

On the Timing of Adjunction*

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1 Introduction

A crucial task for syntactic theory: to determine...

- (1) a. what syntactic operations are made available by the human capacity for language,
- b. what their properties are, and
- c. why they have the properties they do.

Today, I'll try to bring us closer to this goal by pushing forward our understanding of *adjunction*.

(May 1985; Chomsky 1986a, 1995; Kayne 1994, ch. 3; Johnson 2004; Hornstein & Nunes 2008; Bell 2012; and references therein, a.m.o.; see also Lakoff & Ross 1966 and Reinhart 1976)

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 elements—in particular, *adjuncts*—can be merged *late*, or countercyclically.

(Nissenbaum 1998, Sauerland 1998, Fox & Nissenbaum 1999/2006, Stepanov 2000, 2001, Fox 2002, Bošković 2004, Henderson 2007, a.o.)

(Set aside today: the possibility of Wholesale Late Merger in Takahashi & Hulsey's [2009] and Stanton's [2016] sense.)

Motivation for Lebeaux's proposal: an interaction between \bar{A} -movement and Condition C (which states that an R-expression cannot be bound, Chomsky 1981, 1986b).

- (2) *Condition C violations*
 - a. *He_i resented an inspection of John_i's office.
 - b. *He_i resented an inspection near John_i's office.

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1.1 Roadmap

- §2: The phenomenon: *Exactly*-stranding
- §3: An odd generalization: *Exactly* can be generated, but not stranded, within VP
- §4: Analysis: Phase-Constrained Obligatory Late Adjunction
- §5: Predictions: *Exactly*-stranding at phase edges
- §6: Interlude: Clause-final stranded *exactly* is high
- §7: Further predictions: Stranding of other adjuncts to *wh*-phrases
- §8: Concluding remarks

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; Kroll 2013:15; Davis 2017:3):

- (7) a. {Who(m)/What} exactly did she blame?
b. {When/Where/Why/How} exactly did he hide the donuts?
c. How well exactly did she paint the toothpicks?
d. {How many grapes/How much frosting} exactly did he eat?
e. What kind of wombat exactly does she want?
f. {What/Which} pretzel exactly did he sell for a million dollars?

WH-*exactly* is formed by adjoining *exactly* to a *wh*-phrase (contra McCloskey 2000:64, fn. 8):³

- (8)
-
- ```
graph TD
 DP1[DP [WH]] --- DP2[DP [WH]]
 DP1 --- AdvP[AdvP]
 DP2 --- who[who]
 AdvP --- exactly[exactly]
```

When an adjunction structure like (8) is built, *wh*-movement can affect the entire adjunction structure:

- (9) a. {Who(m)/What} exactly did she blame? (= (7a-b))  
b. {When/Where/Why/How} exactly did he hide the donuts?

...or just the adjunction host, in which case the adjunct is *stranded*:

- (10) *Exactly*-stranding  
a. {Who(m)/What} did she blame exactly?  
b. {When/Where/Why/How} did he hide the donuts exactly?

(See Bell 2012 for an investigation of the extent to which adjunction hosts are visible to syntactic operations.)

<sup>2</sup>Also *precisely*. *Exactly* can be replaced by *specifically* in many of the sentences in (7), but not all. This handout illustrates the relevant phenomena with *exactly* throughout.

<sup>3</sup>Today's analysis thus rejects the Adjunction Prohibition, which bans adjunction to arguments (Chomsky 1986a:16 [citing Kyle Johnson], McCloskey 1992, 2006, Motapanyane 1994, Bošković 1997, 2003, 2004, a.o.). (See Ernst 2002:13-14 for an argument against the Adjunction Prohibition.) This seems independently theoretically desirable; feel free to ask for details.

### 3 An odd generalization: *Exactly* can be generated, but not stranded, within VP

Consider the following:

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

Null hypothesis: *exactly* in (11b) is stranded within the direct object position inside VP.

There's actually evidence that the null hypothesis is wrong.

When a WH-*exactly* in direct object position is followed by a second internal argument and a clause-final low adjunct...

...WH-*exactly* can be moved as a whole, but the stranding option is called off:

- (12) a. Muriel put WHAT exactly on the table with great care?! *Echo question*  
b. Who put what exactly on the table with great care? *Multiple question*  
c. What exactly did Muriel put on the table with great care? *Movement of WH-exactly*  
d. \*What did Muriel put exactly on the table with great care? \* *Exactly-stranding*

(Note: If you get this pattern of judgments even in the absence of the final adjunct—here [PP *with great care*]  
—feel free to ignore this adjunct. It has been added to control for an interfering factor that arises in some idiolects.)

The pattern is general and robust:

- (13) a. Mrs. Winston sent WHO exactly to the principal without a second thought?! *Echo Q*  
b. Who sent who exactly to the principal without a second thought? *Multiple Q*  
c. Who exactly did Mrs. Winston send to the principal without a second thought? *Mvt. of WH-exactly*  
d. \*Who did Mrs. Winston send exactly to the principal without a second thought? \* *Stranding*
- (14) a. Harvey gave WHAT exactly to the president to annoy you?! *Echo Q*  
b. Who gave what exactly to the president to annoy you? *Multiple Q*  
c. What exactly did Harvey give to the president to annoy you? *Mvt. of WH-exactly*  
d. \*What did Harvey give exactly to the president to annoy you? \* *Stranding*
- (15) a. She talked to WHO exactly about drugs in hushed tones?! *Echo Q*  
b. Who talked to who exactly about drugs in hushed tones? *Multiple Q*  
c. Who exactly did she talk to about drugs in hushed tones? *Mvt. of WH-exactly*  
d. \*Who did she talk to exactly about drugs in hushed tones? \* *Stranding*

Generalization:

- (16) Wh-adjoined *exactly* can be generated, but not stranded, within (big) VP.  
(When it seems to have been stranded within VP, it's actually in a high right-peripheral position [§6].)

Why?

## 4 Analysis: Phase-Constrained Obligatory Late Adjunction

The key to understanding this strange situation is the following:

(17) *Phase-Constrained Obligatory Late Adjunction* (= (6))

For H a phase head and XP its associated spellout domain (= complement), adjunction within the HP phase occurs immediately before spellout of XP.<sup>4</sup>

For this proposal to be successful, it must *at least* explain why, when *WH-exactly* is generated within VP...

- (18) a. not moving the adjunction host is legitimate  
 b. moving the adjunction host is illegitimate

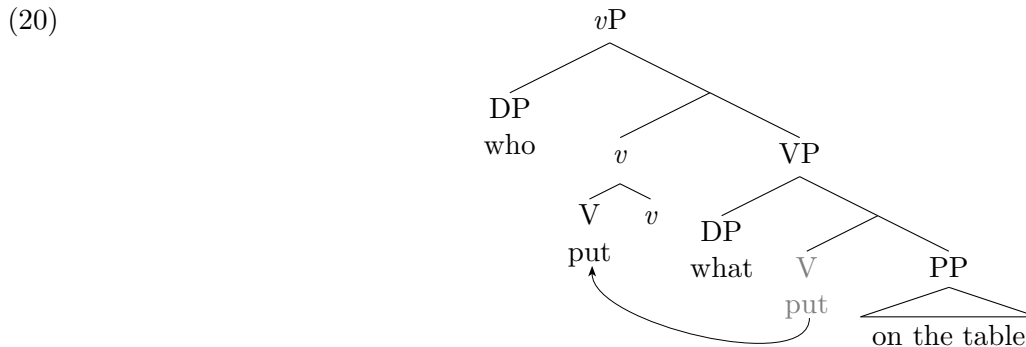
Let's consider each type of derivation in turn.

### 4.1 Derivation A: *WH-exactly* is generated within VP, and the host doesn't move

Consider the derivation of the following multiple question:

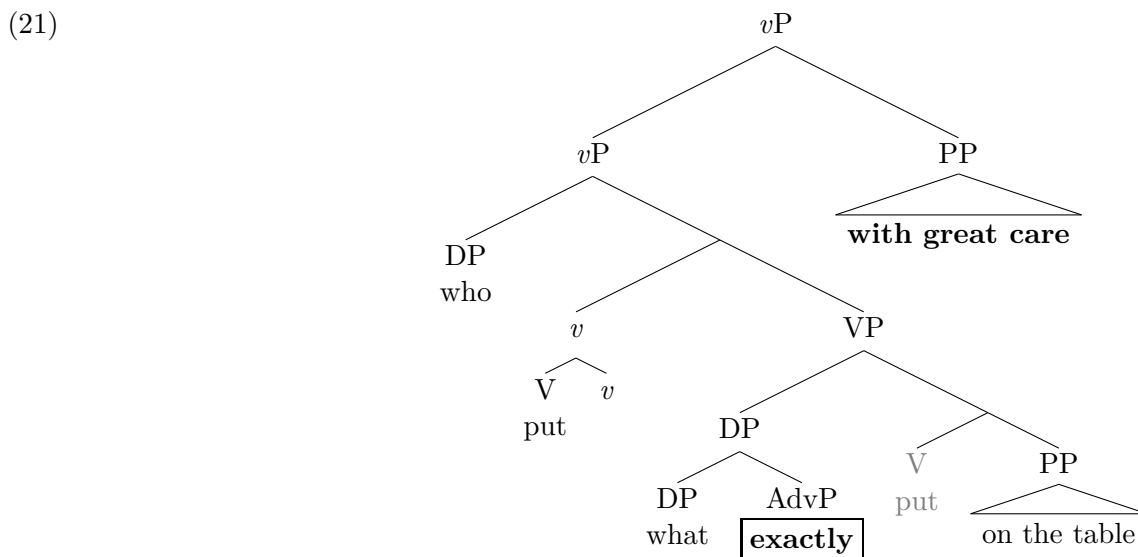
(19) Who put what exactly on the table with great care? (= (12b))

First, the following structure is built up:



By this point, the first phase head (*v*) has already been merged in.

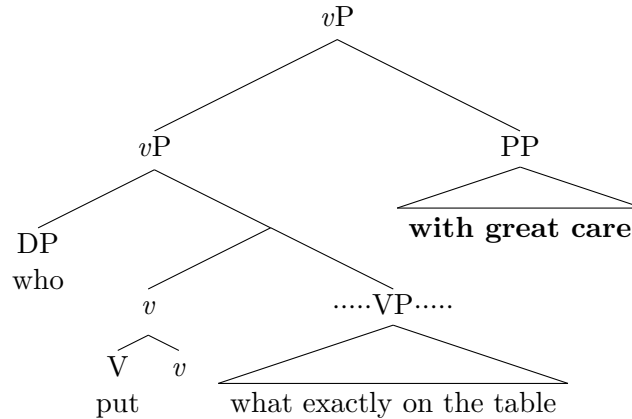
Immediately before the phase head's complement (VP) is spelled out, adjunction within the *vP* phase takes place:



<sup>4</sup>This proposal is similar (though not identical) to [Stepanov's \(2001\)](#): he also argues that adjuncts are obligatorily merged late. There are also similarities to [Bošković's \(2004\)](#) analysis of the unfloatability of quantifiers in various positions. More on the differences later.

Immediately after adjunction takes place within the *vP* phase, VP is spelled out, with the DP-adjunct *exactly* inside it:

(22)



And the derivation continues, ultimately converging.

The derivation of echo questions like (23) is identical in relevant respects.

(23) Muriel put WHAT exactly on the table with great care?! (= (12a))

#### 4.2 Derivation B: WH-*exactly* is generated within VP, and the host illicitly moves

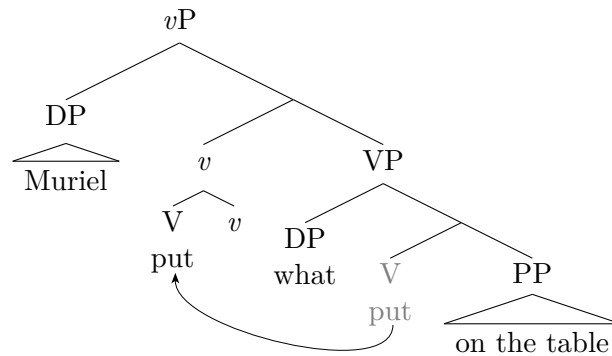
Now consider the following:

(24) \*What did Muriel put exactly on the table with great care? (= (12d))

Let's try to derive (24) and see what goes wrong.

First, the following structure is built up:

(25)



Suppose, counterfactually, that 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's impossible.)

How could this be done? Three ways come to mind that would be possible a priori.

### 4.3 Possibility A: Adjoin, then move

One way: adjoin *exactly* to *what* (in the latter's base position) and then move *what* to the *vP* edge, stranding *exactly*.

This is correctly 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, *what* is effectively trapped.

Immediately after adjunction takes place within the *vP* phase, VP (containing *what exactly*) is spelled out. As a result, *what* never has a chance to move to the *vP* edge.

### 4.4 Possibility B: Adjoin and move simultaneously

It's conceivable a priori that *exactly* could adjoin to *what* and *what* could move to the *vP* edge simultaneously. (On simultaneous operations, see [Chomsky 2008](#).)

If this happened, then, immediately after adjunction had taken place in the *vP* phase (i.e., after *exactly* had adjoined to *what*), VP would be spelled out, owing to Phase-Constrained Obligatory Late Adjunction.

But because *what* would move to the *vP* edge at the same time as it was adjoined to 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 and move *what*, stranding *exactly* within VP. But this empirically seems to be impossible.

I therefore suggest that syntactic operations cannot apply simultaneously (contra [Chomsky 2008](#)).

This is independently desirable. Every derivational theory of syntax posits that some operations are nonsimultaneous (i.e., some operations precede others)...

...but if simultaneous operations were permitted, a difficult 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.

But if operations are strictly ordered (i.e., cannot be simultaneous), this theoretical problem doesn't arise.

## 4.5 Possibility C: Move, then adjoin

One more conceivable possibility: *what* moves to the *vP* edge, and then *exactly* adjoins 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:

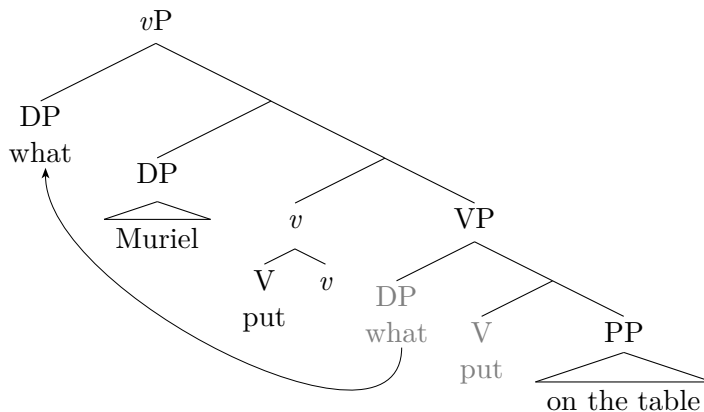
(26) *Least Tampering*<sup>5</sup>

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

$@(X)$ : the set of c-command relations in  $X$ . (X = a syntactic object)

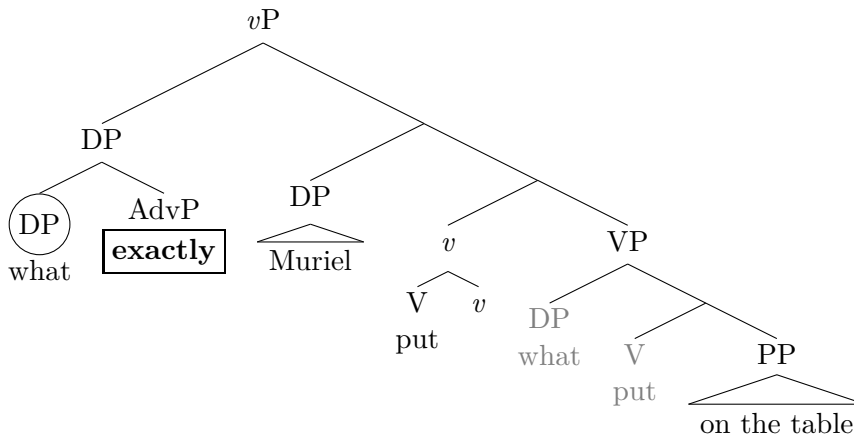
To see why, consider this hypothetical “movement + adjunction to lower copy” derivation in detail. First, *what* would move to the *vP* edge:

(27)



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

(28)



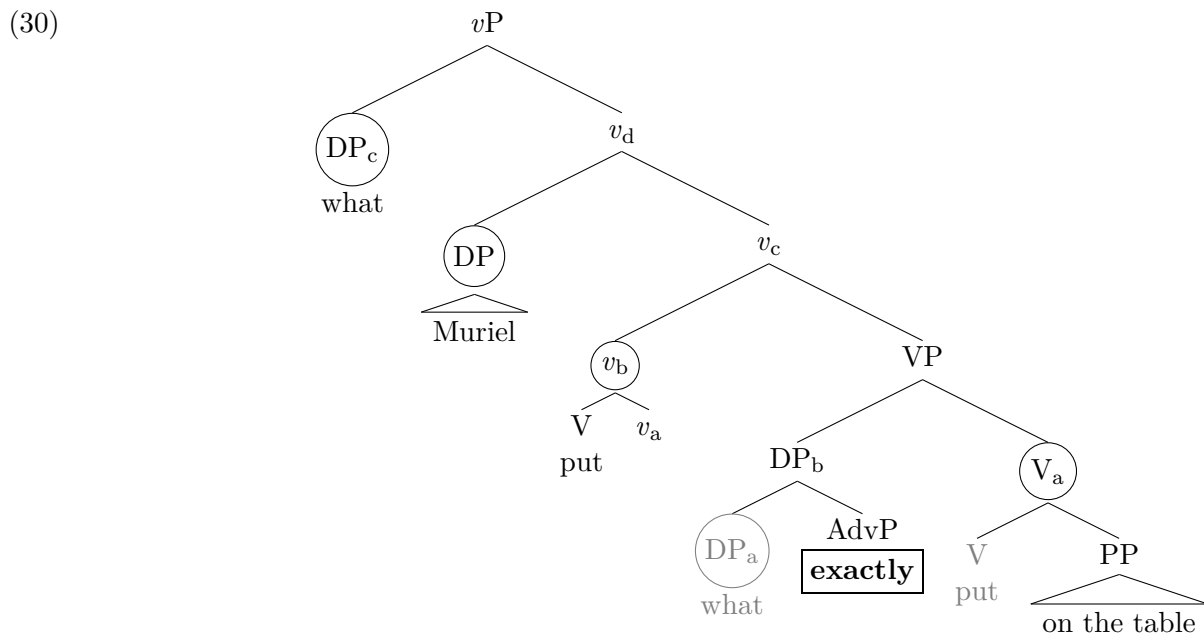
<sup>5</sup>Modified from Stepanov’s (2001:102, (16)) version, itself modified from Chomsky’s (2000:137, (59)) version. The main change in (26) is that it says “minimally changes  $@(\alpha)$ ,” whereas Stepanov’s version says “does not change  $@(\alpha)$ .” For further discussion, see Stepanov 2001:101-102, Freidin 2016:691-693, and references cited there.



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

- (29) a. [DP *what*] >> [AdvP *exactly*] <sup>6</sup> (“>>” = c-commands)  
 b. [AdvP *exactly*] >> [DP *what*]

But now suppose instead that *exactly* adjoined not to the higher copy of *what* but to its lower copy:<sup>7</sup>



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

- (31) a. [DP-a *what*] >> [AdvP *exactly*]  
 b. [AdvP *exactly*] >> [DP-a *what*]  
 c. V<sub>a</sub> >> [AdvP *exactly*]  
 d. v<sub>b</sub> >> [AdvP *exactly*]  
 e. [DP *Muriel*] >> [AdvP *exactly*]  
 f. [DP-c *what*] >> [AdvP *exactly*]

Adjoining *exactly* to the lower copy of *what* creates many more new c-command relations within *vP* than adjoining it to the higher copy (6 vs. 2 in this case).

Therefore, Least Tampering ((26)) forces adjunction to the higher copy, and in fact rules out adjunction to non-highest copies generally.<sup>8</sup>

<sup>6</sup>The c-command relations are notated this way for readability. More formally, @(*X*) can be modeled as a set of ordered pairs ⟨*Y*, *Z*⟩ (such that *Y* c-commands *Z*). Hence (29) = { ⟨*what*, *exactly*⟩, ⟨*exactly*, *what*⟩ }.

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

<sup>7</sup>Subscripts for ease of exposition (they have no syntactic reality).

<sup>8</sup>A possible alternative would be a multidominance analysis on which [DP-a *what*] and [DP-c *what*] in (31) are a single syntactic object with two occurrences(/two different mothers). On such an analysis, the *exactly* adjoined to *what* would be spelled out in the higher position of [DP *what exactly*]<sup>8</sup>—within [Spec, *vP*]<sup>8</sup>—because an element is generally spelled out in the highest position it reaches in overt syntax. This alternative, though elegant, faces a serious problem: as pointed out by Larson (2016:13-15), multidominance analyses in general cannot, without enormous stipulations, account for Lebeaux-type argument/adjunct asymmetries—the initial motivation for the Late Adjunction hypothesis.

## 4.6 Interim conclusion

*Exactly* cannot be stranded within (big) VP:

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:

- (32) a. Adjoin, then Move is ruled out by Phase-Constrained Obligatory Late Adjunction.  
b. Adjoin and Move simultaneously is ruled out because syntactic operations cannot apply simultaneously.  
c. Move, then Adjoin (to lower copy) is ruled out by Least Tampering.

But although *exactly* cannot be stranded within VP, WH-*exactly* can be generated within VP.

When this happens, Phase-Constrained Obligatory Late Adjunction prevents the host from moving.

The result is a WH-*exactly* in situ within VP, as in multiple questions and echo questions.<sup>9</sup>

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

So far, we’ve focused on where *exactly* cannot be stranded.

Now let’s test some predictions of the analysis about where *exactly* should be able to be stranded.

### 5.1 Prediction A: *Exactly*-stranding at the *vP* phase edge

Consider again the central claim:

- (33) *Phase-Constrained Obligatory Late Adjunction* (= (6))

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

This entails that a derivation in which some adjunction occurs within the *vP* phase involves the following (partial) order of operations:

- (34) a. Adjunction within the *vP* 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 *vP*), the analysis makes the following prediction:

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

I.e., although *exactly* cannot be stranded within VP, it should be strandable at the *vP* phase edge.

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<sup>9</sup>Sportiche (2016, to appear) argues that Late Merger is not possible (cf. Gluckman 2014; Chomsky 2015; Chomsky, Gallego, & Ott to appear), and that the phenomena it has been used to explain should be reanalyzed—largely in terms of Neglect (noninterpretation) of (subconstituents of) copies at the interfaces. Today’s analysis of *exactly*-stranding provides an argument against this view.

Things look good for this prediction: *exactly* does seem to be strandable at the *vP* edge ((36)). The relevant sentences have an informal ring to them (hence the <sup>I</sup> diacritic below).

- (36) a. <sup>I</sup>What was he exactly doing there?  
 b. <sup>I</sup>Who were they exactly talking to?  
 c. <sup>I</sup>What did she exactly send?

Attested examples abound:<sup>10</sup>

- (37) a. What did she exactly do to make people turn against her? Oh, that's right, she became successful.<sup>11</sup>  
 b. What did he exactly mean by this?  
 c. what did you exactly do, to get it?  
 d. What did they exactly change in the newest update?  
 e. Him? Why? What had I exactly done wrong that made me deserve this torture?

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:

- (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

This makes it seem as though *exactly* could not always be stranded at the *vP* edge, contra the prediction in (35).

However, Harwood (2015) argues on independent grounds that passive and progressive *be* are part of the clause-internal phase when present (though see fn. 12).

If so, then our analysis still predicts that clauses with passive and/or progressive *be* should allow *exactly* to be stranded at the left edge of the clause-internal phase...

...but this will now be understood as a position to the immediate left of these auxiliaries (more specifically, whichever one is highest in a given derivation).

Strikingly, this revised prediction is completely borne out:

- (39) a. <sup>I</sup>What had she exactly been sent? Passive be  
 b. <sup>I</sup>What had she exactly been sending? Progressive be  
 c. <sup>I</sup>What had she exactly been being sent?<sup>12</sup> Progressive be + Passive be

<sup>10</sup>Nicholas Bellinson informs me, however, that he finds examples like (36-37) unacceptable even in informal registers, indicating that some idiolects rule them out somehow. How is not yet clear, but this variation is reminiscent of the variation within West Ulster English with regard to where (and, specifically, in which phase edge positions) *wh*-associated quantifiers can float (Hegarty 2011, Henry 2012, McCloskey 2017; see also Tilleson 2018 for relevant data from Upper Midwest American English).

<sup>11</sup>These examples are from the following websites, respectively:

<https://nyulocal.com/why-teresa-giudice-is-actually-the-classiest-real-housewife-of-new-jersey-84d1444b43c2>  
<http://www.anewmode.com/topic/what-did-he-exactly-mean-by-this>  
<http://www.gamefaqs.com/boards/647136-the-amazing-spider-man/63372527>  
<https://forum.xda-developers.com/galaxy-tab-s/help/exactly-change-update-t2812151>  
<https://www.wattpad.com/19414029-i-think-i-love-you-chapter-3-hyunsik%27s-pov/page/2>

<sup>12</sup>On 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 (p. 547, (55)). The findings here suggest 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 his—specifically, one on which progressive *be* occupies the clause-internal phase head position in surface syntax even when it surfaces as *been*.

We also predict that *exactly* should be unstrandable between progressive and passive *be*, which is correct:

- (40) \*What had she been exactly being sent? Progressive be + Passive be

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

We just saw that 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 phase head's complement).

The analysis makes parallel predictions concerning the CP phase, for the same derivational-timing-related reasons.

### 5.2.1 Prediction B<sub>1</sub>: *Exactly*-stranding at the CP phase edge

One of these predictions is the following:

- (41) 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.

This seems to be correct (cf. McCloskey 2000:63-64, fn. 8; Davis 2017:3, 2018:9):

- (42) 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*:

- (43) a. <sup>M</sup>What did he arrange exactly for her to receive?  
b. <sup>M</sup>What did she campaign exactly for the mayor to legalize?

These sentences, though marked (<sup>M</sup>), are acceptable—and enormously better than the sentences above in which *exactly* is illicitly stranded in the interior of a phase.

### 5.2.2 Prediction B<sub>2</sub>: 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 CP phase.

Thus, attempting to strand *exactly* to the immediate right of the C *that* or *for* should produce unacceptability. This is correct:<sup>13</sup>

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

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<sup>13</sup>Like today's analysis, Stepanov's (2001) analysis entails that adjuncts are merged late *obligatorily*. However, his analysis entails that all the adjuncts *in the entire tree* (e.g., the two adjuncts italicized in (1) below) are merged after everything else.

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

This conclusion is incompatible with phase theory. On Stepanov's analysis, [<sub>PP</sub> *because he was sick*] adjoins to its host (presumably the embedded TP) after the embedded CP, the matrix *vP*, and the root node (possibly a CP node) have been constructed—by which point, on standard phase-theoretic assumptions, Merge within the complement of the embedded C should be impossible.

On a more empirical note, today's analysis provides an argument that late adjunction is indeed obligatory, but takes place within every phase (just before the phasal complement is spelled out), not all at once near the end of the overt syntax.

## 6 Interlude: Clause-final stranded *exactly* is high

*Exactly* can be stranded clause-finally:

- (46) a. What did Muriel put on the table with great care exactly?  
b. Who did Mrs. Winston send to the principal without a second thought exactly?  
c. What did Harvey give to the president to annoy you exactly?  
d. Who did she talk to about drugs in hushed tones exactly?

Today's analysis entails that *exactly* cannot be stranded within VP.

Therefore, it predicts that clause-final stranded *exactly* (henceforth “right-*exactly*”) should be outside of VP, and thus higher than VP.

This section shows that that prediction is correct.

### 6.1 Evidence from *vP*-preposing

Under *vP*-preposing, a clause-final manner adverb can either be carried along ((47)) or stranded ((48)):

- (47) *vP*-preposing can carry along a clause-final manner adverb
- a. I know that plenty of people would be willing to read that paper superficially. But read it carefully, who would?  
b. No one has ever sung the first song in this book halfheartedly. Sung it enthusiastically, on the other hand, who hasn't?
- (48) *vP*-preposing can strand a clause-final manner adverb<sup>14</sup>
- a. I know that plenty of people would be willing to read the SMITH paper SUPERFICIALLY. But read the JONES paper, who would CAREFULLY?  
b. No one has ever sung the FIRST song in this book HALFHEARTEDLY. Sung the SECOND song, on the other hand, who hasn't ENTHUSIASTICALLY?

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

- (49) I know that plenty of people like to eat tomatoes.
- a. But eat peppers, who would exactly?  
b. \*But eat peppers exactly, who would?
- (50) I'm well aware that no one has ever yodeled in the big library.
- a. But yodeled in the small library, who hasn't exactly?  
b. \*But yodeled in the small library exactly, who hasn't?

This shows that right-*exactly* is not only higher than VP, but indeed higher than *vP*.<sup>15</sup>

<sup>14</sup>Cf. Phillips 2003:55-58. Small caps denote focal stress. For me, the italicized material in (48) must also be pronounced emphatically.

<sup>15</sup>Thanks to Nick Kalivoda for discussion of these facts.

This argument still goes through if, as Ott (to appear) 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).

## 6.2 Evidence from sluicing

Right-*exactly* can survive sluicing, as shown in (51a-c). (These sentences have an elevated ring to them, as is typical of sentences in which a sluicing site is followed by overt material in the same clause.)

- (51) a. What should we read TODAY to impress our ENGLISH teacher? And what ~~should we read~~ TOMORROW exactly(, to impress our GERMAN teacher)?<sup>16</sup>  
b. Which dishes did he order with great gusto without worrying about their prices? And which ~~did he order~~ with TREMENDOUS gusto exactly(, without even THINKING about their prices)?  
c. 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)?

Since sluicing elides at least TP, (51) shows that right-*exactly* is (or at least can be) higher than TP.

## 6.3 Where is right-*exactly*, exactly?

One possibility: it's 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.<sup>17</sup>

Another possibility: right-*exactly* is not in fact adjoined to a *wh*-phrase that subsequently strands it, but simply right-adjoined to the entire CP.

If the latter analysis is correct, then it may be that *exactly* right-adjoins to phrases bearing the [WH] feature in general—not only the *wh*-phrases that move to the specifier of C<sub>[WH]</sub>, but also the projection of this C itself.

This question will be left open here. What's important for present purposes is that right-*exactly* is indeed higher than VP, as required by today's analysis.

---

<sup>16</sup>In the long versions of (51a-c), 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* shown in (1):

- (1) a. An EXCELLENT student didn't read Goethe exactly.  
b. A GOURMAND didn't order the dishes with tremendous gusto exactly.  
c. A VALIANT EXPLORER didn't visit the Arctic Circle exactly.

The post-*exactly* adjuncts in (51) eliminate this possibility because they cannot follow focus-sensitive *exactly* ((2)), which apparently has a strong affinity for absolute clause-final position:

- (2) a. \*An EXCELLENT student/\*BETHANY didn't read Goethe exactly(.) to impress our German teacher.  
b. \*A GOURMAND didn't order the dishes with tremendous gusto exactly(.) without even thinking about their prices.  
c. \*A VALIANT EXPLORER didn't visit the Arctic Circle exactly(.) despite her fear of snow.

<sup>17</sup>If, 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)).

## 7 Further predictions: Stranding of other adjuncts to *wh*-phrases

Nothing in the analysis is specific to the adverbs *exactly* and *precisely*: Phase-Constrained Obligatory Late Adjunction applies to all adjuncts.

Therefore, the analysis predicts that all adjuncts to *wh*-phrases should have the same distribution as *wh*-adjoined *exactly*—both when they are not stranded and when they are.

Let's test this prediction for two types of adjuncts to *wh*-phrases: relative clauses<sup>18</sup> (RCs) and PPs.

(On what can adjoin to a *wh*-phrase, see McCawley 1992.)

### 7.1 *Wh*-adjoined RCs and PPs can be generated, but not stranded, within VP

...just like *wh*-adjoined *exactly*:

(52) A *wh*-adjoined RC can be generated, but not stranded, within VP

- a. Muriel put WHAT that was slimy on the table with great care?! *Echo question*
- b. Who put what that was slimy on the table with great care? *Multiple question*
- c. What that was slimy did Muriel put on the table with great care? *Movement of [WH + RC]*
- d. ?\*What did Muriel put that was slimy · on the table with great care?<sup>19</sup> \* *RC stranding*

(53) A *wh*-adjoined PP can be generated, but not stranded, within VP

- a. Muriel put WHAT from the swamp on the table with great care?! *Echo Q*
- b. Who put what from the swamp on the table with great care? *Multiple Q*
- c. What from the swamp did Muriel put on the table with great care? *Mvt. of [WH + PP]*
- d. ?\*What did Muriel put from the swamp · on the table with great care? \* *Stranding*

### 7.2 *Wh*-adjoined RCs and PPs can be stranded at the edge, but not in the interior, of a *that*-CP

(54) A *wh*-adjoined RC can be stranded at the edge, but not in the interior, of a *that*-CP

- a. What that's REALLY VALUABLE did Mary say that Bill should keep locked up?
- b. ?What did Mary say · that's REALLY VALUABLE · that Bill should keep locked up?
- c. \*What did Mary say that · that's REALLY VALUABLE · Bill should keep locked up?
- d. \*What did Mary say that Bill · that's REALLY VALUABLE · should keep locked up?

(55) A *wh*-adjoined PP can be stranded at the edge, but not in the interior, of a *that*-CP

- a. What from the museum did Mary say that Bill should keep locked up?
- b. ?What did Mary say · from the museum · that Bill should keep locked up?
- c. \*What did Mary say that · from the museum · Bill should keep locked up?
- d. \*What did Mary say that Bill · from the museum · should keep locked up?

<sup>18</sup>It might seem that analyzing relative clauses as adjuncts (Chomsky 1973, 1977, Lebeaux 1991, a.o.) is untenable for English, given the evidence that English relativization structures are (or can be) formed by head-raising. But there is in fact no incompatibility here; see Henderson 2007.

<sup>19</sup>Paired raised dots (· *xyz* ·) enclose constituents pronounced between short “pauses” (or rather, with some nontrivial degree of prosodic autonomy). This prosody is used here to give heavy XPs stranded sentence-internally their best chance of being acceptable.

### 7.3 *Wh*-adjoined RCs and PPs can be stranded at the edge, but not in the interior, of a *for*-CP

- (56) A *wh*-adjoined RC can be stranded at the edge, but not in the interior, of a *for*-CP
- What that's REALLY VALUABLE did Mary arrange for Bill to keep locked up?
  - ?What did Mary arrange · that's REALLY VALUABLE · for Bill to keep locked up?
  - \*\*What did Mary arrange for · that's REALLY VALUABLE · Bill to keep locked up?
  - \*What did Mary arrange for Bill · that's REALLY VALUABLE · to keep locked up?
- (57) A *wh*-adjoined PP can be stranded at the edge, but not in the interior, of a *for*-CP
- What from the museum did Mary arrange for Bill to keep locked up?
  - ?What did Mary arrange · from the museum · for Bill to keep locked up?
  - \*\*What did Mary arrange for · from the museum · Bill to keep locked up?
  - \*What did Mary arrange for Bill · from the museum · to keep locked up?

### 7.4 A *wh*-adjoined RC can be stranded at the edge, but not in the interior, of the clause-internal phase

- (58) A *wh*-adjoined RC can be stranded at the edge of the clause-internal phase
- ?What had John · that was REALLY DIRTY · washed for two hours by then?
  - ?What had John · that was REALLY DIRTY · been washing for two hours by then?
  - ?What had already · that was REALLY DIRTY · been washed for two hours by then?
  - ?What had already · that was REALLY DIRTY · been being washed for two hours by then?
- (59) A *wh*-adjoined RC cannot be stranded in the interior of the clause-internal phase
- \*What had John been · that was REALLY DIRTY · washing for two hours by then?
  - \*What had already been · that was REALLY DIRTY · washed for two hours by then?
  - \*What had already been · that was REALLY DIRTY · being washed for two hours by then?
  - \*What had already been being · that was REALLY DIRTY · washed for two hours by then?

### 7.5 A *wh*-adjoined PP can be stranded at the edge, but not in the interior, of the clause-internal phase

- (60) A *wh*-adjoined PP can be stranded at the edge of the clause-internal phase
- ?What had John · from the old garage · washed for two hours by then?
  - ?What had John · from the old garage · been washing for two hours by then?
  - ?What had already · from the old garage · been washed for two hours by then?
  - ?What had already · from the old garage · been being washed for two hours by then?
- (61) A *wh*-adjoined PP cannot be stranded in the interior of the clause-internal phase
- \*What had John been · from the old garage · washing for two hours by then?
  - \*What had already been · from the old garage · washed for two hours by then?
  - \*What had already been · from the old garage · being washed for two hours by then?
  - \*What had already been being · from the old garage · washed for two hours by then?<sup>20</sup>

<sup>20</sup>Interestingly, *exactly* cannot be stranded at the left edge of a DP or PP:



## 8 Concluding remarks

### 8.1 Extensions

The phenomena investigated here raise interesting questions that go considerably beyond the domain of narrow syntax.

- In structures like *what exactly*, *what precisely*, *just what*, and *%what all*, an element forms a constituent with a *wh*-phrase, but seems to affect the kind of question asked or answer requested (cf. Kroll 2013 and references therein)...

...raising the question of what their compositional semantics is and how they come to have the pragmatic effects they do.

- *Stranding* phenomena of the sort investigated here display intricate patterns of microvariation, which is partially (but only partially) regionally based.

E.g., some speakers don't allow *exactly* to be stranded at the left edge of the clause-internal phase, even in informal registers (fn. 10).

In West Ulster English, *wh*-associated *all*-stranding (McCloskey 2000) is subject to regional microvariation: subvarieties differ with regard to which phase edge positions they allow *all* to be stranded in (Hegarty 2011, Henry 2012, McCloskey 2017; see also Tilleson 2018 on Upper Midwest American English).

Another case: some varieties of English allow *else*-stranding (*Who do you think else he saw?*, p.c. from Daniel Ezra Johnson to Jim McCloskey; see also Bošković 2004:692, fn. 13).

Elucidating the microvariation in this domain and its sources (grammatical and otherwise) would be a worthwhile collaborative project for syntacticians and sociolinguists.

- In at least one of these cases (*wh*-associated *all*-stranding), there is evidence that primary linguistic data from which children could learn that this type of stranding is possible in their variety is very rare...

...posing a challenging acquisition puzzle.

### 8.2 Summary and theoretical implications

The distribution of *wh*-adjoined phrases (*exactly/precisely*, relative clauses, PPs; see McCawley 1992) initially seems bizarre.

*Wh*-movement can affect either the entire 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.

- 
- |     |    |                                                                                         |                                    |
|-----|----|-----------------------------------------------------------------------------------------|------------------------------------|
| (1) | a. | Clarence sent [ <sub>DP</sub> a picture of WHO exactly] to the museum as a prank?!      | <i>Echo question</i>               |
|     | b. | Who sent [ <sub>DP</sub> a picture of who exactly] to the museum as a prank?            | <i>Multiple question</i>           |
|     | c. | **Who did Clarence send [ <sub>DP</sub> exactly a picture of] to the museum as a prank? | * <u><i>Exactly</i></u> -stranding |
| (2) | a. | Mildred argued [ <sub>PP</sub> with WHO exactly] about snakes with great glee?!         | <i>Echo Q</i>                      |
|     | b. | Who argued [ <sub>PP</sub> with who exactly] about snakes with great glee?              | <i>Multiple Q</i>                  |
|     | c. | **Who did Mildred argue [ <sub>PP</sub> exactly with] about snakes with great glee?     | * <i>Stranding</i>                 |

Although the matter deserves further investigation, this could be taken to suggest that DP and PP are not phases, but only CP and the clause-internal phase, as argued by Chomsky, Gallego, and Ott (to appear).

On the other hand, a *wh*-adjoined phrase can be stranded at a phase edge.

I've argued that the seemingly strange distribution of *wh*-adjoined phrases can be explained in terms of the relative timing of syntactic operations. . .

. . .specifically, if adjunction is late (Lebeaux 1991) obligatorily (Stepanov 2001) *within each phase*:

(62) *Phase-Constrained Obligatory Late Adjunction* (= (6))

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

If this is correct, it likely reveals something deep about the architecture of syntax—plausibly the following:

(63) The syntax prioritizes satisfying featural requirements imposed by lexical items.

(e.g., those imposed by their selectional features and probe features [Heck & Müller 2007])

If this is so, then it is actually conceptually natural for the syntax to wait until the last possible moment (within each phasal subderivation) to add in the relatively “peripheral” or “inessential” elements (adjuncts).

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## 10 Appendix: Double extraposition and its implications

Sections 3-4 account for the unacceptability of sentences like the following largely in terms of Phase-Constrained Obligatory Late Adjunction:

- (64) a. \*What did Muriel put exactly on the table with great care? (= (12d))  
 b. \*Who did Mrs. Winston send exactly to the principal without a second thought? (= (13d))  
 c. \*What did Harvey give exactly to the president to annoy you? (= (14d))  
 d. \*Who did she talk to exactly about drugs in hushed tones? (= (15d))

Something more needs to be said, though. In order for today's analysis to fully account for the unacceptability of (64a-d), it must be impossible to derive them as follows (using (64a) as an example):

- (65) \*What did Muriel put  $\text{---}_i$   $\text{---}_k$  **exactly** on the table  $\text{---}_i$  with great care  $\text{---}_k$ ?
- 

I.e., it must be impossible to strand *exactly* in the clause-final position (Appendix A) and extrapose both the lower internal argument and the *v*P-final adjunct rightward past this clause-final *exactly* in an order-preserving fashion.

### 10.1 The basic pattern

Fortunately, there is evidence that this derivation is indeed unavailable (in some idiolects; on the variation, see below).

Apparently, independently of *exactly*-stranding, the following generalization holds for some speakers (myself included):<sup>21</sup>

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

Evidence:

- (67) 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.  
 c. Muriel put **yesterday** on the scratched-up metal table the extremely heavy iguana.  
 (68) 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.  
 c. Harvey gave **today** to the president of Mozambique his collection of toy platypuses.

Generalization (66), then—whatever its source—correctly rules out the unwanted derivation in (65), thereby completing the Phase-Constrained Obligatory Late Adjunction analysis of the unacceptability of (64a-d).

As mentioned, though, there is some variation here. For some speakers, sentences like (67b) and (68b) are acceptable (cf. Stroik 1990:659, (17b), and Rudin 2013:1, (2)). This raises a question as to whether—and, if so, on what parse—these speakers accept sentences like (64a-d). Preliminary work suggests that the patterns of (un)acceptability here are quite complex, and that there is idiolectal variation even within this population. Given the intricacy of the data, the investigation of this matter will be left for another occasion.

<sup>21</sup>See Jayaseelan 1990:66, Kubota and Levine 2017:221, and Danckaert to appear for related discussion. The terms *extraposition* and *heavy shift* are used interchangeably here.

## 10.2 Implications for *exactly*-stranding sentences

The analysis so far ties the unacceptability of (64a-d) in part to Phase-Constrained Obligatory Late Adjunction and in part to the unavailability (in some idiolects) of order-preserving double extraposition (as in (65)).

If this is correct, what's wrong with derivation (65) is that it involves extraposing two *v*P-internal phrases in an order-preserving fashion. Extraposing them in a non-order-preserving fashion should be perfectly possible. This prediction is correct:

- (69) a. What did Muriel put exactly with great care on the table? (cf. (64a-d))  
b. What did Harvey give exactly, to annoy you, to the president?  
c. Who did Mrs. Winston send exactly without a second thought to the principal?  
d. Who did she talk to exactly in hushed tones about drugs?