Selectional Violations in Coordination (A Response to Patejuk and Przepiórkowski to appear)

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Abstract

Bruening and Al Khalaf (2020) showed that selectional violations in coordination are extremely limited (there are exactly two) and exactly match those that are permitted in ellipsis and displacement. Patejuk and Przepiórkowski (to appear) criticize Bruening and Al Khalaf (2020) on numerous fronts. They do successfully show that conjuncts do not need to match in syntactic category, but their dismissal of the selectional violation data does not succeed. I present additional data, including the results of three large-scale acceptability surveys, that show that the two violations of selectional restrictions are real and are fully general. The two patterns that need an analysis are coordinations of *NP&CP* appearing where CPs are banned, and *Adv&AP* appearing in prenominal position where adverbs are banned. I propose a variation on the analysis of Bruening and Al Khalaf (2020) that accounts for all of the facts and which meets Patajuk and Przepiórkowski's objections.

1 Introduction

Bruening and Al Khalaf (2020), henceforth "B&AK," made several claims about category mismatches in coordination. I focus on two here. The first was that mismatching categories were much less available than people thought. Based on this, B&AK suggested that they might not be real, and that coordination is restricted to combining only elements of the same syntactic category. The second claim involved violations of selectional restrictions in coordination. B&AK argued that these were real but were limited to two very particular types, both of which also appeared in leftward displacement and coordination. B&AK proposed an analysis of this pattern. Patejuk and Przepiórkowski (to appear), henceforth "P&P," criticize B&AK on numerous fronts. Regarding these two claims in particular, they argue that mismatching categories are very widespread, and there is no restriction on coordination limiting it to combining elements of the same syntactic category. P&P are not very clear about selectional violations in coordination, but they seem to dismiss them and deny that they exist.

In this paper, I revisit these two claims. Regarding coordination of unlike categories, I conclude that P&P are correct, and there is no requirement that conjuncts match in syntactic category. As for selectional violations, however, I show that they are real, and they are as described by B&AK: they are limited to two types that also surface in leftward displacement and ellipsis, and they depend on linear order. The two types are coordinations of *NP&CP* in positions where CPs are not permitted,

and coordinations of *Adv&Adj* in positions where adverbs are not permitted. I report on three large-scale surveys that validate the empirical claims in B&AK, and also document some variation in judgments that must be captured in an analysis.

Given the empirical picture arrived at here, I propose a revision of the analysis proposed by B&AK. This requires spelling out some architectural assumptions of the left-to-right derivational model that B&AK propose. Among the things spelled out are a rethinking of thematic roles, and a parallel architecture where the interface levels of PF and LF are constructed in parallel with the syntactic derivation.

I begin with an overview of the two issues in coordination under contention here (section 2). Section 3 presents data from P&P and other literature to show that category mismatches are permitted (everywhere), so long as selectional restrictions are obeyed. Section 4 then goes into detail on selectional violations, and shows that there is still a small class of cases where selectional restrictions can be violated. These are extremely limited, in exactly the way that B&AK showed. They still require an explanation. Section 5 goes on to propose a variation on the analysis of B&AK to account for them.

2 The Two Issues Regarding Coordination

The two issues under contention are, first, whether coordination is limited to combining the same syntactic categories, and second, whether selectional restrictions can be violated in coordination. An example bearing on the first issue is the following, where two different categories, NP and AP, appear to be coordinated as the complement of the verb *be*:

(1) Pat is a Republican and proud of it. (NP and AP; Sag *et al.* 1985: 117, (2b))

Since *be* permits both NP and AP complements, selectional restrictions are not violated here by either conjunct.

B&AK argued that all such cases of mismatching categories in coordination are either conjunctions of larger categories plus ellipsis, or they involve coordination of "supercategories." P&P criticize this approach, and present a large amount of evidence (reviewed briefly in section 3) showing that unlike categories can be coordinated.

Turning to violations of selectional restrictions in coordination, the kinds of cases at issue are the following. First, the predicate *depend on* allows only NPs and not CPs:[1]

(2) a. You can depend on my assistant.
b. * You can depend on that he will be on time. (Sag *et al.* 1985: 165, (125b))

In coordination, however, a non-initial conjunct can be a CP for most speakers, in violation of the selectional restriction we just saw:

(3) a. You can depend on [[$_{NP}$ my assistant] and [$_{CP}$ that he will be on time]]. (Sag *et al.* 1985: 165, (124b))

[1] I increasingly hear speakers produce utterances with finite declarative CPs as complements of prepositions, and younger speakers that I talk to increasingly accept them. The pattern of judgments reported here holds for those speakers who do not accept or produce declarative CPs as complements of prepositions. See more on the pattern of judgments found in the acceptability survey in section 4.4.

b. * You can depend on [[$_{CP}$ that my assistant will be on time] and [$_{NP}$ his intelligence]].

This is only allowed if the CP is a non-initial conjunct (3b).

One of the main empirical contributions of B&AK was to show that selectional violations of this sort are extremely limited, much more limited than previous accounts of them would predict. B&AK identified exactly two: In one, a CP could behave as an NP in coordination, as in (3a). In the other, a non-*ly* adverb could be coordinated with an adjective in prenominal position, while such an adverb is not permitted in this position by itself (see section 4.2 on the compound parse *the once-king*):

(4) a. The Once and Future King (book title)
b. * the once king

Other imaginable selectional violations do not occur. B&AK further noted that exactly these two mismatches also occur in leftward displacement and ellipsis, which they took to be very significant and in need of an explanation.

3 Category Mismatches are Allowed in Coordination

B&AK thought that apparent category mismatches in coordination are more limited than prior literature had made them out to be, and so tried to deny that they were real. P&P's corpus data do seem to indicate that B&AK were incorrect in this regard. It does seem to be the case that conjuncts can mismatch in category, so long as selectional violations are obeyed. For example, in predicate position, categories do not need to match, but selectional restrictions must be obeyed by all conjuncts (as B&AK already observed, based on prior literature):

(5) a. It's five o'clock and getting dark already. (NP and VP; Peterson 1981: 451, (14))
b. Pat is a Republican and proud of it. (NP and AP; Sag *et al.* 1985: 117, (2b))
c. I consider John crazy and a fool. (AP and NP; Bowers 1993: 605, (23a))
d. I consider that a rude remark and in very bad taste. (NP and PP; Sag *et al.* 1985: 118, (3b))

(6) (*become* selects NPs and APs but not PPs or VPs)
a. Danny became a political radical and very antisocial. (NP and AP)
b. * Danny became a political radical and under suspicion. (*NP and PP)
c. * Danny became courageous and in front of the hostages. (*AP and PP)
d. * Chris became a republican and awarded a prize. (*NP and VP; Sag *et al.* 1985: 143, (67d))

Conjoined modifiers do not need to match in syntactic category (these were also observed by B&AK):

(7) a. We walked slowly and with great care. (AdvP and PP; Sag *et al.* 1985: 140, (57))
b. They wanted to leave tomorrow or on Thursday. (NP and PP; Sag *et al.* 1985: 143, (69a))

c. John plays at night and every Sunday. (PP and NP; Moltmann 1992: 25, (29b))

d. John ran down the path, a marked man and desperately afraid. (NP and AP; Peterson 2004: 650, (16a))

e. In jeans and a T-shirt and sporting two days' growth on his chin, John presented a less than inspiring figure. (PP and AP; Peterson 2004: 650, (16b))

Note that in all of the above cases, either conjunct individually would also be grammatical in that position, so no distributional constraints on category are violated.

As for conjoined arguments of predicates, they also do not need to match in syntactic category, contrary to what B&AK say. Here are a few examples:[2]

(8) Many in DC behave this way or worse. (NP and AdvP/AP; P&P, (17))

(9) Xenocrates... believed that stars are fiery Olympian Gods and in the existence of sublunary daimons and elemental spirits. (CP and PP; P&P, (82))

(10) This boycott would show not only that there is a price to pay but also our great unity in the face of oppression. (CP and NP; P&P, (43))

(11) This class educates parents on the importance of water safety by teaching children to float and other lifesaving techniques. (Non-finite clause and NP; P&P, (99))

P&P produce a large amount of corpus data to show that these kinds of coordinations are very widespread. They also show that coordination of larger categories plus ellipsis is not a viable analysis for such cases, as the coordinate structure behaves as a constituent (e.g., for clefting). I conclude that B&AK were incorrect, and unlike categories can be coordinated in argument position.

P&P also show that linear order does not matter when all conjuncts are categories selected by the verb (or other selector). For instance, both NP&CP and CP&NP orders are fine when the verb permits both (modulo heaviness effects). P&P use pseudoclefts to show that the coordination is a constituent in the following examples (to rule out coordination of larger categories plus ellipsis; see B&AK):

(12) a. John's inability to get along with Pat and that he had no background in logic is what I didn't remember until it was too late.

b. That John had no background in logic and his inability to get along with Pat is what I didn't remember until it was too late.

As we will see, linear order *is* important when selectional restrictions are violated.

In all of these cases so far, every conjunct must obey selectional restrictions, or the result is deviant:

(13) a. Do you treat the four museums individually or as a collective? (AdvP and PP; P&P, (10))

b. We treat them individually and *(as) under suspicion. (*treat* requires *as* with NPs and PPs)

[2]Example and section numbers for P&P come from a pre-publication version downloaded from https://doi.org/10.1162/ling_a_00438 on 2/16/2022.

(14) a. . . . this promotion will only last for three days or until all stocks run out. (PP and CP; P&P, (25))

b. * It will last for three days or unlimited. (*last* does not permit APs)

(15) (Borsley 2005: 464, (7a–b))

a. Hobbs ended up liking Rhodes and hating Barnes.

b. * Hobbs ended up liking Rhodes and to hate Barnes. (*end up* selects *-ing* and not *to*)

I conclude so far that mismatching categories are permitted in general in coordination, so long as selectional restrictions are obeyed. The following biconditional, quoted by P&P, is therefore correct in one direction:

(16) If (and only if) in a given syntactic construction a constituent X can be replaced without change of function by a constituent Y, then it can also be replaced by a coordination of X and Y. (Huddleston and Pullum 2002: 1323)

What we have seen in this section is that, if X can be replaced by Y, then it can also be replaced by a coordination of X and Y. The other direction of the biconditional is the second issue, which is the focus of the rest of this paper.

4 Selectional Violations in Coordination

While it is true that if X can be replaced by Y, then it can also be replaced by a coordination of X and Y, it is not true that if X can be replaced by a coordination of X and Y, then X can be replaced by Y. We have already seen this with the examples in (3a) and (4a), repeated here:

(3a) You can depend on [[$_{\text{NP}}$ my assistant] and [$_{\text{CP}}$ that he will be on time]]. (Sag *et al.* 1985: 165, (124b))

(4a) The Once and Future King (book title)

In (3a), CP is not a valid argument of *depend on*, and the CP cannot replace the NP (2b). Nevertheless, NP & CP can replace the NP. Similarly for (4a): *once* cannot replace *future* (I assume that linear order is not intended to be important in 16), even though *once and future* can replace *future*. Thus, it is not true that if a coordination of X and Y can replace X, then Y can also replace X.

What P&P say about these is not entirely clear. They do try to deny the adverb data, and claim that adverbs like *once* are valid prenominal modifiers (hence, Adv can replace Adj). As for examples like (3a), all that P&P have to say is that they are not fully general. In order to maintain the statement in (16) as a biconditional, which seems to be their intent, they would have to say either that declarative CPs are valid arguments of prepositions, or that coordinations of NPs and CPs as in (3a) are not actually acceptable.

In the rest of this section, I investigate selectional violations in coordination in more detail. Sections 4.2–4.3 evaluate P&P's contention that the adverb data are not an instance of a selectional violation because the relevant adverbs can function as prenominal modifiers. I show that this is not correct. Sections 4.4–4.5 investigate whether the CP data could be dismissed, and conclude that it cannot be. Most speakers surveyed do not permit a declarative CP as complement of a preposition, but do permit a conjunction of NP and CP, and this pattern is fully general. I conclude

that selectional restrictions can indeed be violated in coordination in these two cases, and the biconditional statement in (16) is therefore falsified in one direction.

Having shown that these two selectional violations are real, I then go on to illustrate B&AK's points about them: They are extremely limited (section 4.6), and they depend on linear order (section 4.7). Section 5 then goes on to propose an analysis of them.

First, however, I need to provide some background on syntactic selection.

4.1 Syntactic Selection

The phenomenon discussed in this paper is that of categorial selection (or C-selection), where a specific syntactic category appears to be required in a given syntactic environment. I take it as established that C-selection is necessary in a model of grammar, and cannot be reduced to semantic selection (see, e.g., Pollard and Sag 1987: 121–129, Alrenga 2005). There is a recent literature that is concerned with getting rid of selection in the domain of embedded CPs. This literature claims that it is possible to predict the distribution of embedded questions versus declaratives based on semantic factors (Mayr 2019, Theiler *et al.* 2019, Uegaki and Sudo 2019, Özyildiz 2021). However, this literature is very narrowly concerned with that question. As far as I can see, it has nothing to say about the distribution of syntactic categories like NP versus CP. The proposed explanations for the distribution of questions and declaratives have absolutely no bearing on the distribution of categories like NPs and CPs.

Pollard and Sag (1987: 121–129) provide a number of examples showing that C-selection cannot be reduced to semantic selection. For example, they discuss a number of predicates that are all very similar in meaning to *become*. All of them take what is essentially a semantic predicate as their complement, but they all differ in what syntactic categories are permitted. *Become* allows NPs and APs but not PPs or VPs (6), *grow* permits only APs, *get* permits APs, PPs, and VPs but not NPs. When it comes to selecting non-finite clauses, selection is even more arbitrary. For instance, two other *become*-type predicates, *end up* and *turn out*, both take NPs and APs (17a–b), but *end up* only takes an *-ing* complement (17c) and *turn out* only takes a *to* complement (17d):

(17) a. She ended up {broken-hearted/a cold-hearted cynic}.
b. The cookies turned out {disgusting/a success}.
c. They ended up {liking/*to like} sweat lodges.
d. They turned out {to like/*liking} sweat lodges.

Such facts necessitate categorial selection as distinct from semantic selection, since every complement here is identical semantically in being a predicate (of any type: telic/atelic, individual-level/stage-level, etc.).

As another consideration, in the survey discussed in section 4.4, a subset of the population appears to accept finite declarative CPs as complements of prepositions, while the majority disallows them. If C-selection were somehow semantic in nature, we would have to conclude that the two different populations of speakers somehow have different semantics for the predicates and constructions at issue. This seems unlikely. On the other hand, if there is C-selection in the grammar, and this is often arbitrary, then this pattern makes sense: speakers can differ in the C-selectional patterns they have in their grammars.

I therefore assume that a model of grammar must include a notion of C-selection. I implement this in the analysis in section 5 as feature checking, where a selector has a C-selectional feature that must be checked off by merging it with a projection of the appropriate category.

One of the patterns discussed in this paper involves modifiers, specifically, adjectives and adverbs. Modifiers are often treated as not being involved in selection. However, there are clear category restrictions on modifiers in particular positions. In the pattern at issue here, adjectives are allowed in prenominal position (between determiners and the head noun), while adverbs are not. On the other hand, adverbs modify other categories, like adjectives and verbs, while adjectives do not. These are clearly restrictions on the distribution of syntactic categories, and so should fall under a model of C-selection.

There are two ways they could. First, as proposed by Pollard and Sag (1994), Bruening (2010a, 2013), Bruening and Al Khalaf (2020), the modifier can be viewed as C-selecting the category it modifies. In the feature-checking theory, this would be implemented by giving a modifying adjective a C-selectional feature that requires something of category N, for instance. The other possibility is that the modified category (optionally) selects its modifiers. For instance, a head N would be able to C-select a modifying adjective (and this would have to be allowed to iterate). Either implementation would require that linear order be specifiable, too: PPs can modify Ns, but they must come after the head noun, not before, unlike adjectives.

I will adopt the view in which the modifier selects the modified category, for two reasons. First, it makes more intuitive sense. Modifiers are viewed as modifiers precisely because they are not selected by the predicate they modify, whereas modifiers are often limited in what they can modify. Second, iterability is easier to implement in this view. An adjective can have a C-selectional feature that requires it to merge with a projection of a category N. Nothing stops another adjective from doing the same thing, and so we can have multiple adjectives modifying projections of a single N. If the modified category is what selects, then it has to be able to have multiple selectional features in addition to just one or even none. Given these two considerations, I assume that modifiers C-select the categories they modify.

With this background, we can turn to the two patterns of selectional violations discussed here.

4.2 Adverbs Conjoined with Adjectives

P&P attempt to dismiss the non-*ly* adverb data presented by B&AK and represented above by (4a). They claim that non-*ly* adverbs like *once* and *soon* can be used as prenominal modifiers, and so there is no violation of a selectional restriction when they appear there coordinated with an AP. However, they present only four examples. Two of these have an irrelevant parse:

(18) a. The Once-King of Penn State (P&P, (72))
b. Twice Winner of the Man Booker Prize (P&P, (73))

The example in (18a) is a compound. It can be seen to be a compound because it must undergo *one*-replacement with the rest of the head noun:

(19) a. the first once-king and the second (*once) one
b. the current king and *the once one
c. the once-king on the left and the (*once) one on the right

It also cannot come outside a prenominal adjective unless it modifies only that adjective, and it cannot be coordinated with another adjective where it is second:

(20) a. the future nominal king
b. * the once nominal king (only grammatical as *once-nominal*)
c. * the future and once king (Bruening and Al Khalaf 2020: 14, (44d))

P&P's example in (18a) is not relevant, then, as it involves a compound.

P&P's other example in (18b) is telegraphic. If the determiner were pronounced, it would come after *twice*:

(21) a. (It is) twice the winner of the Man Booker Prize.
b. * (It is) the twice winner of the Man Booker Prize.

This is an adverbial use of *twice*, not a prenominal one, and so it is not relevant, either.

The other two examples shown by P&P are completely unacceptable, in my judgment:

(22) a. The release of the now Caliphate Al Baghdadi (P&P, (74))
b. They call him the thane of glamis, thane of cawdor, and the soon king (P&P, (75))

Note that (22a) seems to be a mistake, since *Caliphate* is not a person, *Caliph* is. We should therefore probably discount this example. However, the writer could simply have used *Caliphate* wrong, and it is possible that some English speakers indeed allow non-*ly* adverbs as prenominal modifiers.

In an effort to evaluate this possibility, I conducted an acceptability survey using Amazon Mechanical Turk. For this purpose I made use of the free tools described in Gibson *et al.* (2011) and available at http://tedlab.mit.edu/software/, modified for the purposes of this experiment. The experiment included two sub-experiments, one on adverbs in prenominal position (Experiment 1a), and the other on CPs as objects of prepositions (Experiment 1b). I describe the adverb sub-experiment here, and the CP sub-experiment in section 4.4.

There were eight pairs of experimental items in the adverb sub-experiment. They contrasted one of the adverbs *now, soon, once, twice* (each used twice) with adjectives in prenominal position, as follows:

(23)

Items for Experiment 1a: Prenominal Adverbs vs. Adjectives	
Adv	We want to meet the now vice president.
Adj	We want to meet the current vice president.
Adv	Someone will introduce the soon king.
Adj	Someone will introduce the future king.
Adv	We are looking forward to a soon visit.
Adj	We are looking forward to an upcoming visit.
Adv	At the event we saw the once president.
Adj	At the event we saw the past president.
Adv	They will toast the twice winner.
Adj	They will toast the two-time winner.
Adv	The newspapers are celebrating the now prime minister.
Adj	The newspapers are celebrating the incoming prime minister.
Adv	An announcer will present the once CEO.
Adj	An announcer will present the former CEO.
Adv	This event features the twice runner-up.
Adj	This event features the two-time runner-up.

If P&P are correct and these non-*ly* adverbs are capable of being prenominal modifiers, then we should not see any difference in the ratings subjects assign to the two members of each pair. On the other hand, if these adverbs are not capable of functioning as prenominal modifiers on their own, then we should see a large difference in acceptability ratings.

Each subject saw only one member of each pair. Subjects answered a comprehension question about every sentence and also rated every sentence on a scale of one to five (1: Extremely unnatural, 2: Somewhat unnatural; 3: Possible, 4: Somewhat natural, 5: Extremely natural). The two sub-experiments served as fillers for each other, since they were very different in form. The survey also included eight additional filler or control sentences that were intended to be matched for register and style. These were created by modifying examples taken from the web, typically online newspaper articles. Each of the eight was manipulated to create an ungrammatical match, where the manipulation was changing the word order to an unacceptable one (the ungrammatical sentences were not presented with the star):

(24) a. South Africa became the second African country to announce that it would leave the International Criminal Court.

b. * South Africa became the second African country to announce that it would the International Criminal Court leave.

As stated, there were eight pairs of fillers, and again each subject saw only one member of each pair. Subjects rated a total of 24 sentences (8 experimental items from the adverb study + 8 experimental items from the CP study + 8 filler items). A different list was created for each subject with the presentation order randomized.

80 workers were recruited from within the USA (limited to those classified as "masters" by Amazon Mechanical Turk[3]). Several completed the survey more than once; in those cases, all

[3]I and other researchers have seen a noticeable decline in the quality of respondents on Amazon Mechanical Turk. They respond very oddly on clearly grammatical and ungrammatical control items, and score very low on the comprehension questions. Limiting workers to masters results in much better performance.

beyond the first were thrown out. Subjects' data were also discarded from the analysis if the subject was not from the USA, did not identify their native language as English, or got fewer than 75% of the comprehension questions correct. Data from fifteen subjects were thrown out for these reasons (most for repetitions). This left 65 subjects whose data entered the analysis. 36 identified as male, 29 as female. Four were age 20–30, 31 were 30–45, 22 were 45–55, and 19 were over 55.

Mean ratings and standard deviations are shown below, both raw and z-scores (again, the scale is 1–5, 1: Extremely unnatural, 2: Somewhat unnatural; 3: Possible, 4: Somewhat natural, 5: Extremely natural):

(25)

Experiment 1a Raw Scores				
	control	ungramm	Adj	Adv
mean	4.451737	2.271318	4.748062	3.115830
SD	0.9110576	1.3595143	0.5460293	1.2675513

Experiment 1a Z-Scores				
	control	ungramm	Adj	Adv
mean	0.6257453	-0.9699534	0.8717220	-0.3082697
SD	0.7118555	0.9427681	0.4038916	0.8311803

The "control" items are the grammatical fillers and the "ungramm" items are the ungrammatical fillers. Subjects behaved as expected on these items, with the grammatical fillers being rated above 4 and the ungrammatical fillers being rated closer to 2. Subjects also behaved as expected on the Adj items, rating them close to 5 (they were generally shorter than the grammatical fillers and probably rated slightly higher for that reason). The crucial items are the Adv items. As can be seen, these are rated much lower than either Adj or control (but higher than ungramm).

Statistical analysis was run using R (R Core Team 2012). Z-scores were analyzed by means of linear mixed-effect modeling using the R-package lme4. In the model, Condition was a fixed effect and subjects and items were included as random slopes and intercepts. Reported p-values were extracted from the fitted model objects using the Satterthwaite approximation implemented by the lmerTest package. This analysis indicates that Condition is highly significant, and Adv differs from Adj (df=8.35200, t=7.284, $p<.001$). The predictions of P&P are not upheld.

In an attempt to look for speaker variation, I analyzed the responses by participant. 63 of 65 participants rated Adj 4 or higher (97%), which I take to indicate that they found these conditions perfectly acceptable (as expected). None rated Adj below 3. In contrast, 14 of 65 rated Adv 4 or higher (22%), while 28 of 65 rated Adv below 3 (43%). As a measure of noise, 1/65 rated control below 3 (1.5%) and 1/65 rated ungramm 4 or higher (1.5%). This means that approximately 43% of those surveyed find non-*ly* adverbs unacceptable as prenominal modifiers. However, approximately 20% rated Adv 4 or higher, which would seem to indicate that approximately 20% of the population accepts these non-*ly* adverbs as prenominal modifiers.

However, it is possible that those who accept non-*ly* adverbs as prenominal modifiers are only doing so on a compound parse. To evaluate this possibility, I conducted a follow-up study on Amazon Mechanical Turk. The setup of this experiment was very similar to that described above, except that the items for this experiment served as the fillers for an unrelated 2x2 experiment on passives and middles. There were eight pairs of items, as follows:

(26)

Items for Experiment 2: *One*-Replacement, Adverbs vs. Adjectives	
Adv	We want to meet the now Caliph and the old one.
Adj	We want to meet the current Caliph and the old one.
Adv	Someone will introduce the soon king and the current one.
Adj	Someone will introduce the future king and the current one.
Adv	We are looking forward to a soon visit and a return one.
Adj	We are looking forward to an upcoming visit and a return one.
Adv	At the event we saw the once president and the current one.
Adj	At the event we saw the past president and the current one.
Adv	They will toast the twice winner and the four-time one.
Adj	They will toast the two-time winner and the four-time one.
Adv	The newspapers are celebrating the now prime minister and the outgoing one.
Adj	The newspapers are celebrating the incoming prime minister and the outgoing one.
Adv	An announcer will present the once CEO and the current one.
Adj	An announcer will present the former CEO and the current one.
Adv	This event features the twice runner-up and the three-time one.
Adj	This event features the two-time runner-up and the three-time one.

If there is a subset of the population that permits these non-*ly* adverbs as prenominal modifiers, then they should judge the Adv items to be completely acceptable, and as acceptable as the Adj items. On the other hand, if those who accepted these non--*ly* adverbs as prenominal modifiers in Experiment 1a did so only on a compound parse, then all the participants should judge these Adv items with *one*-replacement to be unacceptable. As shown above (19), on a compound parse the non-*ly* adverb has to be included in *one*-replacement (in the judgment of this author and numerous native speakers polled informally).

There were eight pairs of items (all given above), and each subject saw only one member of each pair. Subjects answered a comprehension question about every sentence and also rated every sentence on a scale of one to five (1: Extremely unnatural, 2: Somewhat unnatural; 3: Possible, 4: Somewhat natural, 5: Extremely natural). Subjects also saw one member of each set of four items for the passive/middle experiment, for which there were eight such sets, plus eight fillers. The fillers were as described above for the previous experiment (pairs of grammatical and ungrammatical). Subjects rated 24 sentences total (8 for the adverb experiment, 8 fillers from the passive/middle experiment, 8 fillers).

83 workers were recruited from within the USA, limited to those classified as "masters" by Amazon Mechanical Turk. Several completed the survey more than once; in those cases, all beyond the first were thrown out. Subjects' data were also discarded from the analysis if the subject was not from the USA, did not identify their native language as English, or got fewer than 75% of the comprehension questions correct. Data from 6 subjects were thrown out for these reasons (most for repetitions). This left 77 subjects whose data entered the analysis. 42 identified as male, 33 as female, one as other (one did not answer). 5 were age 20–30, 48 were 30–45, 10 were 45–55, and 13 were over 55 (one did not answer).

Mean ratings and standard deviations are shown below, both raw and z-scores:

(27)

Experiment 2 Raw Scores				
	Filler: Gr	Filler: Ungr	Adj	Adv
mean	4.391447	2.199346	3.817590	2.596721
SD	0.9516665	1.2737448	1.0782839	1.1661293
Experiment 2 Z-Scores				
	Filler: Gr	Filler: Ungr	Adj	Adv
mean	0.7536416	-0.7767131	0.3638937	-0.4940319
SD	0.6686520	0.8748345	0.6250683	0.7158855

Participants behaved as expected on the grammatical and ungrammatical fillers. The Adj items were rated slightly lower than the grammatical fillers, but still close to 4. The crucial items are the Adv items. These are rated very low, below 3, like the ungrammatical fillers.

Statistical analysis was run using R (R Core Team 2012). Z-scores were analyzed by means of linear mixed-effect modeling using the R-package lme4. In the model, Condition was a fixed effect and subjects and items were included as random slopes and intercepts. Reported p-values were extracted from the fitted model objects using the Satterthwaite approximation implemented by the lmerTest package. This analysis indicates that Condition is highly significant, and Adv differs from Adj (df=7.67300, t=6.895, $p<.001$). This indicates that, contrary to what P&P say, non-*ly* adverbs are not rated the same way as adjectives in prenominal position.

I also analyzed the data by participant to look for individual variation. This time, only 6 out of 77 or 7.8% rated the Adv condition 4 or higher. 50/77 or 65% rated it below 3. This is a significant drop from the previous experiment, where 22% rated a prenominal non-*ly* adverb 4 or higher. I conclude that the vast majority of people only accept such an adverb in prenominal position on a compound parse. If there are English speakers who accept these non-*ly* adverbs as prenominal modifiers on a par with adjectives, they are a very small minority: less than 8%, which could be noise.

To sum up, the results of two large-scale surveys show that the vast majority of the population does *not* accept non-*ly* adverbs in prenominal position, contra P&P. Those who do accept them seem to be doing so only on a compound parse, since acceptability drops dramatically with *one*-replacement.

Importantly for this paper, although most English speakers reject non-*ly* adverbs as prenominal modifiers by themselves, they do accept them conjoined with an adjective in this position. While examples like this were not tested directly in the two experiments reported here, B&AK present extensive corpus and judgment data to substantiate this claim. This means that, for the majority of English speakers, the statement in (16) is violated: Adv is not a valid prenominal modifier and cannot replace Adj in Det Adj N, but [Adv&Adj] can. This is a clear example of a categorial restriction being violated in coordination, and it requires an analysis.

4.3 An Overgeneration Problem?

P&P also claim that the analysis of B&AK suffers from an overgeneration problem. According to them, some other non-*ly* adverbs, namely, *here, there, well, perhaps, together* cannot ever be used prenominally, not even in coordination. Some of them can be used postnominally (*here, there, together*). The question is, though, whether B&AK would predict that these elements should be able

to appear prenominally in coordination with an adjective. In the analysis of B&AK, this actually depends on the lexical properties of the adverbs involved. For B&AK, adverbs like *soon* have the structure [$_{\text{Adv}}$ Adj Adv], where the Adv head is null and can be deleted in certain configurations. In the analysis that I propose, the relevant adverbs are very underspecified items with particular selectional features (see section 5.8).

So, B&AK and the current paper only predict that *here, there, well, perhaps, together* could be coordinated prenominally with an adjective if they have the right lexical properties. What are these items? Well, *here, there*, and *together* seem to have the distribution of a PP. They can serve as the second argument of verbs like *put* and *set*, they can be the internal argument of *be, come* (except that *there* clashes deictically with *come*[4]), but they cannot be the internal argument of *become* (recall that this verb permits APs and NPs but not PPs). In this they pattern with PPs, while adverbs are not allowed in these positions:

(28) a. I put them {here/there/together/on the floor/*randomly}.
b. We are {here/there/together/on the floor/*randomly}.
c. We came {here/together/to the door/*randomly}. (*randomly* acceptable on adverbial rather than complement parse)
d. We became {a couple/smarter/*here/*there/*together/*on the floor}.

Perhaps most tellingly, *here, there, together* can be modified with *back* and *right*, like a PP and unlike an adjective or adverb:

(29) a. They came back here.
b. We'll go right there.
c. I put them back together.
d. * I made them back whole.
e. * They are behaving back badly.

If *here, there, together* indeed have the distribution of PPs, as they appear to, then it is no surprise that they can appear postnominally but not prenominally, since PPs have the same distribution:

(30) a. A war here is not what Springfield needs. (P&P, (71))
b. * a here war
c. A war in Springfield would be undesirable.
d. * an in Springfield war

(31) a. A visit there is all Bart wants. (P&P, (70)
b. * a there visit
c. A visit to the hospital is all Bart wants.
d. * a to the hospital visit

(32) a. Two men together could lift this piano.

[4]A reviewer notes that this clash can be removed by taking the perspective of the addressee for the verb, as in *Can I come there?*

b. * two together men
c. Two men with their spouses could clear this away in an hour.
d. * two with their spouses men

It is also then no surprise that they cannot appear in prenominal position coordinated with an adjective, since PPs cannot do this either:

(33) a. * the here and very expensive shop (P&P, (64))
b. * the on Main Street and very expensive shop

(34) a. * a there but reasonable shop (P&P, (65))
b. * a for the wealthy but still reasonable shop

(35) a. * the together and equal liability (P&P, (68))
b. * the for harm and equal liability

And this is exactly what the analysis in B&AK and the one in section 5.8 predict.

As for *well*, it actually has a use as an adjective, as in *I am not a well man*. In this use, it can be coordinated with another adjective, of course, as in *We will need to move both the well and ill patients*. This *well* is irrelevant. However, one could ask whether adverbial *well*, meaning *good*, could coordinate with an adjective. It does not seem to be able to:

(36) a. She performed well.
b. a {good/*well} performance
c. a {good/*well} and emotional performance
d. so {good/*well} a performance

Adverbial *well* is also not permitted with short leftward displacement (36d). Coordination and leftward displacement pattern together, according to B&AK (section 4.6); these facts are therefore consistent with their analysis. Moreover, it is possible to pinpoint a reason: *well* and *good* are probably suppletive forms of the same lexical item. In an adnominal environment, this item will always be pronounced *good*. There is simply no way to have this item be pronounced *well* when it is adnominal.

The final adverb discussed by P&P is *perhaps*. This is a modal adverb which is probably semantically incompatible with being used as an adnominal modifier.[5] It certainly cannot be used predicatively to predicate of an NP:

(37) a. * This outcome is perhaps.
b. * You cannot count on an outcome that is perhaps.

Perhaps also does not improve as a prenominal modifier by being displaced to the left of the determiner, unlike *soon*:

(38) a. * that/so/how perhaps an outcome

[5] A reviewer points out a poem by e. e. cummings entitled "spring is like a perhaps hand." e. e. cummings deliberately violated grammatical rules in his poetry, so I would not take this example to indicate that *perhaps* can function adnominally for any speaker.

b. * a perhaps but not certain outcome (P&P, (67))

In the analysis of B&AK, displacement to the left and the ability to appear prenominally coordinated with an adjective are expected to correlate, and they do, here negatively.

In fact, it appears that *perhaps* has very strict selectional requirements and only merges with projections very high in the clause. It cannot be included in VP ellipsis or *though*-preposing, for instance:

(39) a. Johnson left town, perhaps. Branson did too. (certainly did, not perhaps)
b. (*Perhaps) depressed (*perhaps) though your dog is,. . .

If *perhaps* only C-selects projections high in the clause, then B&AK face no overgeneration problem regarding this adverb, since it does not have the right lexical properties to be coordinated with an adjective in prenominal position.

Meanwhile, I have identified a few other non-*ly* adverbs that might participate in the Adv&Adj pattern, namely, *always, often, seldom*:

(40) a. the always and changing light (name of artwork by Clair Bremner)
b. * the always light
c. an often and familiar ghost (name of TV episode)
d. * an often ghost
e. Common symptoms include an often and intense itching, (https://animalallergycolorado.com/animal-disease-index/equine-atopy)
f. * an often itching
g. and mixed lamellar stacks are a seldom and questionable exception (https://onlinelibrary.wiley.com/doi/full/10.1002/polb.21162)
h. * a seldom exception

It therefore appears that the pattern is fully general, for those items that have the right lexical properties.

I conclude that what B&AK had to say about non-*ly* adverbs in examples like *the once and future king* was correct. These adverbs are not able to appear as prenominal modifers by themselves, but they are able to appear there in coordination with an adjective, or displaced to the left of the determiner. This is a fully general pattern that requires an analysis.

4.4 CPs in NP Positions

I turn now to the other possible case of a selectional violation in coordination, that of CPs in NP positions, like *You can depend on my assistant and that he will be on time*. As noted above, what P&P have to say about these is not entirely clear. All that they do say is that they are not fully general. According to them, not all predicates that do not select CPs permit CPs in coordination. For instance, Bayer (1996) claimed that this was the case with the preposition *despite*:

(41) (Bayer 1996: 585, (25a, c–d))
a. Despite LaToya's intransigence, Michael signed the contract.

b. * Despite that all the musicians quit, Michael signed the contract.

c. * Despite LaToya's intransigence and that all the musicians quit, Michael signed the contract.

P&P seem to be claiming that selectional violations of this sort are not fully general and therefore may not be real, but this is not entirely clear in their paper. Regardless, they do seem to be trying to maintain Huddleston and Pullum's statement in (16). In order to do that, they would have to claim either that CPs can appear in positions that were previously thought to allow only NPs (e.g., as complement of a preposition), or that CPs are not actually acceptable coordinated with NPs in NP positions.

In order to evaluate whether either of these two possibilities could be correct, I also carried out an acceptability study on Amazon Mechanical Turk on CPs in NP positions (Experiment 1b). The details of the study are described in section 4.2. As described there, I included eight pairs of items with CPs as fillers for the adverb/adjective items. These eight pairs were the following:[6]

(42)

Items for Experiment 1b: CPs in NP Positions	
Simple	You can depend on that my assistant will be on time.
Coord	You can depend on my assistant and that he will be on time.
Simple	We succeeded despite that no one helped us.
Coord	We succeeded despite the difficulty and that no one helped us.
Simple	Children were in the ocean in spite of that sharks had been spotted the day before.
Coord	Children were in the ocean in spite of the strong current and that sharks had been spotted the day before.
Simple	We talked about that that intern had worked at the White House.
Coord	We talked about that intern and that he had worked at the White House.
Simple	She is ashamed of that she ran away.
Coord	She is ashamed of her cowardice and that she ran away.
Simple	Most people are familiar with that mindfulness exercises can have profound effects on health.
Coord	Most people are familiar with the benefits of meditation and that mindfulness exercises can have profound effects on health.
Simple	The company hired her despite that she was fired from her previous job.
Coord	The company hired her despite her felony conviction and that she was fired from her previous job.
Simple	The director started speaking nostalgically about that his first car was like an old friend.
Coord	The director started speaking nostalgically about his first car and that it was like an old friend.

[6] A reviewer points out that *She is ashamed of her cowardice and that she ran away* can have a parse where *of her cowardice* and *that she ran away* are coordinated as complements of *ashamed*. This parse would not violate selectional restrictions (*she is ashamed that she ran away* is acceptable). Since none of the other items have such a parse available to them, and since ratings on this item did not differ from those of the other items, I do not think this affects the interpretation of the results of this experiment in any way.

The pairs contrasted in having only a CP in an NP position (Simple), or a coordination of NP and CP (Coord). Note that I included two instances of *despite*, which Bayer (1996) and P&P claimed does not allow a coordination of NP and CP. I also included an example of *in spite of*, which is very similar semantically to *despite*.

See section 4.2 for details of the study and the participants. As stated there, data from 65 participants entered the analysis. The table below shows the mean ratings and standard deviations for the Coord and Simple items, and repeats them for the grammatical and ungrammatical fillers, for comparison:

(43)

Experiment 1b Raw Scores				
	control	ungramm	Coord	Simple
mean	4.451737	2.271318	3.949612	2.872093
SD	0.9110576	1.3595143	1.0555485	1.2043680
Experiment 1b Z-Scores				
	control	ungramm	Coord	Simple
mean	0.6257453	-0.9699534	0.2817038	-0.5021786
SD	0.7118555	0.9427681	0.6654763	0.7420387

As can be seen, the Simple items are rated much lower than the grammatical controls and the Coord items. The Coord items are rated close to 4 on the 5-point scale.

Statistical analysis was again run using R (R Core Team 2012). Z-scores were analyzed by means of linear mixed-effect modeling using the R-package lme4. In the model, Condition was a fixed effect and subjects and items were included as random slopes and intercepts. Reported p-values were extracted from the fitted model objects using the Satterthwaite approximation implemented by the lmerTest package. This analysis indicates that Condition is highly significant, and Coord differs from Simple (df=7.984, t=5.575, $p<.001$).

Recall that P&P would have to maintain either that CPs can appear in NP positions, or that coordinations of CPs and NPs cannot. Neither possibility seems to be correct. The Simple conditions are rated very low, while the Coord conditions are rated quite high. It appears from this survey that speakers reject CPs in NP positions, but they do accept them when coordinated with NPs.

It also appears that the participants in the survey do not agree with Bayer's contention that *despite* behaves differently from other predicates. The table below shows means by item:

(44)

Mean by Item		
Item Number	Simple	Coord
1	2.794117647	3.903225806
2	**3.096774194**	**3.515151515**
3	2.794117647	3.516129032
4	2.677419355	4.060606061
5	2.264705882	4.032258065
6	2.741935484	4.294117647
7	**3.705882353**	**4.032258065**
8	2.896551724	4.205882353

Items 2 and 7 are *despite*, while item 3 is *in spite of*. Item 7, in particular, is not rated lower in coordination than any of the other items (it is equivalent to item 5). Item 2 is rated slightly lower

in coordination, but it still goes up from Simple to Coord, indicating that coordination does always improve a CP in an NP position. (Note that *despite* is surprising in having the highest ratings in the Simple condition: they are the only ones rated over 3.) This survey therefore finds no support for Bayer's and P&P's contention that *despite* is different in not permitting a CP coordinated with an NP as its complement. It behaves the same, in that coordination improves a CP.

I also looked for individual variation. 36 of 65 participants rated Coord 4 or higher (55%). Seven of 65 rated Coord below 3 (11%). This means that 55% of participants find CPs in coordination fully acceptable, while 11% find them unacceptable. Previous literature has reported that some speakers find coordinated CPs unacceptable or marginal (see B&AK). From this experiment, it appears that those speakers are a minority (approximately 11% find them unacceptable, 34% marginal). As for a CP by itself in an NP position, 13 of 65 participants rated the Simple condition 4 or higher (20%), while 38/65 rated Simple below 3 (59%). This indicates that 59% of the participants do not allow a CP in an NP position, while 20% do. These 20% must have a different C-selectional pattern in their grammar, such that the relevant predicates select categories besides NPs (at least CPs). In this case there is no possibility of an alternate parse, as there was with adverbs in prenominal position. We have to admit individual variation in the grammars of speakers along C-selectional lines.

In footnote 1, I speculated that younger speakers might be more likely to permit CPs as objects of prepositions. Unfortunately, there were only four participants in the youngest age group (20–30). It is therefore not possible to address this hypothesis with the current results. (A statistical model with age as a factor found no significant effect of age, only an effect of condition.)

To summarize these results, it does not appear to be possible to maintain either that CPs are allowed in NP positions, or that coordinations of NP & CP are disallowed in NP positions. For the majority of speakers surveyed, CPs are not allowed in the relevant positions, but they improve markedly in coordination with an NP. This is a violation of the biconditional in (16). A CP can violate selectional restrictions when coordinated with an NP. Not only that, the predicate *despite* does not differ from other predicates as Bayer (1996) and P&P claimed.

4.5 The NP & CP Pattern is Fully General

As mentioned above, P&P claim that CPs appearing in coordination in places where CPs are banned is not a fully general pattern. The survey in the previous subsection did not find any support for this contention. In particular, *despite* did not behave differently from other contexts. The survey also included a number of preposition and verb plus preposition contexts. Some more examples follow, showing that the pattern is fully general (*discuss* and *contemplate* permit only NP complements and not CPs):

(45) a. We were discussing the issue of snake locomotion and that no one understands how anesthesia works.

b. We were contemplating the possible existence of dream worlds and that the dinosaurs were not really killed by an asteroid.

(46) a. We were anxious about money being short and that it was getting harder and harder to get jobs.

b. This analysis accounts for first conjunct agreement and that dual is more marked than plural.

In section 4.7, we will also see this pattern with subjects of certain predicates, and with the adjunct P *notwithstanding*.

In addition, some of P&P's own examples have exactly this character:

(47) When I think [[$_{PP}$ of my parents] and [$_{CP}$ that they have never been further East than Europe]], I can't help but feel guilty... (P&P, (92))

(48) None of them thought [[$_{PP}$ about budgets] and [$_{CP}$ that money is limited]]. (P&P, (93))

P&P presented these examples as a conjunction of PP and CP, but my intuition says that they are NP and CP complements of the P, or at least can be. For instance, in (48), thinking that money is limited is different from thinking about the fact that money is limited (the latter is an activity, while the former just reports a belief state). In my intuition the sentence can have the *think about* interpretation. If this is possible, then this is an instance of the pattern that P&P say is not fully general.

P&P do claim that two verbs, namely *withdraw* and *strengthen*, do not allow a CP and still do not when it is coordinated with an NP:

(49) (P&P50–52)

a. {He withdrew/This strengthens} {this claim / the claim that Homer is a genius}.

b. * {He withdrew/This strengthens} that Homer is a genius.

c. * {He withdrew/This strengthens} this claim and that Homer is a genius.

However, these two verbs have much stronger selectional restrictions than the other predicates discussed here. They do not even allow *the fact that*, but require other types of nouns like *claim* (49), *contention*, or *allegation*:

(50) a. This strengthens {our contention that / *the fact that} the game is rigged.

b. You will have to withdraw {your allegation that / *the fact that} you were discriminated against.

In section 5.6, I will show that this strong selectional requirement explains, in the analysis of B&AK, why these two verbs do not permit CPs in coordination.

To sum up, the three predicates identified by Bayer (1996) and P&P as not allowing CPs in coordination either actually do (*despite*), or there is a good reason why they do not (*strengthen, withdraw*). Contra Bayer (1996) and P&P, the pattern where a CP can appear in an NP position just in coordination is fully general. It is a genuine instance of something being allowed in coordination when it is not allowed by itself. This requires an account.

4.6 Selectional Violations are Limited

Prior accounts of violations of selectional restrictions in coordination propose that the first conjunct enjoys a special prominence within the coordinate structure. This generally takes the form of positing a hierarchically more prominent position for the first conjunct. This prominence permits the first conjunct to percolate its own features to the coordination as a whole (Munn 1993, 1999, Johannessen 1996, 1998, Zhang 2010, Larson 2013, and many others). One of the main contributions of B&AK was to show that this is not a viable analysis, for two reasons. First, it is the

linearly closest conjunct that has to satisfy selectional restrictions, not the first one; and second, selectional violations are extremely limited and exactly match those observed in leftward extraction and ellipsis. This subsection illustrates how limited they are, while section 4.7 discusses linear order.

B&AK showed that only two selectional violations are attested in coordination: a CP may be coordinated with an NP where CPs are not allowed, as in (3a), and certain non-*ly* adverbs may be coordinated with APs where adverbs are not allowed, as in (4a). Other conceivable violations do not occur. For instance, if all that were required were that the first conjunct satisfy selectional restrictions, then anything should be allowed as a non-initial conjunct. A PP with the semantically contentless P *of* that appears in nominalizations should be fine coordinated with an NP, but it is not:

(51) * The invaders destroyed the castle and of the surrounding town. (Bruening and Al Khalaf 2020: 9, (24))

Similarly, the violations of selectional requirements that were shown above would be expected to be grammatical, but they are not:

(52) a. Do you treat the four museums individually or as a collective? (AdvP and PP; P&P, (10))

b. We treat them individually and *(as) under suspicion. (*treat* requires *as* with NPs and PPs)

(53) a. . . . this promotion will only last for three days or until all stocks run out. (PP and CP; P&P, (25))

b. * It will last for three days or unlimited. (*last* does not permit APs)

(54) (Borsley 2005: 464, (7a–b))

a. Hobbs ended up liking Rhodes and hating Barnes.

b. * Hobbs ended up liking Rhodes and to hate Barnes. (*end up* selects *-ing* and not *to*)

(55) (Bruening and Al Khalaf 2020: 10, (34))

a. Danny became a political radical and very antisocial. (NP and AP)

b. * Danny became a political radical and under suspicion. (*became* selects NPs and APs but not PPs)

c. * Chris became a republican and awarded a prize. (*became* selects NPs and APs but not VPs; Sag *et al.* 1985: 143, (67d))

Contrasting with verbs that only permit NPs and not CPs, verbs like *think*, *hope*, and *boast* that only permit CPs do not permit an NP as the second conjunct (56):

(56) (Bruening and Al Khalaf 2020: 16, (49a–c))

a. * She thinks [[$_{CP}$ that the world is flat] and [$_{NP}$ another discredited thing]].

b. * She hopes [[$_{CP}$ that the defending champs will win] and [$_{NP}$ a good result for the host country]].

c. * She boasted [[$_{CP}$ that she had won the Pulitzer Prize] and [$_{NP}$ her other accomplishments]].

Similarly, a PP is not permitted as a second conjunct with a verb that only allows NPs (57):

(57) (Bruening and Al Khalaf 2020: 16, (50a–c))

a. * The Spartans ate [[$_{NP}$ wheat] and [$_{PP}$ on parched corn]]. (cf. The Spartans dined on parched corn.)

b. * She idolizes [[$_{NP}$ her mother] and [$_{PP}$ to her father]]. (cf. She looks up to her father.)

c. * The Persians destroyed [[$_{NP}$ Babylon] and [$_{PP}$ of Ninevah]]. (semantically contentless P)

Additionally, a verb that selects an adverb does not allow an adjective as a second conjunct, and a verb that selects an adjective does not permit an adverb as a second conjunct:

(58) (Bruening and Al Khalaf 2020: 16, (51a–b))

a. * She was behaving [[$_{AdvP}$ naturally] and [$_{AP}$ nonchalant]].

b. * She became [[$_{AP}$ unnerved] and [$_{AdvP}$ distractedly]].

It is clear that it is not good enough for the first (or closest) conjunct to satisfy selectional requirements of the selecting element. The only violations that are actually acceptable are the two that we saw above.

B&AK also showed that the same selectional violations are found with leftward displacement and ellipsis. A CP can be related to a position that only permits NPs in leftward displacement (e.g., Higgins 1973, Kuno 1973, Kaplan and Bresnan 1982, Postal 1994, Bresnan 1995, Alrenga 2005, Takahashi 2010):

(59) a. * We weren't thinking about that we might not be welcome.

b. That we might not be welcome, we weren't thinking about.

(60) a. This assumption accounts for *(the fact) that these nouns behave differently. (Alrenga 2005: 185, (35c))

b. That these nouns behave differently, this assumption accounts for.

A CP can also be related to a position that only permits NPs in ellipsis, as in fragment answers (Merchant 2004) and split questions (Arregi 2010):

(61) *Fragment Answers* (Bruening and Al Khalaf 2020: 17, (54))

a. Q: What is she ashamed of? A: That she left him in the lurch.

b. * She is ashamed of that she left him in the lurch.

(62) *Split Questions* (Bruening and Al Khalaf 2020: 17, (55))

a. What is she ashamed of, that she left him in the lurch?

b. * She is ashamed of that she left him in the lurch.

Just as a non-*ly* adverb could be coordinated with an AP in examples like *the once and future king*, these same adverbs can serve as nominal modifiers if they are displaced to the left of the determiner:

(63) (Bruening and Al Khalaf 2020: 17, (56))

a. * I was expecting a soon visit.
b. How soon a visit are you expecting?
c. I wasn't expecting that soon a visit.

(It does not appear to be possible to construct examples of ellipsis that would strand such a modifier.)

B&AK showed that other violations of selectional restrictions are not permitted in leftward displacement and ellipsis, just as they are not acceptable in coordination. For instance, while CPs may be related to NP positions, NPs may not be related to CP positions:

(64) (Bruening and Al Khalaf 2020: 18, (59a–c))
a. * A totally discredited thing, she thinks.
b. * Her many accomplishments, she boasted.
c. * A good result, she is hoping.

(65) (Bruening and Al Khalaf 2020: 18, (60a–c))
a. * What does she think, a totally discredited thing?
b. * What is she boasting, her many accomplishments?
c. * What is she hoping, a good result?

PPs may not be related to NP positions, nor may NPs be related to PP positions:

(66) (Bruening and Al Khalaf 2020: 18, (61a–b))
a. * It was on parched corn that the Spartans ate. (PP where only NP allowed)
b. * It was parched corn that the Spartans dined. (NP where only PP allowed)

(67) (Bruening and Al Khalaf 2020: 18, (62a–b))
a. Q: What did the Spartans eat? A: *On parched corn.
b. Q: What did the Persians destroy? A: *Of Babylon.

Adverbs with *-ly* may not be related to adjective positions:

(68) (Bruening and Al Khalaf 2020: 18, (63a–b))
a. * Distractedly is what she became.
b. * What did she become, distractedly?

B&AK concluded that there are exactly two apparent violations of selectional restricitons that are allowed in coordination, and both of them are also allowed in leftward displacement and ellipsis. Violations that are not allowed in leftward displacement and ellipsis are also not allowed in coordination, and vice versa.

4.7 Linear Order

As stated above, one of the contributions of B&AK was to show that subcategorization violations depend on linear order. In the two cases where a subcategorization violation is permitted, it is not the first conjunct that has to obey the subcategorization requirements, but the conjunct that is

closest to the element it is in a subcategorization relation with. So in (3a), repeated below, the *first* conjunct has to be an NP, because it is closer to the P *on*, but in Adv & AP coordinations (4a), the *second* conjunct has to be an AP, because it is closer to the head N:

(3a) You can depend on [[$_{NP}$ my assistant] and [$_{CP}$ that he will be on time]]. (Sag *et al.* 1985: 165, (124b))

(4a) The Once and Future King (book title)

B&AK also showed that there are cases of CPs coordinated with NPs where CPs are not allowed, but which come before their selector. Such cases include ones where a predicate does not permit a CP as subject, and the postposition *notwithstanding*:

(69) (Bruening and Al Khalaf 2020: 13, (40a–b), (41a–b))

a. * [$_{CP}$ That he was late all the time] resulted in his being dismissed. (based on Pollard and Sag 1987: 131)

b. [$_{NP}$ His constant harassment of co-workers] resulted in his being dismissed.

c. [[$_{CP}$ That he was late all the time] and [$_{NP}$ his constant harassment of co-workers]] resulted in his being dismissed.

d. * [[$_{NP}$ His constant harassment of co-workers] and [$_{CP}$ that he was late all the time]] resulted in his being dismissed.

(70) (Bruening and Al Khalaf 2020: 14, (43a–c))

a. That she got third place and her injury in the final round notwithstanding, she felt good about her performance in the Olympics.

b. Her injury in the final round notwithstanding,...

c. * That she got third place notwithstanding,...

As B&AK note, some speakers do allow CPs with these predicates, and so they are not relevant. The relevant speakers are ones who disallow CPs but nevertheless allow a CP in coordination with an NP.

Given these observations, we need an analysis where the two selectional violations that are observed in coordination depend on linear order.

4.8 Summary

While P&P do successfully show that B&AK were incorrect about category mismatches not being allowed at all in coordination, they are unsuccessful in dismissing selectional violations in coordination. The core observations put forward by B&AK were correct: there are exactly two selectional violations that are permitted in coordination, and they depend on linear order. Precisely these two are also allowed in leftward displacement and ellipsis. This pattern of selectional violations requires an analysis. In the next section, I propose a variation on the analysis in B&AK that accounts for the facts and meets the objections to that analysis leveled by P&P.

5 Analysis

Given the linear order facts, we might attempt to pursue an analysis in which separation between two elements in a selectional relation is what enables a selectional violation. If a selecting preposition, say, is separated from a category that it does not allow, like a CP, by displacement, ellipsis, or another conjunct in a coordinate structure, then the CP is allowed. This seems to be what Bayer (1996) is suggesting in his footnote 7. This could not be correct, however. As Bruening (2018), Bruening and Al Khalaf (2020) showed, *rightward* displacement of a CP does not permit it to appear in an NP position:

(71) (Bruening 2018: 366, (7a–c))
  a. We can attribute to magic *(the fact) that CPs can behave as NPs.
  b. We reject without equivocation *(the claim) that nouns and verbs are not distinct.
  c. We must explore in several different languages *(the possibility) that CPs might actually be NPs.

(72) a. * You can depend on at any time that my assistant will be on time.
  b. * We were talking about with great enthusiasm that CBD oil is becoming readily available.

(Note that there is an independent ban on stranding prepositions with rightward movement, but I show such examples anyway simply for completeness.)

Similarly, simply putting another adjective between a non-*ly* adverb and a head noun does not render it acceptable:

(73) a. the future beloved king
  b. * the once beloved king (only grammatical on parse *the once-beloved king*)

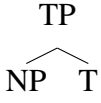
(74) a. * the twice happy winner (only grammatical on parse *the twice-happy* winner)
  b. * a soon short visit (only grammatical on parse *a soon-short visit*)

This means that we do not want an analysis where CPs and adverbs are banned only from being adjacent to the relevant head. We need a different analysis. We also need an explanation for why it is these two categories in particular and not others that can violate selectional restrictions.

In this section, I present a slightly amended form of the analysis proposed by B&AK which answers P&P's objections.

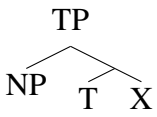
5.1 A Left-to-Right Derivation

B&AK adopted the view that the derivation is built left to right rather than bottom-up (e.g., Phillips 1996, 2003, Richards 1999, Bruening 2010b, 2014, 2016, Osborne and Gross 2017, Bruening and Al Khalaf 2019). I will also adopt this view here. In an SVO language like English, this means that the specifier of a projection will be built first, and then the head will be merged:

(75)


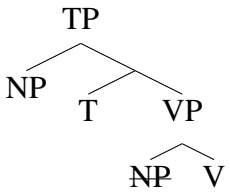
When the complement is begun, it will merge with the lowermost node (the head), as its sister:

(76)



Movement is implemented as copying, but from the higher position to the lower:

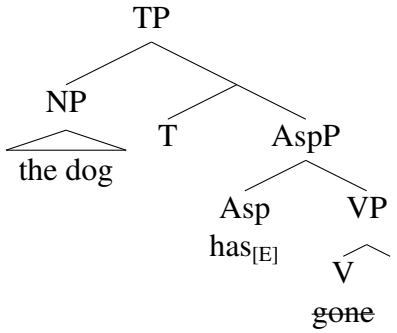
(77)



Generally, the highest copy is what will be pronounced.

It is important in this sort of model that the interface levels of PF and LF cannot follow the entire derivation in time. They have to be constructed in parallel. The sentence has to be pronounced as it is being built, and it also has to be interpreted as it is being built. PF and LF are therefore parallel interfaces, not end stages. (Jackendoff 2002 also proposes a parallel architecture.) Take ellipsis as an example, since it figures prominently in this paper. I assume that ellipsis involves full structure, but with the items within the elided constituent unpronounced at the PF interface. Following Merchant (2001), a head whose complement is to be elided has an [E] feature. This is an instruction at the PF interface to assign no pronunciation to the complement. In an example like *the cat hasn't gone out yet but the dog has*, the Asp head presumably has the [E] feature. The PF interface being built in parallel will then assign no pronunciation to the items in the complement of Asp, as they are being built. I indicate non-pronunciation with strikethrough:

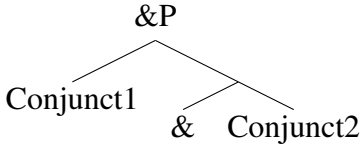
(78)



5.2 The Analysis of Coordination

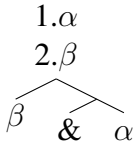
B&AK adopted a non-headed analysis of coordination, but also noted that this was not crucial. I will instead adopt a headed analysis of coordination, where the coordinating head, &, combines with a complement and specifier and projects a maximal projection:

(79)



The features of the & head and by percolation its maximal projection are derived from the coordinates. I propose that this is accomplished by Agree (Chomsky 2000). The & head has no category or other features, and it has to get them by Agreeing with its complement and specifier (cf. Murphy and Puškar 2018). The & head Agrees with each conjunct as it becomes available. Since the derivation works left to right, & Agrees first with its specifier and second with its complement. The features it gains thereby are put into a push-down stack. The features of the first conjunct are added to the stack first, and then pushed down by the features of the second conjunct. In the following representation, the numerals indicate the order in which any evaluation will take place (1 is the top of the stack, 2 below it, etc.):

(80)

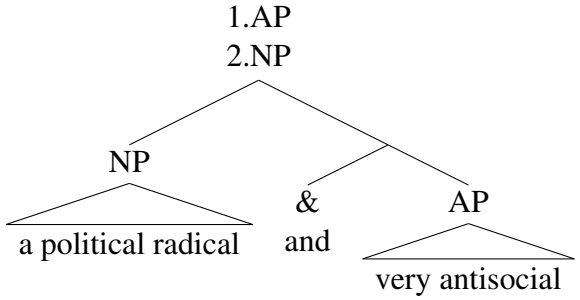


Note that it is the head & which has these features; they percolate to its maximal projection. To save space, I write them only on the maximal projection, unless it is relevant that they are on the head as well (as it is in section 5.8).

P&P object to B&AK's analysis, saying that "it is not clear what theoretical mechanism makes it possible" to collect the categories of the conjuncts. In my analysis, the theoretical mechanism is Agree. Putting the features gained through Agree into a push-down stack is equivalent to ordering features by recency, which is something that has been proposed for multiple instances of Agree (e.g., Müller 2010). So there is nothing unusual about this analysis, it only combines well-recognized mechanisms and frequently proposed ideas in a particular way.

Since coordination is not restricted to coordinating only the same syntactic categories, we can also get rid of the notion of a "supercategory" used by B&AK. In an example like *Danny became a political radical and very antisocial*, we would simply have a coordination of an NP and an AP, with the categories (and other features) put into a push-down stack via Agree:

(81)



5.3 C-Selection and S-Selection

B&AK implemented C-selection as feature checking. Selectors have features, which are checked off by merging something of the appropriate category with the selector. Selectors can select more than one category; for instance, *become* can select either an NP or an AP. I will notate this as *become* having the feature [C∈{NP,AP}]. What this notation means is that *become* has to be merged with a category C that is a member of the set {NP,AP} (I have modified the notation in B&AK here slightly). Outside of coordination, the feature is checked off by merging only one

category. If an NP is merged with *become*, then the C feature is checked off and nothing else can be merged. (If a head selects more than one argument, then it has more than one C feature.)

In coordination, however (e.g., *Danny became a political radical and very antisocial*), what is merged with the selector is a node with more than one category feature, in the form of a push-down stack. To evaluate whether the categories on the push-down stack are in the set required by the selector, every member of the push-down stack has to be evaluated. Consider the following:

(82) a. Danny became$_{[C\in\{NP,AP\}]}$ [$_{[1.AP\ 2.NP]}$ a political radical and very antisocial].

b. * Danny became$_{[C\in\{NP,AP\}]}$ [$_{[1.PP\ 2.NP]}$ a political radical and under suspicion].

The syntax checks each element on the push-down stack, in order, against the C-selectional feature of the selector. In (82a), AP is checked first; it is in the set {NP,AP}. Then NP is checked; it is also in the set {NP,AP}. The C-selectional feature on the verb is satisfied and checked off. In (82b), however, PP is checked first; it is not in the set {NP,AP}, and so the C-selectional feature is not satisfied and the derivation crashes.

In addition to C-selection, B&AK proposed that selecting heads also have semantic selectional features. B&AK state that these are features like animacy, sentience, moral reasoning. They called these S-features ([S]). I will further refine this analysis to say that, for checking of S-features to work, the merged element must have a *superset* of the S-features that the selecting head does. Suppose a selecting head only requires that its argument be sentient. Then an argument that is sentient, is capable of moral reasoning, has the ability to move, is volitional, etc., will certainly satisfy that requirement. So S-features are different from C-features: C-feature checking requires that the category be a member of the permitted set. S-feature checking instead requires that the merged item have a superset of the S-features that the selecting head requires.

B&AK also propose that C-feature checking and S-feature checking differ in their behavior in coordination. As we saw above, C-features have to be checked against every conjunct when the selected argument is a coordinate structure. In contrast, B&AK propose that S-features only have to be checked once. B&AK did not give any reason for this, but now it is possible to do so. C-feature checking triggers merge of a complement or specifier and requires matching of syntactic category to selecting features. In the case of coordination, every conjunct has to be checked in order to meet requirements and permit merge. If the check is to ensure that the category merged is a member of the permitted set, then every category on the push-down stack has to be checked. In contrast, I view S-features as a replacement for the traditional notion of a thematic role. In past conceptions, predicates have thematic roles to assign, and if they fail to assign or discharge a thematic role, the derivation crashes. If S-features replace thematic roles, then they just need to be successfully discharged. S-feature checking is simply a check that the predicate has a semantically suitable argument. Since the argument needs to have a superset of the selected features, it is enough in coordination to check the top of the push-down stack. If the top of the push-down stack does have a superset of the selected features, then the system can be sure that everything is fine; additional features on a lower level on the stack will not matter. Conversely, if the top of the stack does *not* have a superset of the selected features, then the system can see immediately that there is a violation. Hence S-features only need to be checked against the top of the stack, and at that point they are either satisfied or not.

It is important to note that S-features are *syntactic* objects, and are not the same thing as semantic interpretation. Checking off an S-feature with the closest conjunct and not checking it against

a further conjunct does not mean that the further conjunct fails to get a semantic interpretation. It only means that there was no checking relation between the two in the syntax. It also does not mean that semantic selection can be violated. All of the conjuncts still need to be semantically interpreted. It is never the case that a conjunct can violate semantic restrictions. Consider the following:

(83) Her outburst frightened the cat #and her earlier statements.

In (83), a psych verb like *frighten* requires an object that is capable of feeling fear. In the analysis of B&AK, the first conjunct, *the cat*, can check off the S-features of *frighten*. This sentence is therefore syntactically well-formed. However, it is not semantically well-formed. Even though the S-features of *frighten* are satisfied and checked off, every conjunct still needs to be interpretable at the LF interface. *Her earlier statements* is not a valid argument of *frighten*, and so this sentence is deviant semantically (but it is syntactically well-formed).

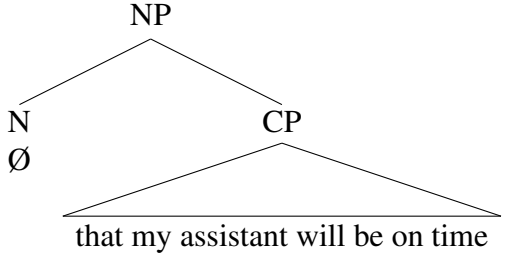
Regarding what S-features are, it is clear that traditional thematic roles like "agent" and "patient" are woefully inadequate. Predicates that require particular types of arguments actually impose much more particular requirements than is captured by these gross roles. For instance, predicates of motion only require that something be capable of moving and do not care about anything like volition, sentience, or even animacy (if animacy is something other than the ability to move); see *the wind-up toy walked down the hall*. Predicates of ingestion only require that something be capable of ingesting; again volition, agency, animacy are irrelevant (*the mindless blob devoured everything in its path*). Psychological predicates require sentience or the ability to have feelings, but nothing else (*even a brain in a vat would be afraid of this*). Predicates of vocalization only require the ability to vocalize (*the recording said that...*). Conversely, predicates like *murder* require much more than volition or agency; they require the possibility of moral culpability. Similarly, supposedly agentive verbs can always have volition removed with adverbs like *accidentally* (*she accidentally hit him with a stick*), but this never works with verbs like *murder* (#*she accidentally murdered him*). I propose that we throw out thematic roles at a gross level like "agent" and "patient" and replace them with much more specific features, whichever ones turn out to be relevant in particular languages. Some obvious ones are sentience, movement, moral culpability, ability to ingest, ability to vocalize, plural vs. singular.

With this much background, we can turn to the two selectional violations that are the focus of this paper.

5.4 Violation 1: CPs in NP Positions

B&AK proposed that CPs can optionally combine with a null N head that turns them into NPs (cf. Davies and Dubinsky 1998, 2009):

(84)



There must be something wrong with putting this structure in an argument position, or CPs would always be able to appear in NP positions:

(85) * You can depend on that my assistant will be on time. (Sag *et al.* 1985: 165, (125b))

This is where S-features come in in B&AK's analysis. B&AK proposed that the null N head is not able to bear these features because it is semantically contentless. Since it cannot bear S-features, it is not able to check them on the selecting predicate. The sentence in (85) is then ungrammatical because the selecting P (or V + P[7]) has unchecked selectional S-features.

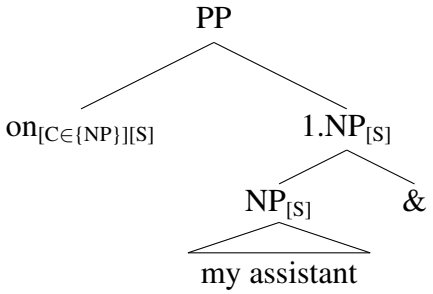
Turning to coordination, take the examples in (86):

(86) a. * You can depend on that my assistant will be on time.
b. You can depend on [[$_{NP}$ my assistant] and [$_{NP}$ Ø [$_{CP}$ that he will be on time]]].
c. * You can depend on [[$_{NP}$ Ø [$_{CP}$ that my assistant will be on time]] and [$_{NP}$ his intelligence]].

As explained above, (86a) is ungrammatical because either the CP is a CP and selectional restrictions are violated (i.e., C-selectional features are not checked), or it is an NP headed by the null N, but this null N cannot check the S-features of *depend on*. In (86b), however, there is a stage of the derivation where feature checking can occur.

In a left-to-right derivation, the syntax begins with the subject, merging it in Spec-TP and creating a TP with head T. This will merge with a ModalP for the modal *can*, and so on to the VP headed by *depend*. After *on* is merged, the syntax will begin building the coordinated object, starting with the left conjunct and then merging &:

(87)



As described above, & Agrees with its complement and its specifier and the features it gains thereby are put in the form of a push-down stack. & can perform its first Agree operation as soon as it is merged, at the stage of the derivation shown in (87). At this point it can Agree with its already-merged specifier. It does so, and the category and [S] features that it gains thereby are put on the top of the stack, as shown. (Again, these features are collected on the head &, but percolate to the maximal projection of &.)

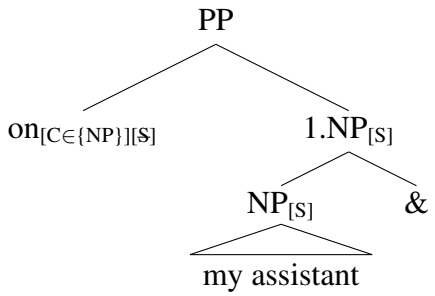
B&AK say that feature checking on the selector can start to take place at this point, before &P is finished. At the stage of the derivation shown in (87), *on* can start to check its features. Since there is only one set of category and [S] features on the stack at this point, those are the ones that are checked. NP is in {NP}, so the C-selectional feature of *on* is satisfied (so far). Since *my*

[7]P&P also criticize B&AK for not being clear on whether it is *on* that selects, or *depend on*. This is a much larger issue that would take us too far afield. Since *depend on* has a narrower semantics than *on* by itself, I will assume that the two together are what selects (cf. mediated selection in Pesetsky 1995).

assistant is a valid object for *depend on*, we can assume that its [S] features are a superset of the features selected by *on*.

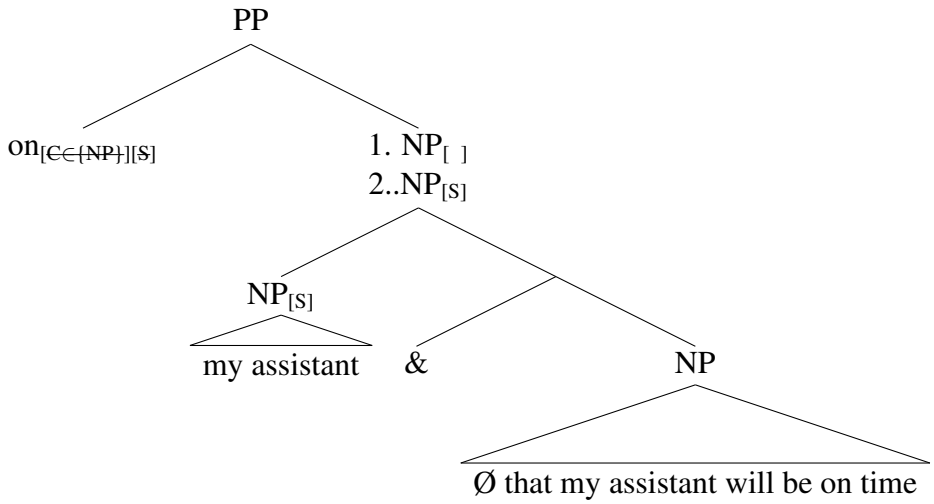
As stated in section 5.3, C-selectional features need to be checked fully, against every item on the stack, but S features only need to be checked once, and then they delete. If this is how it works, then the S-features on the preposition can be checked off and deleted:

(88)



After the second conjunct is merged, the category features and S-features of the second conjunct are added to the top of the stack at the topmost level of the coordinate structure, pushing down the features already there:

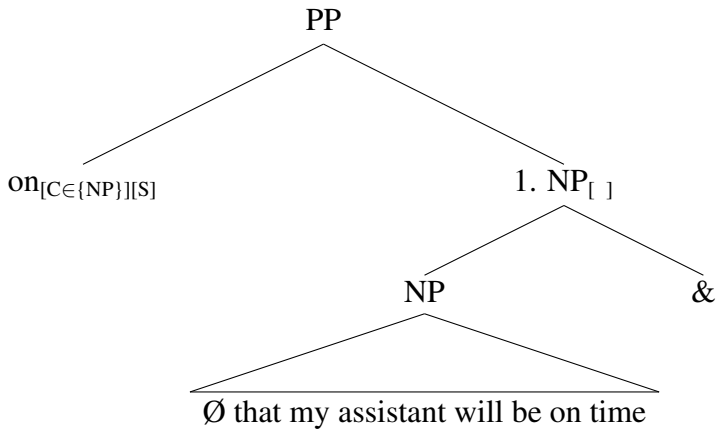
(89)



The C-selectional feature of *on* can now be checked off, since both conjuncts are NP, and NP is in {NP}. The S-features on *on* were already checked off, and so it does not matter that the second conjunct does not possess a superset of those required by *on* (it does not have any at all). This derivation converges, explaining why (86b) is acceptable.

In contrast, in (86c), at the stage of the derivation like (87), the topmost node of the coordination does not have any S-features, because the leftmost conjunct does not have them:

(90)



As stated above, the S-features of *depend on* are checked immediately, as soon as possible. At this point, a violation is registered, because the complement of *depend on* does not have a superset of the S-features that *depend on* requires. The S-features fail to check, and the derivation crashes at this point.

Additionally, in both (86b) and (86c), if the CP is instead a CP and not an NP, then the derivation crashes because the C-selectional features of *depend on* will not be checked: CP is not a subset of {NP}.

At this point I can address another of P&P's objections (their section 3.5). They criticize this left-to-right derivation for being vague, and ask why feature checking does not have to take place immediately, as soon as *my* is merged into the tree (without even the head noun *assistant*). In (88), checking cannot take place until & is merged and Agrees with its specifier, since prior to that point it does not have any features. The features of *my* also cannot check the features of *on*, because selectional features can only be checked in a head-complement or Spec-head relation. *My* is not the complement of *on*, and I assume that the syntax knows this when it merges *my* (it has to, or the right structure could not be built).

Now consider cases where the coordinate phrase *precedes* the selector, as in (91) below. In (91a), again either the CP is a CP and selectional restrictions are violated, or the CP is an NP headed by a null N. In this case, the null-N-headed NP cannot check the S-features of *be incoherent*, and the sentence crashes at PF.

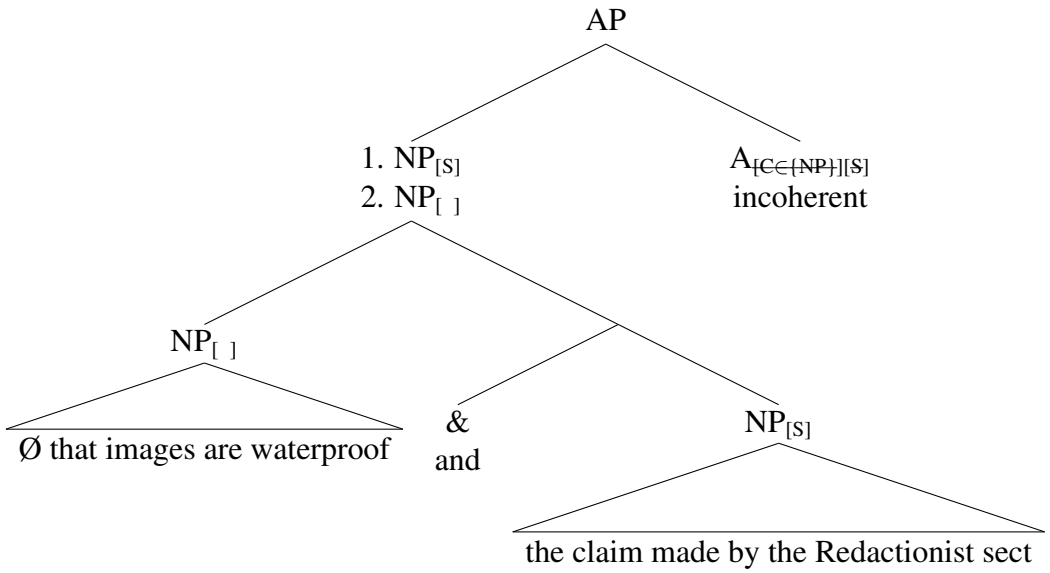
(91) a. * That images are waterproof is incoherent. (Pollard and Sag 1987: 131)

b. [[$_{NP}$ Ø [$_{CP}$ That images are waterproof]] and [$_{NP}$ the claim made by the Redactionist sect]] are both incoherent.

c. * [[$_{NP}$ The claim made by the Redactionist sect] and [$_{NP}$ Ø [$_{CP}$ that images are waterproof]]] are both incoherent.

In (91b), the coordinate phrase is built before it ever merges with the selector. Hence, there is no intermediate stage of the derivation where only one conjunct is present and feature checking can take place. The first time feature checking can take place is when the main predicate is merged. B&AK assumed that a null copy of the subject is merged in the specifier of the main predicate, and it is in that position that feature checking takes place:

(92)



Since the coordinate structure was built left-to-right, the features of the first conjunct were added first to the stack at the topmost node of the coordinate. Then the second conjunct was added, and its features were added to the push-down stack, pushing down the features of the first conjunct. Once &P merges with the A, the stack is as shown, with $NP_{[S]}$ on the top. Therefore, when the selecting head goes to check features, it must consider the features of the second conjunct first. In this case, the second conjunct does have S-features, which are a superset of the features of the selecting predicate. The S-features of the predicate are therefore checked off. Once again the syntax does not wait to check the S-features of the next set on the stack. It does wait to check all of the C-features, but these are compatible, as both conjuncts are NPs. Both C- and S-features are therefore checked off on the A, and the derivation converges.

In contrast, in (91c), the second conjunct does not have any S-features, since it is headed by the semantically contentless head N. When the predicate goes to check features, the S-features on the top of the stack are not a superset of the S-features on the predicate, and the derivation crashes. (Alternatively, the CP is just a CP, and selectional restrictions are violated.)

5.5 Ellipsis and Displacement

In order to account for why CPs can also be related to NP positions in ellipsis (fragment answers and split questions), B&AK proposed that the S-features on the selecting head are PF features. This means that they are uninterpretable at the PF interface (Chomsky 1993). According to B&AK, S-features are PF features because they are semantic features that play no role at PF. They therefore have to be deleted prior to the PF interface. One way to do this is to check them against a selected argument, as described in the previous subsection. Another way to delete them, however, is to delete them along with other material through ellipsis. B&AK proposed that this is what happens in fragment answers and split questions. They adopted a non-movement approach to fragment answers and split questions, where F-marked constituents do not elide when an XP that contains them is marked for deletion (e.g., Reich 2007, Griffiths *et al.* 2018):

(93) a. Q: Is she boasting that she won an Olympic medal?
A: No, ~~[XP she is boasting]~~$_{[C\in\{CP\}]}$ [$_{CP[F]}$ that she was nominated for a Pulitzer Prize]

⟧.

b. Q: What is she ashamed of?
A: ⟦~~$_{XP}$ She is ashamed of$_{[C\in\{NP\}][S]}$~~ $[_{NP[F]}$ Ø $[_{CP}$ that she left him in the lurch]] ⟧.

Deletion enables an F-marked CP to actually be an NP, by virtue of being the complement of the null N head. In (93b), the selecting predicate *ashamed of* has unchecked S-features, but since they are deleted at PF, all grammatical constraints are satisfied. In (93a), the CP is capable of checking S-features of the verb *boast* (or *boast* has no S-features at all), so it does not matter whether *boast* elides or not.

In contrast with S-features, C-selectional features are not PF features and have to be satisfied (everywhere). This is why the only selectional violations we see in ellipsis involve CPs being treated as NPs. In the following example, *ate* has the feature [C∈{NP}], and PP is not in {NP}:

(94) Q: What did the Spartans eat?
A: *⟦~~$_{XP}$ The Spartans ate$_{[C\in\{NP\}]}$~~ $[_{PP[F]}$ on parched corn] ⟧.

Eliding *ate* does not fix the problem, so the derivation crashes. Back in (93b), the null N head *is* of category N, and so it does satisfy the C-selectional feature of *ashamed of*.

P&P object to this analysis of ellipsis, claiming that it is incompatible with the left-to-right derivation proposed for coordination. In that analysis, S-features of a selecting head have to be checked as soon as possible, before the second conjunct is even merged in examples with coordination. According to P&P, this must be long before the PF level, and so the derivation of (93b) should crash before it even reaches PF.

P&P's objection is based on a misunderstanding. As explained above, in a left-to-right derivational model, the interface level of PF cannot follow the entire derivation in time. Rather, the derivation has to interface with PF and LF as it goes. That is, PF is a parallel interface, not a point in the derivation. What it means for S-features to be illegitimate PF objects is that they cannot be pronounced. As the syntax builds the derivation from left to right in (93b), the items that it merges up to the F-marked NP are all marked for deletion, meaning that none of them are pronounced. The S-features are already marked for deletion before the F-marked NP is even merged.

As for displacement, B&AK did not have much to say about it. They adopted the view that leftward displacement of a CP is actually base-generation of the CP in a high position, related to a null operator of category NP that moves out of the argument position (e.g., Alrenga 2005, Moulton 2013). This explains why CPs can only be related to NP positions in leftward displacement. The null operator NP must have S-features, since it can appear in an argument position (like any null operator in relative clauses or other constructions). In contrast, CPs moved rightward can only be related to CP positions. (In ellipsis, a CP can be related to either a CP or an NP position.) B&AK proposed that rightward movement is movement of the CP itself. If such a moved CP was actually an NP with the null N head, this movement would not permit it in argument position. The selecting predicate would still have unchecked S-features, even if the null N head in the lower copy could be deleted. There is no way for rightward movement of a CP to enable it to appear in a position that does not allow CPs. B&AK did not have any explanation for why leftward and rightward movement of CPs differ, and I do not have any suggestions to add, either.

5.6 *Strengthen* and *Withdraw*

Now that I have presented the analysis modified from B&AK, I can return to the overgeneration problem raised by P&P. The problem is that the verbs *strengthen* and *withdraw* do not allow CPs at all, even in coordination with an NP. In section 4.5, I showed that these two verbs have very strong selectional restrictions. Recall that they do not allow *the fact that* but require nouns like *contention* or *allegation*:

(95) a. This strengthens {our contention that / #the fact that} the game is rigged.
b. You will have to withdraw {your allegation that / #the fact that} you were discriminated against.

In the analysis of B&AK, the null N head that turns CPs into NPs is basically an unpronounced version of *the fact*. Since *the fact* is not allowed with these verbs, it is not surprising that the null N head is not, either. I assume this is because neither of them is compatible with the semantic requirements of these two verbs. These two verbs require nouns of a different sort as their objects (possibly, non-factive nouns). With a coordinated object, even if the first conjunct satisfies the S-features of the verb, the result will be semantically deviant if a subsequent conjunct is headed by the contentless N head (just like *frighten* in (83) above). Note that a second conjunct headed by *the fact that* is also semantically deviant:

(96) a. # This strengthens our contention that the game is rigged and the fact that only certain people are allowed to win.
b. # You will have to withdraw your allegation and the fact that the workplace environment is toxic.

If CPs are semantically deviant with *strengthen* and *withdraw*, then the analysis in B&AK predicts that they will also be semantically deviant in leftward displacement and ellipsis. Note that neither of these fixes semantic deviance of the type that we find with verbs like *frighten*:

(97) a. # Her outburst frightened her earlier statements.
b. # What did her outburst frighten, her earlier statements?
c. # Her earlier statements, her outburst frightened.

The analysis therefore predicts that CPs will be unacceptable with *strengthen* and *withdraw* even with ellipsis and leftward displacement, which is correct:

(98) a. # That Homer is a genius, this new action of his strengthens.
b. # That she was discriminated against, she will have to withdraw.

(99) a. Q: What does this new finding strengthen?
A: #(The argument) that the goat boy must be real.
b. Q: What are we going to have to withdraw?
A: #(The allegation) that we were deliberately misled.

(100) a. What does this strengthen, #(the argument) that CPs can behave as NPs?
b. What will she withdraw, #(the allegation) that she was discriminated against?

Far from posing an overgeneration problem, then, *strengthen* and *withdraw* behave exactly as would be expected in the analysis of B&AK.

5.7 More Empty N Heads?

P&P also criticize B&AK for needing more empty N heads that turn CPs into NPs. In their section 3.4, they say that B&AK need another, distinct, empty N head for interrogative CPs, since those can appear as objects of prepositions without ellipsis, displacement, or coordination. These CPs must be capable of being semantically selected, and so the empty N head that appears with these CPs must be capable of bearing S-features. P&P also claim that B&AK need yet another empty N head, for those speakers who allow CP subjects with predicates like *be incoherent*. P&P further argue that it would be "counterintuitive" to use a null N head with CP subjects, because that would mean that CP subjects could not be semantically selected.

Let me start with CP subjects. B&AK reject the view that all CP subjects are actually topics related to a null NP in subject position (e.g., Koster 1978, Alrenga 2005). If they were, there would be no way to capture the fact that there are some predicates that disallow CP subjects, at least for some speakers (e.g., *be incoherent*). B&AK therefore adopted the view that declarative CP subjects are actually NPs, with a null head noun (e.g., Davies and Dubinsky 2009). For the speakers who disallow CP subjects with certain predicates, those predicates have S-features, and the null N head cannot check them off. For other speakers who do allow CP subjects with these predicates, these predicates simply do not impose any S-selectional requirements. For these speakers, all that is required is a subject of category NP. A CP turned into an NP with the same null N head is sufficient. We do not need another, distinct empty N head for CP subjects, we just need predicates to be unselective.[8]

As for interrogative CPs (and exclamative CPs), these raise numerous issues of analysis, which I cannot do full justice to here. I will say that, if we do need to acknowledge a second null N head to turn question CPs into NPs, it is a matter of opinion whether that would be undesirable. Note that the semantically contentless null N head that B&AK propose for declarative CPs is very like the overt N *fact* in *the fact that*. This N is incapable of appearing with interrogative and exclamative CPs. Such CPs only combine with Ns like *question*. If there were a distinct null N for turning questions into NPs, it would then not be surprising if this null N were differrent from the null N corresponding to *the fact that*. It would have to be compatible with questions, and it would then be capable of bearing S-features and could therefore satisfy selectional requirements.

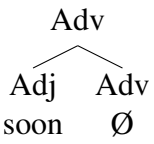
This may not be entirely satisfying, but a full exploration of the issues involved with the distribution of interrogative CPs would take up far too much space. I do note that P&P do not offer any proposals regarding how to account for the distributions of these various CPs.

5.8 Violation 2: Adverbs in Adjective Positions

For the second selectional violation in coordination, examples like *the once and future king*, I will propose a completely different analysis from what B&AK proposed. What they proposed was that adverbs like *once*, *soon*, *now* have the following structure, with a null and semantically contentless

[8] Alternatively, B&AK could simply allow CP subjects. Predicates that permit CP subjects might have the C-selectional feature [C∈{NP,CP}]. Then no empty N head is necessary at all. It is not at all crucial for the analysis of B&AK whether CP subjects are CPs or NPs. I do not adopt this analysis, however, because it would leave unexplained the generalization in Alrenga (2005), according to which CPs are allowed as subjects of passive verbs only if those verbs allow NP objects when active. This points to CP subjects actually being NPs, as proposed by B&AK and many others.

Adv head:[9]

(101)


B&AK also proposed that there is a constraint against adverbs modifying $\overline{\text{N}}$ constituents:

(102) * [$_{\overline{\text{N}}}$ Adv $\overline{\text{N}}$]

B&AK proposed that $\overline{\text{N}}$ categories are coordinated in examples like *the once and future king*, with right-edge ellipsis (a linear process) in the first conjunct. The null Adv head can be elided along with the head noun in the first conjunct:

(103) the [$_{\overline{\text{N}}}$ [$_{\overline{\text{N}}}$ [once ~~Ø] king~~] and [$_{\overline{\text{N}}}$ future king]]

The morphosyntactic constraint against adverbs modifying nominal categories in (102) is a PF constraint. Removing offending material at PF by ellipsis removes any indication that the constraint has been violated.

There are two problems with this analysis that lead me to try to improve upon it. One is that the constraint in (102) is a complete stipulation. It would be better to have the selectional violation fall out from the workings of the system. The second problem is empirical. One of the non-*ly* adverbs that appears in this pattern is *twice*. This adverb as a measure phrase is also banned from appearing with comparatives, although it can appear in equatives (Gobeski 2011):

(104) a. She is {two times/*twice} taller than him.
b. She is twice as tall as him.

However, in coordination, *twice* appears to be able to occur as the conjunct further from the comparative:[10]

[9]In their section 3.6, P&P object to this analysis on the following basis: "Ø_{Adv} is assumed to be active only within the lexical entries of non-*ly* adverbs, that is, it does not occur in the lexicon on its own: it is not active in syntax proper because, if it were, it could turn any adjective into an adverb so that any adjective could occur in strictly adverbial positions." B&AK did not say this. All they said was that the null Adv head was part of the lexical entry of these particular adverbs. That is not a particularly technical statement. There are various things it could mean. I would interpret it to mean that the null Adv head does have its own lexical entry (as every head must), but both it and the entries for *soon, once*, etc., specify that they must occur together. The null Adv head, like such suffixes as *-ceive*, is limited to only occurring with certain roots, and certain roots have to occur with it. The lexicon is full of such items, and there is no reason to expect that any given head will be able to combine productively with any other head of the appropriate type. This criticism is off the mark. It is also irrelevant to the current paper, since I am proposing a different analysis.

[10]Example (105b) uses disjunction, where most of the examples up to this point have used conjunction with *and*. A reviewer questions whether the same selectional violation patterns hold with disjunction. I have not looked at this systematically, but my own judgment is that the same pattern obtains:

(i) a. They are always talking about either beer-making techniques or that abortion is now illegal.
b. Any once or future president may enter freely. (example modified from the reviewer)
c. However, this might be a seldom or even single occurrence of a top player in the league going against a fellow starting All-Star, . . . (https://pippenainteasy.com/2017/02/19/jimmy-butler-isaiah-thomas-star-

(105) a. She is twice and maybe even three times taller than he is.
b. * She is one point five or even twice taller than he is.

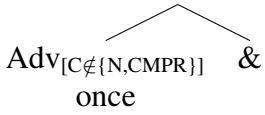
The following are some naturally occurring examples of this pattern found on the web:

(106) a. In well-drained soil, the planting hole should be at least twice and preferably five times wider than the root ball. (https://hgic.clemson.edu/factsheet/planting-trees-correctly/)
b. For isotropic materials, the area and volumetric thermal expansion coefficient are, respectively, approximately twice and three times larger than the linear thermal expansion coefficient. (https://en.wikipedia.org/wiki/Thermal_expansion)

This is clearly an instance of the same pattern as *the once and future king*, yet the analysis of B&AK will not extend to it. They simply stipulated a constraint against adverbs modifying $\overline{\text{N}}$, but that is not what is violated in (104a). B&AK would have to stipulate another constraint against an adverb co-occurring with a comparative.

I propose instead that the relevant adverbs are underspecified items. They can appear in basically any position except merged with a (non-maximal) N or a comparative. They can appear with predicates, for instance (*He was king once*), verbs and adjectives (*Once bitten, twice shy*), higher in the clause (*Having once been king,...*; *Once you have done this,...*), with PPs (*Once on the roof,...*), and others. As stated in section 4.1, modifiers C-select the categories that they modify. I propose that these adverbs, rather than having positive C-selectional features, have negative specifications instead. For instance, *twice* has the C feature [C$\notin${N,CMPR}]. A negative specification like this indicates that the item with the feature cannot merge with something of the specified set of categories. It will be satisfied and checked off as soon as the next item is merged, so long as that item is not in the specified set of categories.

Take an example like *the once and future king*. In the coordinate phrase, the adverb *once* is merged first, and then the & head is merged with it. *Once* has the C-feature [C$\notin${N,CMPR}]:

(107)


The & head Agrees with *once* and copies its features, putting them on a push-down stack:

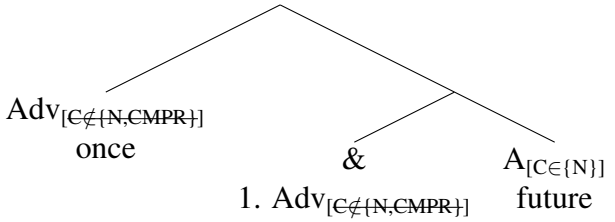
(108)


The & head then merges with the adjective *future*. This immediately satisfies the C-selectional feature copied from *once*, since A is not in {N,CMPR}. The C feature is checked off:

game-teammates/amp/)

I will have to leave full exploration of disjunction to future work, but my impression is that it does not differ from conjunction for the phenomena investigated here. (Note also that (105b) is still ungrammatical if *or* is replaced with *and*.)

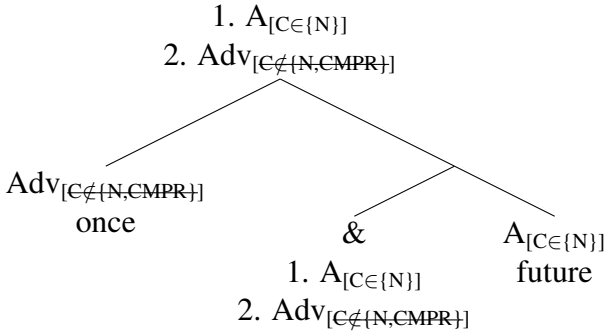
(109)



This also checks off the features on the Adv, through the previously established Agree link.

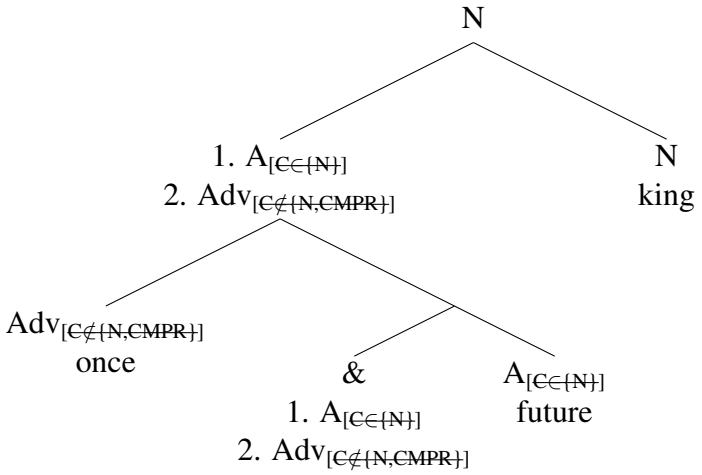
The & head then Agrees with the second conjunct, *future*, and puts the features it gains thereby on the top of the push-down stack. Those features percolate to &P; the checked off ones do too, but they have been checked off and are satisfied:

(110)



When the whole coordinated phrase merges with a non-maximal N, no violation is registered, because the negative selectional features have been satisfied and checked off. The features of the A are now satisfied, too:

(111)



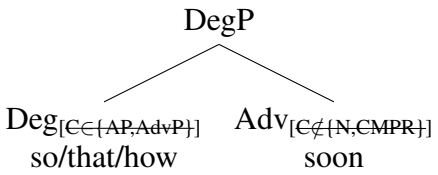
The derivation would work in the same way for the comparative case in (105a). When & merges with the second conjunct, *three times*, the C feature of *twice* will be checked off, since *three times* is not in {N,CMPR}. The C feature of *three times* will be put on the top of the push-down stack, but this feature will be satisfied when the comparative is merged, because *three times* does select for a comparative.

If the final conjunct is one of these adverbs (**the future and once king* or **one point five or even twice taller than*), the C-feature of *once/twice* would not be checked off within the coordinate phrase and would percolate to &P. The C feature would not be satisfied when &P merges with a non-maximal N or a comparative, and the derivation would crash.

As for short displacement (*so soon a visit*), one possibility is that the environment from which these adverbs is banned is specifically a *non-maximal* N projection. The phrase *so soon* seems to be able to adjoin to a maximal NP. I have notated the C feature as [C$\notin${N,CMPR}], whereas in previous sections head selectors had features like [C$\in${NP,AP}]. This requires that our model of grammar recognize a distinction between maximal (NP) and non-maximal (N) projections. NP is not in {N,CMPR} on this analysis, and so *soon* can merge with a maximal NP. This analysis requires that this position is not displacement at all, but base-generation (same for short rightward displacement, in *a visit that soon*).

A second and perhaps better possibility is that in *so/that/how soon a visit*, the degree element *so/that/how* is not combining with *soon* as a modifier, but is instead a selector itself. It changes the category of the whole, call it DegP:

(112)



Merging Deg with the Adv satisfies and checks off the C-feature on the Adv, since Deg is not in {N,CMPR}. Deg selects APs and AdvPs, possibly among other categories, as its first argument, and then whatever selectional feature DegPs have (e.g., C$\in${NP}, not shown in the tree). Merging AdvP with Deg also satisfies the first C-feature on Deg.

One advantage of this second possibility is that it makes *so soon* a different syntactic category from *soon* (or even *very soon*, where *very* is just a modifier of Adv). This seems to be correct, since the phrases have different distributions. For one thing, DegPs like *so Adjective* appear to the left of the determiner in an NP (*so dark a night*), but APs appear to the right (*a dark night*). I will therefore adopt this second possibility for apparent short displacement of *so/that/how soon*. Note that in this second analysis, too, apparent short displacement is not movement, but is instead base-generation.

In any case, the analysis proposed here successfully accounts for the *once and future king* pattern, as well as the newly discovered *twice or even three times taller* pattern. It does so without any stipulations or extrinsic constraints, or any null heads. Instead, the coordination pattern falls out from the way C-selection works, given the lexical specifications of the relevant adverbs.

5.9 Speaker Variation

B&AK also attempted to account for speaker variation on the phenomena discussed here. They and previous literature observed variation in judgments on coordination of CPs with NPs. According to them, a majority of speakers actually rejects or finds marginal examples like *You can depend on my assistant and that he will be on time*. In contrast, no variation has been documented in the judgments on coordination with adverbs, on displacement (leftward or rightward), or on ellipsis.

In the experiment reported in section 4.4, the distribution of judgments was not as B&AK speculated, but variation was observed. In that experiment, the majority, or 55%, rate NP&CP coordination 4 or higher. 11% rate them under 3, while the other 34% rate them in between 3 and 4. It is difficult if not impossible to pinpoint the cutoff lines for individual speakers; many of the participants in the experiment, for instance, simply never used the lowest rating 1, even for clearly

ungrammatical fillers. It is also not clear exactly what factors beyond grammaticality go into a participant's judgment of acceptability (or "naturalness," as they were told in the instructions). It is likely that numerous factors outside of the grammar influence these judgments. Nevertheless, we can probably say with some certainty that if a participant rates some condition 4 or higher, they find that condition acceptable. If they rate it below 3, we can take that to indicate that they find it unacceptable. In between, we cannot know. So, I take these results to indicate that a majority (over 50%) of speakers find NP&CP coordinations acceptable in positions that do not allow CPs by themselves. About 10% of speakers do not.

To account for speaker variation, B&AK proposed that, for speakers who reject coordination of CPs with NPs, S-feature checking is just like C-feature checking. For these speakers, S-features do not delete after being checked just once, they have to be checked against all conjuncts. All conjuncts therefore have to have S-features, and a CP turned into an NP with the null N head is not sufficient. In ellipsis, the S-features are deleted by ellipsis, for all speakers, and so all speakers permit the null N head. In leftward displacement, a null operator of category NP starts in argument position and moves; this null NP must have S-features, since null operators are generally able to start in argument positions. In coordination of non-*ly* adverbs with adjectives, there is again no room for speaker variation; their acceptability simply falls out from the system.

The analysis proposed here, then, building on B&AK, successfully accounts not only for the two selectional violations in coordination, but also accounts for the pattern of speaker variation.

6 Conclusion

B&AK made several observations about mismatching categories in coordination. P&P tried to argue that B&AK's observations were incorrect. As we have seen, P&P do seem to have shown that category mismatches are more widespread than B&AK thought. In argument positions, in particular, mismatching categories seem to be permitted, so long as selectional restrictions are obeyed. However, P&P also argued that the two instances of selectional violations in coordination that B&AK observed were not real. I have shown here that they are, and they are fully general. They also have exactly the character that B&AK observed: there are only two of them, not others, and the same ones appear in leftward displacement and ellipsis. These patterns require an analysis.

I have also proposed a revision of the analysis in B&AK to account for these patterns. The analysis capitalizes on the mechanics of Agree in a left-to-right derivation of coordination. The coordinating head & has no features of its own and gets them by Agreeing with its specifier and complement, in that order. The features it gains are put in the form of a push-down stack. Combined with a view of C-selection and S-selection that treats them as feature checking, this analysis successfully accounts for the pattern and its sensitivity to linear order. This sensitivity falls out from the left-to-right derivation and a motivated difference between C-selection and S-selection, where S-selection replaces the notion of thematic roles.

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