prevents the *wh*-associate from moving. The result is a *WH-exactly* phrase which is in situ within VP, as in multiple questions and echo questions.¹⁷

¹⁶However, a weaker view on which some operations are simultaneous, but not (\bar{A} -)movement and adjunction, would also be compatible with the observations examined here.

¹⁷Sportiche (2016, 2019) argues that permitting late merger (e.g., of adjuncts) has undesirable empirical and theoretical consequences (see also Gluckman 2014 and Chomsky, Gallego & Ott to appear). Sportiche proposes that late merger is in fact not possible, and that the phenomena it has been used to explain should be reanalyzed—largely in terms of Neglect, or noninterpretation, of copies (or subconstituents of copies) at the interfaces. The analysis of *exactly*-stranding in the text, however—which relies crucially on (Phase-Constrained Obligatory) Late Adjunction—provides an argument that late adjunction is possible after all.

Like the analysis developed here, Stepanov’s (2001) analysis entails that adjuncts are obligatorily merged late. His analysis is therefore an important precursor to this one. However, his analysis entails that all the adjuncts in the entire structure (e.g., the two italicized in (i) below) are merged in after everything else.

- (i) John claimed *after class* that he couldn’t come *because he was sick*. (Stepanov 2001:107, (31))

A potential theoretical problem with this analysis is that it is incompatible with standard phase theory. On Stepanov’s analysis, [_{PP} *because he was sick*] in (i) is adjoined to its host (presumably the embedded TP) after the embedded CP, the matrix *vP*, and the matrix clause (possibly a CP) have been constructed—by which point, on standard phase-theoretic assumptions, Merge within the embedded CP should be impossible. On a more empirical note, the analysis

5. Predictions: *Exactly*-stranding at phase edges

As was just shown, the analysis developed above explains a great deal about the distribution of *wh*-associated *exactly*. In particular, it explains why, although WH-*exactly* can be generated within VP, *exactly* cannot be stranded within VP.

The discussion so far has focused mainly on where *exactly* cannot be stranded. This section, by contrast, tests some predictions that the analysis makes about where it should be possible for *exactly* to be stranded.

Consider again the formulation of Phase-Constrained Obligatory Late Adjunction:

(32) **Phase-Constrained Obligatory Late Adjunction** (= (5))

For H a phase head and XP its associated spellout domain (= complement), adjunction within the HP phase must occur immediately before spellout of XP.

As discussed above, this has the consequence that a derivation in which some adjunction occurs within the *v*P phase involves the following (partial) order of operations:

- (33) a. Adjunction within the *v*P phase
 b. [*Then, immediately*] Spellout of VP (the complement of the phase head *v*)

Because only VP is spelled out at this point (not the entire *v*P), Phase-Constrained Obligatory Late Adjunction makes the following prediction:

- (34) It should be possible to (internally or externally) merge a *wh*-phrase at the *v*P edge, adjoin *exactly* to it (triggering VP spellout), and (in the next phase) move the adjunction host, stranding *exactly* at the *v*P edge.

of *exactly*-stranding developed here provides an argument that late adjunction is indeed obligatory, but takes place at the phase level (just before the phasal complement is spelled out), not all at once near the end of the overt syntax.

Abe's (2018) analysis, another important precursor to this one, entails that an adjunct can be merged late, but no later than the spellout domain containing its host is spelled out (all of which is also true on the analysis developed here). If the analysis developed here is on the right track, late adjunction is indeed constrained by phasal spellout, as Abe argues, but adjunction within a given phase not only may but indeed must occur late.

That is, although *exactly* cannot be stranded within VP, it should be strandable at the ν P phase edge.¹⁸

5.1 Prediction A: Exactly-stranding at the ν P phase edge

5.1.1 Data, part A: Nonsubject *wh*-phrases

Things look good for the prediction in (34): *exactly* does appear to be strandable at the ν P edge in many idiolects ((35)). Curiously, the relevant sentences have an informal ring to them (which is indicated below with the diacritic ¹), as is also noted by Branan (2019, fn. 16).

- (35) a. ¹What was he exactly doing there?
 b. ¹Who were they exactly talking to?
 c. ¹What did she exactly send?

Attested examples, which are generally likewise informal, are easy to come by; five are given below.¹⁹ The “Google gamma” (Horn & Abbott 2012, Horn 2013, Tyler & Wood to appear) is

¹⁸To briefly foreshadow the discussion in this section, it will be shown that the analysis predicts that *exactly* should be strandable at the edge of the ν P phase and at the edge of the CP phase, but not in the interior of either phase (e.g., not to the immediate right of C). All these predictions will be argued to be correct. It is worth noting, though, that these predictions are not unique to the Phase-Constrained Obligatory Late Adjunction analysis, but are shared by any analysis on which *exactly* underlyingly forms a constituent with its *wh*-associate but is stranded by movement of the latter. On standard assumptions, a moved *wh*-phrase originating within VP moves from its base position to [Spec, ν P] and then to [Spec,CP], but does not pass through non-phase-edge positions (e.g., a position to the immediate right of C). Therefore, the fact (demonstrated below) that a *wh*-phrase cannot strand *exactly* in such non-phase-edge positions is unsurprising, if *exactly* and its *wh*-associate underlyingly form a constituent. These predictions are still worth testing, though: the fact that they are borne out provides support precisely for that crucial component of the analysis—i.e., the hypothesis that a “stranded” *exactly* is indeed stranded by the movement of a *wh*-phrase with which it underlyingly forms a constituent. If this were not so (e.g., if a “stranded” *exactly* were base-generated as an adjunct to some clausal projection), we would have no explanation for the fact that all the positions in which *exactly* can be stranded are positions that *wh*-phrases transit through (because it would in principle be perfectly possible for a “stranded” *exactly* to be adjoined to a clausal projection in the interior of a phase and surface there, contrary to what is observed).

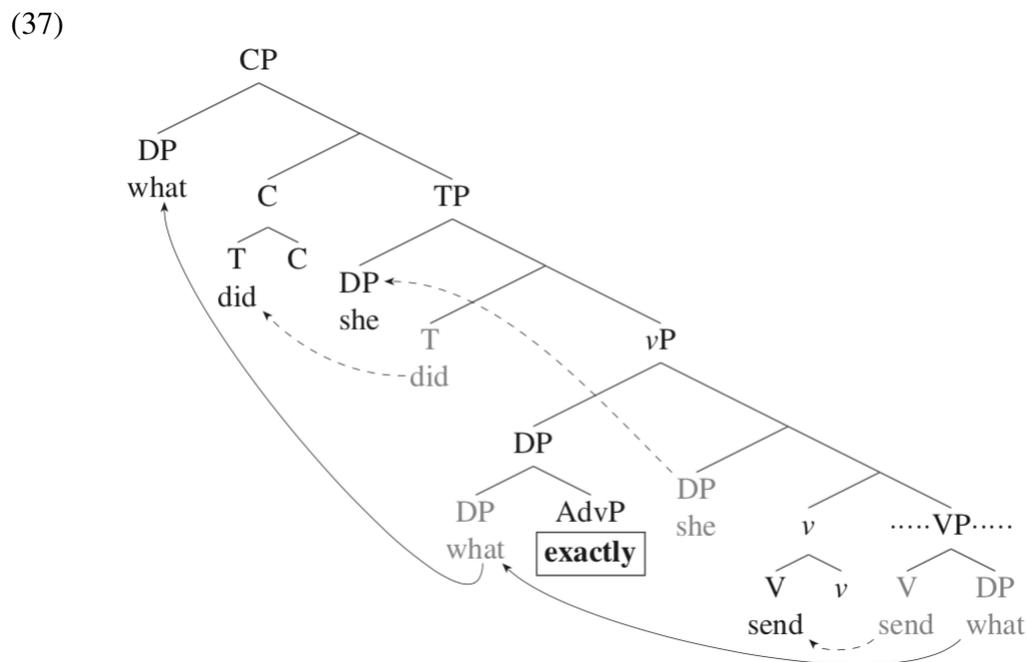
¹⁹Jim McCloskey, Jason Merchant, and Nicholas Bellinson inform me, though, that they find examples such as (35)–(36) unacceptable even in informal registers (see also Davis 2019b:31, (82)), indicating that some idiolects of English rule them out somehow. How they do this is not yet clear, but the variation here is reminiscent of the variation within West Ulster English with regard to where (and, specifically, in which phase-edge positions) *wh*-associated *all* can float (Hegarty 2011, Henry 2012, McCloskey 2019, and references therein; see also Tilleson 2018 on Upper Midwest American English, and see McCloskey 2019, Sect. 5, for a broader crosslinguistic perspective).

The claim that sentences such as (35)–(36) belong to an informal register reflects my own judgment (cf. Davis 2019b:1–2 on English possessor extraction). This observation is made here simply for the sake of reasonably complete description. Although it is not clear why such sentences are informal, the effect is unlikely to be tightly related to core syntactic properties and operations; therefore, the syntactic analysis developed here is not intended to account for it. (This is in accord with Wood’s 2017 reasoning [p. 268, fn. 25]: “Given that [...] what is standard or formal in

used in this paper to mark examples found on Google.

- (36) a. What did she exactly do to make people turn against her? Oh, that's right, she became successful. γ
 b. What did he exactly mean by this? γ
 c. what did you exactly do, to get it? γ
 d. What did they exactly change in the newest update? γ
 e. Him? Why? What had I exactly done wrong that made me deserve this torture? γ

The derivation of (35-c) ¹*What did she exactly send?* is shown in (37), with irrelevant details simplified.



There is an apparent problem, though. *Exactly* cannot be stranded to the immediate left of the lexical verb when passive *be*, progressive *be*, or both are present:

one language (e.g., negative concord in Italian) can be nonstandard or informal in another (e.g., negative concord in English), I do not encode social effects of this kind in the structure-building rules.”)

- (38) a. *What had she been exactly sent? *Passive be*
b. *What had she been exactly sending? *Progressive be*
c. *What had she been being exactly sent? *Progressive be + passive be*

It is standardly assumed that, in English, material at the *vP* phase edge is linearized to the immediate left of the lexical verb (which is itself the reflex of a complex *v* head consisting of at least *V* + *v*). If this is correct, then (38a–c) seem to suggest that *exactly* cannot (always) be stranded at the *vP* phase edge, contra the prediction in (34).

However, Harwood (2015) argues on independent grounds that passive and progressive *be* are *part* of the clause-internal phase when present (though see fn. 20 below; see also Davis 2019b:32, fn. 32). If this is so, then our analysis still predicts that clauses containing passive *be* and/or progressive *be* should allow *exactly* to be stranded at the left edge of the clause-internal phase. Crucially, though, this will now be understood as a position to the immediate *left* of these auxiliaries (more precisely, whichever one is the highest in a particular derivation).

Strikingly, this revised prediction is borne out. The relevant sentences ((39a–c)) are acceptable in some idiolects, and have the informal ring to them that is characteristic of sentences that strand *exactly* at the edge of the clause-internal phase:

- (39) a. ¹What had she exactly been sent?
b. ¹What had she exactly been sending?
c. ¹What had she exactly been being sent?

The contrast between (39a–c) and (38a–c) is very sharp.²⁰

One final remark is in order about sentences containing both passive and progressive *be*. In

²⁰On Harwood's (2015) analysis, progressive *be*, when present, is the head of the clause-internal phase, but when it surfaces as *been*, it has raised to a head *Perf* (responsible for the perfective morphology) and is hence outside the clause-internal phase—and, therefore, higher than the phase edge—in surface syntax (see his p. 547, (55)). If the analysis of (38)–(40) given in the text is on the right track, however, this suggests that Harwood's proposal about where the clause-internal phase is is correct, but should be combined with a different analysis of auxiliary inflection than the one he assumes—specifically, one on which progressive *be* occupies the clause-internal phase head position in surface syntax even when it surfaces as *been*.

(39-c), *exactly* is stranded at the clause-internal phase edge (to the left of both *be*'s), and the sentence is acceptable. In (38-c), *exactly* is stranded to the right of both *be*'s—i.e., in a non-phase-edge position—and the sentence is unacceptable (as predicted by Phase-Constrained Obligatory Late Adjunction, which rules out *exactly*-stranding in non-phase-edge positions). The analysis, now revised to incorporate our Harwoodian proposal about where the clause-internal phase is (or, more precisely, our semi-Harwoodian proposal; see fn. 20), predicts that *exactly* should also be unstranded between progressive and passive *be* (i.e., in another non-phase-edge position). This further prediction is correct:

(40) *What had she been exactly being sent? *Progressive be + passive be*

5.1.2 *Data, part B: External-argument wh-phrases*

The previous subsection provided evidence that, as predicted, *exactly* can be stranded at the edge of the clause-internal phase (though it cannot be stranded in the interior of this phase). Our testing of this prediction is not yet complete, however, because all the *wh*-phrases examined in the previous subsection were internal arguments.

It will be particularly important to test the prediction with external-argument *wh*-phrases as well, because these will furnish key evidence that will help us choose between the analysis developed here (based on Phase-Constrained Obligatory Late Adjunction) and the main conceivable alternative: a Bošković 2004–style analysis on which adjuncts may not be stranded in θ -positions.

Bošković (2004) argues that quantifiers cannot be floated in θ -positions. On his analysis, a floated quantifier adjoins to its associate, which subsequently moves, stranding the quantifier. Bošković argues that the quantifier cannot adjoin to its associate when the latter is in its θ -position, because of the Adjunction Prohibition (see fn. 4); instead, it must adjoin to its associate late, after the associate has undergone (some) movement. That is, it must adjoin to a non-lowest copy of its associate.

If, as argued here, the stranding possibilities for *exactly* (and other adjuncts to *wh*-phrases) are determined by Phase-Constrained Obligatory Late Adjunction, then an external-argument *wh*-

phrase that originates in [Spec,vP] should be able to strand *exactly* there. (*Exactly* would adjoin to the *wh*-phrase when the latter was in [Spec,vP]; VP would immediately be spelled out; and then, in the next phase, the adjunction host would move to [Spec,CP], stranding *exactly* within [Spec,vP].) By contrast, if *exactly*'s stranding possibilities are constrained by Bošković's (2004) ban on adjunct stranding in θ -positions, then an external-argument *wh*-phrase should not be able to strand *exactly* in [Spec,vP] (its θ -position).

As it turns out, *exactly* can be stranded in [Spec,vP] by an external-argument *wh*-phrase (in many idiolects, though not in all; cf. fn. 19). This is shown by the sentences in (41)–(42), which have the informal ring to them that is typical of sentences that strand *exactly* at the clause-internal phase edge.

- (41) a. ¹Who had exactly messed it up? *Matrix questions*
 b. ¹What had exactly caused the problem?
- (42) a. ¹I'm not sure who had exactly messed it up. *Embedded questions*
 b. ¹I'm not sure what had exactly caused the problem.

Note that *had* in (42a–b) must be in T—there being no T-to-C movement in embedded questions in mainstream English—and therefore *exactly* must be in [Spec,vP] in these sentences (rather than in some other position—e.g., [Spec,TP]).

Here too, attested examples are easy to come by, with both embedded questions ((43)) and matrix questions ((44)):

- (43) a. There's no word yet on who will exactly write the book, but... γ
 b. However, it remains unclear who will exactly pay for this plan. γ
 c. ...since it was unclear at this stage who would exactly move in to [*sic*] the development...
 γ
 d. ...it would be a little tricky in terms of how it would get paid for and who would exactly pay for it. γ

- e. There are no requirements for how it would be funded, or who would exactly provide the legal assistance. γ
- f. Though it's unclear who would exactly want to do it because the smell of cheap alcohol and fake tanners is probably still not fully sterilized out of the home, the Jersey Shore home is available for renters. γ
- (44) a. Who should exactly pay the donor? The hospital or the patient? γ
- b. Who should exactly implement these checklists? γ
- c. The most pressing question is, who will exactly run the network? γ
- d. Who will exactly own these implementations [...]? γ
- e. because guess what...the server is down, so who should exactly kill you? there isn't a game session anymore... γ

We see, then, that *exactly* can be stranded within [Spec,vP] by an external-argument *wh*-phrase—as predicted by the Phase-Constrained Obligatory Late Adjunction analysis, but not by Bošković's (2004) ban on adjunct stranding in θ -positions.²¹ (In fact, this result provides some evidence against that putative ban.)

5.1.3 How widely available is adjunct stranding at the clause-internal phase edge?

Before concluding this discussion of the clause-internal phase edge, it will be worthwhile to consider and respond to some arguments that have been made to the effect that adjunct stranding at the clause-internal phase edge is restricted or impossible.

Davis (2018:17, fn. 15; to appear, fn. 8) points out that *exactly* can left-adjoin to vP directly (as in *I believe her to have exactly intuited their intentions*), and argues that this is a confound that undermines the argument that a *wh*-phrase can strand an adjunct to it at the left edge of the clause-internal phase. (This process will be referred to below for convenience as *clause-internal stranding*.)

²¹As mentioned above, Bošković's (2004) analysis relies on the Adjunction Prohibition. Aside from its theoretical problems (fn. 4), the Adjunction Prohibition is challenged by the evidence that, in WH-*exactly* constituents—including, crucially, those which are in their θ -positions in surface syntax—*exactly* is adjoined to its *wh*-associate (Section 2).

There is, however, evidence for clause-internal stranding that remains solid even when this potential confound is carefully controlled for. As Davis (2018:4, to appear:5) points out, some Vs are semantically incompatible with *vP*-adjoined *exactly*. One example is *figure* ((45-a)). Despite this incompatibility, *figure* is compatible with WH-*exactly* ((45-b)). Crucially, as shown in (45-c), *figure* is also, in many idiolects, compatible with WH ... *exactly* (with *exactly* at the left edge of the clause-internal phase, yielding the usual informal-register effect). Because the *exactly* in (45-c) cannot be adjoined to *vP* (cf. (45-a)), it must have been adjoined to *what* and then stranded by *what* at the left edge of the clause-internal phase.

- (45) a. Did you (**exactly*) figure he meant something nasty by that?
b. What *exactly* do you figure he meant by that?
c. ¹What do you *exactly* figure he meant by that?²²

An attested example of the structure in (45-c) is given below.

- (46) ...how good do you *exactly* figure him to be at this point in his career? Seriously? γ

Davis (2018:17, 2019b:31–32, to appear:9), drawing on an observation by David Pesetsky, also gives another argument against clause-internal stranding. The argument is based on complex *wh*-phrases such as [[*how much flour*] [_{PP} *to the nearest pound*]], in which a PP is adjoined to a smaller *wh*-phrase. Davis argues, on the basis of examples such as (47), that this kind of PP adjunct can be stranded in [Spec,CP], but not at the edge of the clause-internal phase.

- (47) How much flour ⟨to the nearest pound⟩ did you [_{vP} ⟨*to the nearest pound⟩ say [_{CP} ⟨to the nearest pound⟩ that the bakery [_{vP} ⟨*to the nearest pound⟩ asked for]]]?

Davis argues that the bad versions of (47) are unacceptable because adjuncts to (nonsubject) *wh*-phrases quite generally cannot be stranded at the clause-internal phase edge in English. On his

²²Of 14 native speakers consulted, 7 found (45-c) marginally acceptable or better, and 3 found it perfect, as I do.

analysis, this is a consequence of cyclic linearization (Fox & Pesetsky 2005a,b, Bobaljik 2005, Diesing 2005, Ko 2007, 2014, Engels 2012, Erlewine 2017, Byron 2019, a.o.): if an adjunct (call it XP) to a nonsubject *wh*-phrase were stranded at the clause-internal phase edge, then XP would be linearized to the left of the subject when the clause-internal phase was spelled out,²³ but the subject (having raised to [Spec,TP]) would be linearized to the left of XP when the next highest phase was spelled out, yielding an ordering contradiction and causing the derivation to crash.

This analysis accounts elegantly for the unacceptability of the bad versions of (47). It faces an empirical challenge, though, from the acceptability (in some idiolects) of (45-c) and (46), in which *exactly* does appear to be stranded at the clause-internal phase edge by a nonsubject *wh*-phrase. However, suppose that Davis's analysis is correct, and an adjunct to a nonsubject *wh*-phrase can never be stranded at the clause-internal phase edge.²⁴ In this case, a right-adjunct to an *external-argument wh*-phrase is still predicted to be strandable at the clause-internal phase edge, as in (48):

- (48) a. ¹I'm not sure who had exactly messed it up. (= (42))
 b. ¹I'm not sure what had exactly caused the problem.

This is because the host *wh*-phrase is linearized to the left of its right-adjunct *exactly* when the clause-internal phase is spelled out, and this *wh*-phrase (after raising to [Spec,TP], stranding *exactly*) is again linearized to the left of *exactly* when the next highest phase is spelled out, so there is no ordering contradiction. As discussed in Section 5.1.2 above, sentences such as (48a-b) are indeed acceptable in some idiolects, as predicted by the analysis developed here (but not by Bošković's 2004 ban on adjunct stranding in θ -positions).

Taking stock, then, there is no conceptual incompatibility between Phase-Constrained Obligatory Late Adjunction and Davis's cyclic linearization analysis. On the analysis developed here, an adjunct to a *wh*-phrase can in principle be stranded at the edge of any phase, but never in the

²³ Assuming that the landing site of the complex *wh*-phrase at the clause-internal phase edge was higher than the base position of the subject.

²⁴ If this is so, the acceptability of (45-c) and (46) in some idiolects will have to be explained in some other way, without invoking clause-internal stranding.

interior of any phase. However, it is perfectly possible on this analysis that there are additional constraints or mechanisms that rule out particular instances of adjunct stranding at phase edges, including cyclic linearization à la Davis (2018, 2019b, to appear).

5.2 *Prediction B: Exactly-stranding at the CP level*

As discussed above, the analysis predicts, correctly, that *exactly* should be strandable at the edge of the clause-internal phase, but not in the interior of this phase (i.e., within the complement of the phase head). The analysis makes parallel predictions about the CP phase, for the same derivational-timing-related reasons.

5.2.1 *Prediction B₁: Exactly-stranding at the CP phase edge*

One of these predictions is spelled out below:

- (49) It should be possible to (internally) merge a *wh*-phrase at the CP edge, adjoin *exactly* to it (triggering TP spellout), and (in the next phase) move the adjunction host, stranding *exactly* at the CP edge.

It appears that *exactly* can indeed be stranded at the CP edge, as predicted (cf. McCloskey 2000:63–64, fn. 8; Davis 2017:3):

- (50) a. What do you believe exactly (that) everyone said (that) she devoured?
b. What do you believe (that) everyone said exactly (that) she devoured?

Similar results are obtained when the relevant phase head (the C) is not *that* but *for*. Thus, alongside sentences such as (51a–b), there are sentences such as (52a–b), in which *exactly* is stranded to the immediate left of *for* (hence plausibly at the CP phase edge).

- (51) a. What exactly did he arrange for her to receive?
b. What exactly did she campaign for the mayor to legalize?

- (52) a. ^MWhat did he arrange exactly for her to receive?
 b. ^MWhat did she campaign exactly for the mayor to legalize?

Sentences (52a–b), though marked in comparison to (51a–b), are acceptable; and crucially, they are much better than the sentences above in which *exactly* is illicitly stranded in a non-phase-edge position (in the interior of the clause-internal phase).²⁵

5.2.2 Prediction B₂: No *exactly*-stranding in the interior of the CP phase

Just as the analysis predicts (correctly) that *exactly* should be unstrandable in the interior of the clause-internal phase, so too does it predict that *exactly* should be unstrandable in the interior of the clausal (CP) phase.

If this is so, then attempting to strand *exactly* to the immediate right of C (hence in the interior of the CP phase) should produce unacceptability. This is correct:

- (53) What do you believe that (**exactly*) everyone said that (**exactly*) she devoured?
 (54) a. What did he arrange for (**exactly*) her to receive?
 b. What did she campaign for (**exactly*) the mayor to legalize?

(The sentences in (54), though, may be less informative in this connection than (53), since the C *for* is obligatorily adjacent to the immediately lower subject quite generally [cf. Rizzi 1997:301].)

5.3 A note on the (non)phasehood of DP in English

On the analysis of clause-medial *exactly*-stranding developed here, what determines when *exactly* can be adjoined to a *wh*-DP such as *what* is the relative timing of operations within the ν P phase—or, more precisely, the clause-internal phase. The analysis thus relies on the assumption that DP is not itself a phase, at least in English. Consider why. If DP were a phase in English, then it would be possible to adjoin *exactly* to a *wh*-DP such as *what* during the portion of the derivation

²⁵Like the ^I (“informal”) diacritics used above, the ^M (“marked”) diacritics in (52) are included merely for the sake of reasonably complete description. It is not clear why (52a–b) are marked, and the analysis is not intended to account for this; what is important here is that (52a–b) are acceptable, as the analysis predicts.

corresponding to the DP phase—specifically, immediately before spellout of the complement of the phase head D. (If *what* is an intransitive D, then it has no complement to spell out, but this does not affect the point.) Then, within the *v*P/clause-internal phase, it would be possible to merge [_{DP} [_{DP} *what*] *exactly*] as the complement of V, and, later, move the adjunction host [_{DP} *what*] to the edge of the clause-internal phase, stranding *exactly* within the complement-of-V position. As we have seen, however, *exactly* cannot be stranded in that position. This provides evidence that DP is not a phase (at least in English), as also argued by Davis (2019b, Sect. 6.2); Chomsky, Gallego, and Ott (to appear); and references cited in those works.

This conclusion makes a prediction about *exactly*-stranding. If indeed DP is not a phase in English, then, given that *exactly* can only be stranded at phase edges, *exactly* should not be strandable at the left edge of DP. This prediction is correct (as also discussed in Davis 2018:11, fn. 9; 2019b:27):

- (55) a. Clarence sent [_{DP} {a/the} picture of WHO *exactly*] to the museum as a prank?!
b. Who sent [_{DP} {a/the} picture of who *exactly*] to the museum as a prank?
c. Who *exactly* did Clarence send [_{DP} {a/the} picture of] to the museum as a prank?
d. **Who did Clarence send [_{DP} *exactly* {a/the} picture of] to the museum as a prank?

Likewise, *exactly* cannot be stranded at the left edge of a PP:

- (56) a. Mildred argued [_{PP} with WHO *exactly*] about snakes with great glee?!
b. Who argued [_{PP} with who *exactly*] about snakes with great glee?
c. Who *exactly* did Mildred argue [_{PP} with] about snakes with great glee?
d. **Who did Mildred argue [_{PP} *exactly* with] about snakes with great glee?

Although these matters deserve further investigation, the discussion above provides some evidence for the view that, at least in English, DP and PP are not phases, but only CP and the clause-internal phase, as also argued by Chomsky, Gallego, and Ott (to appear).

6. Excursus: Clause-final stranded *exactly* is high

Before concluding, it will be worthwhile to make a few remarks about something mentioned in Section 3.3—namely, the possibility of stranding *exactly* clause-finally:

- (57) a. What did Muriel put on the table with great care exactly? (= (13-d))
 b. What did Harvey give to the president to annoy you exactly? (= (14-d))
 c. Who did Ms. Winston send to the principal without a second thought exactly? (= (15-d))
 d. What did Gertrude throw against the wall in a fit of rage exactly? (= (16-d))

As discussed in Section 3.3, this can be accounted for by the analysis developed above on the plausible assumption that clause-final stranded *exactly* (henceforth “right-*exactly*”) is outside of, and hence higher than, VP. This section shows that that assumption is correct.

6.1 Evidence from vP-preposing

vP-preposing can either carry along ((58)) or strand ((59)) an ordinary clause-final adverb:²⁶

- (58) I know what she’s going to donate NEXT WEEK. (?)But donate IMMEDIATELY, what will she?
 (59) I know what she’s going to SELL NEXT WEEK. ?But DONATE, *what will she* IMMEDIATELY?

Right-*exactly*, though, cannot be carried along under vP-preposing. Instead, it must be stranded:

- (60) I know what she’s going to SELL.
 a. (?)But DONATE, what WILL she exactly?
 b. *But DONATE exactly, what WILL she?

²⁶Cf. Phillips 2003:55–58. Small caps denote focal stress. For me, the italicized material in (59) must also be pronounced emphatically.

This shows that right-*exactly* is not only higher than VP, but indeed higher than vP.²⁷

6.2 Evidence from sluicing

Right-*exactly* can survive sluicing, as shown in (61a–b) (and further discussed in Davis 2019a:19–20). (These sentences have an elevated ring to them, as is typical of English sentences in which a sluicing site is followed by overt material in the same clause.)

- (61) a. What should we read TODAY to impress our ENGLISH teacher? And what ~~should we read~~ TOMORROW exactly, to impress our GERMAN teacher?
- b. When did she visit the Atlantic Ocean despite her fear of water? And when ~~did she visit~~ the ARCTIC CIRCLE exactly, despite her fear of SNOW?

Sluicing elides at least TP, so (61) shows that right-*exactly* is (or at least can be) higher than TP.²⁸

Where, then, is right-*exactly*? One possibility is that it is stranded in a rightward specifier of a left-peripheral Foc(us) head (Rizzi 1997), with interrogative *wh*-phrases in English moving to an even higher leftward specifier position in the left periphery.²⁹ Another possibility is that right-*exactly* is not in fact adjoined to a *wh*-phrase that subsequently strands it, but simply right-adjoined to the entire CP (or ForceP). (If this is so, then it may be that *exactly* right-adjoins to phrases

²⁷Thanks to Nick Kalivoda for discussion of these facts. The argument still goes through if, as Ott (2018) argues, a fronted vP in English (or VP for him) is an ellipsis remnant in a separate sentence (= root CP). On this analysis, everything in that CP except vP(/VP) is elided, and the inability of *exactly* to survive this ellipsis shows that it is higher than vP(/VP).

²⁸In (61a–b), the right-peripheral *exactly* is followed by an (even higher) adjunct to ensure that it is not an instance of the non-*wh*-associated focus-sensitive adverb *exactly* exemplified in (i):

- (i) An EXCELLENT student didn't read Goethe exactly.

The post-*exactly* adjuncts in (61) eliminate this possibility because they cannot follow focus-sensitive *exactly* ((ii)), which apparently has a strong affinity for absolute clause-final position:

- (ii) a. *An EXCELLENT student/*BETHANY didn't read Goethe exactly(,) to impress our German teacher.
b. *A VALIANT EXPLORER didn't visit the Arctic Circle exactly(,) despite her fear of snow.

²⁹If, as required by this possibility, [Spec,FocP] is—or at least can be—linearized to the right in English, this may shed some light on why clause-final position is a very natural position for focused phrases in this language, and on why some varieties of English, mine included, almost completely lack overt *leftward* focus movement of the Italian/Spanish type (see Rizzi 1997:286, (4), and Zubizarreta 1998:103, (4c–d), (5)).

bearing the [WH] feature in general—not only the *wh*-phrases that move to the specifier of C_[WH], but also the projection of this C itself.) It is also possible that *right-exactly* reaches its surface position by extraposition, understood as rightward movement—though not if Fox and Nissenbaum (1999/2006) are right that adjunct extraposition is not derived by movement. This question will be left open here; what is important for present purposes is that *right-exactly* is indeed higher than VP, as required by the analysis developed in this paper.

7. Conclusion

The distribution of adjuncts to *wh*-phrases (such as *exactly* and *precisely*) initially seems puzzling. When such an element adjoins to a *wh*-phrase, *wh*-movement can affect either the whole adjunction structure or just the adjunction host; in the latter case, the adjunct is stranded. But although a [WH + adjunct] structure can be *generated* in the interior of a phase, the adjunct cannot be *stranded* there.

This paper has argued that the seemingly odd distribution of adjuncts to *wh*-phrases can be explained in terms of the relative timing of syntactic operations—specifically, if adjuncts merge late (Lebeaux 1991) obligatorily (Stepanov 2001) at the phase level:

(62) **Phase-Constrained Obligatory Late Adjunction** (= (5))

For H a phase head and XP its associated spellout domain (= complement), adjunction within the HP phase must occur immediately before spellout of XP.

That derivations must obey (62) may well reveal something deep about the architecture of syntax—namely, that the syntax fundamentally prioritizes satisfying featural requirements (selectional, Agree-related, EPP, etc.). If this is the case, then it is not so surprising that the syntax waits until the last possible moment (within each phasal subderivation) to add in adjuncts, which are not selected but are instead completely optional.

8. Appendix: On the (im)possibility of order-preserving double extraposition and its relation to *exactly*-stranding

Sections 3–4 explain the unacceptability of (63a–d) (in many idiolects, henceforth “strict idiolects”) largely in terms of Phase-Constrained Obligatory Late Adjunction:

- (63) a. *What did Muriel put exactly on the table with great care? (= (13-c))
 b. *What did Harvey give exactly to the president to annoy you? (= (14-c))
 c. *Who did Ms. Winston send exactly to the principal without a second thought? (= (15-c))
 d. *What did Gertrude throw exactly against the wall in a fit of rage? (= (16-c))

As pointed out in fn. 8, though, something more needs to be said. In order for the analysis in the text to fully account for the unacceptability of (63a–d) in strict idiolects, it must be impossible in these idiolects to derive them as follows (using (70-a) as an example):

- (64) *What did Muriel [_{vP} put ___i ___k] **exactly** [on the table]_{*i*} [with great care]_{*k*}?

That is, it must be impossible, in strict idiolects, to strand *exactly* in the clause-final position (on which see Section 6) and extrapose both the lower internal argument and the *vP*-final adjunct past the clause-final *exactly* in order-preserving fashion.

Fortunately, there is evidence that such derivations are indeed unavailable in many idiolects. (On idiolects that may allow such derivations, see below.) It is apparently the case that, completely independently of *exactly*-stranding, the following generalization holds for many idiolects, mine included:³⁰

- (65) When two *vP*-internal constituents undergo extraposition/heavy shift, they obligatorily reverse their order.

³⁰See Jayaseelan 1990:66, Danckaert 2017:152, and Kubota and Levine 2017:221 for some discussion of related issues. The terms *extraposition* and *heavy shift* are used interchangeably here.

To see this, consider (66-a). If the two internal arguments are extraposed past *yesterday*, they cannot surface in the same order ((66-b)), but must instead reverse their order ((66-c)).

- (66) a. Muriel put the extremely heavy iguana on the scratched-up metal table **yesterday**.
 b. *Muriel put **yesterday** the extremely heavy iguana on the scratched-up metal table.
in strict idiolects
 c. Muriel put **yesterday** on the scratched-up metal table the extremely heavy iguana.

One more paradigm supporting the generalization in (65) is given below.

- (67) a. Harvey gave his collection of toy platypuses to the president of Mozambique **today**.
 b. *Harvey gave **today** his collection of toy platypuses to the president of Mozambique.
in strict idiolects
 c. Harvey gave **today** to the president of Mozambique his collection of toy platypuses.

The generalization in (65), then—whatever its ultimate source—correctly rules out the unwanted derivation in (64), thereby completing the Phase-Constrained Obligatory Late Adjunction analysis of the unacceptability of (63a–d) in strict idiolects.

Interestingly, though, there is evidence that the generalization in (65) does not hold for all idiolects—i.e., that there are idiolects in which two vP-internal phrases can extrapose past a clause-final adverbial in order-preserving fashion. Thus, for Stroik (1990:659, (17b)), (68-b) is acceptable, and for Rudin (2013:1, (2)), (69-b) is acceptable. In strict idiolects such as mine, both of these sentences are unacceptable. (Example (69-a) is Rudin’s (1).)

- (68) a. I gave Bill some money **each and every day of my life**.
 b. %I gave **each and every day of my life** Bill some money.
 (69) a. I gave a lecture about heavy shift to my classmates **with an air of resignation**.
 b. %I gave **with an air of resignation** a lecture about heavy shift to my classmates.

This variation has an interesting implication concerning the status of sentences such as the following:

- (70) a. *What did Muriel put exactly on the table with great care? (= (13-c))
b. *What did Harvey give exactly to the president to annoy you? (= (14-c))
c. *Who did Ms. Winston send exactly to the principal without a second thought? (= (15-c))
d. *What did Gertrude throw exactly against the wall in a fit of rage? (= (16-c))

On the analysis developed in this paper, the reason that (70a–d) are unacceptable in many idiolects is that *exactly* cannot be stranded within VP, which in turn is largely due to Phase-Constrained Obligatory Late Adjunction. However, the licitness in some idiolects of sentences such as (68-b) and (69-b) opens up the possibility that these idiolects might allow (70a–d) on a parse involving order-preserving double extraposition—i.e., a parse on which *exactly* is stranded in the vP-external clause-final position (Section 6) and the lower internal argument and vP-final adjunct are extraposed past it in order-preserving fashion, as in (71).

- (71) %What did Muriel [_{vP} put ____i ____k] **exactly** [on the table]_i [with great care]_k? (= (64))

And indeed, there are idiolects (henceforth “lax idiolects”) that permit sentences such as (70a–d) (henceforth “polarizing *exactly*-sentences”). On the analysis developed here, lax idiolects are subject to Phase-Constrained Obligatory Late Adjunction just as strict idiolects are, and thus permit polarizing *exactly*-sentences only on a parse involving order-preserving double extraposition, not on a parse involving *exactly*-stranding within VP. The analysis predicts that, quite generally, idiolects that permit polarizing *exactly*-sentences should also permit order-preserving double extraposition (since, according to the analysis, that is the only way such sentences can be derived in any idiolect)—a prediction that will be well worth testing carefully in future work.

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