

Accounting for unexpected subject gaps in TP coordination*

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Abstract

Work on coordination has been concerned with the conditions in which elements can be “shared” between two conjuncts since at least Ross (1967). This paper aims to describe a curious case of apparently obligatory sharing, where coordinated clauses below a shared element in C—i.e. coordinated TP clauses—are required to “share” a single initial subject unless the subject of the second clause is focused.

I argue that this restriction arises from properties of cyclic linearization (Fox and Pesetsky 2005, Richards 2010). Limitations of the linearization algorithm prevent it from distinguishing DP arguments from one another (Richards 2010). What distinguishes the subjects of TPs from arguments of other clausal conjuncts is that they are both visible to the linearization algorithm on a single cycle of Spell Out. Unable to distinguish the two subjects, this algorithm linearizes them in a single position, except in cases where subject-oriented focus requires an overt subject in the second clause. The final section of the paper extends the analysis to SLF coordination (Höhle, 1983, 1990), which shows a similar restriction on overt subjects in the second conjunct.

Keywords: coordination; linearization; multidominance; contrast; syntax

1. Introduction

Since at least Ross (1967), much work on the syntax and semantics of coordination has been concerned with the conditions in which elements can be “shared” between two conjuncts. This has been particularly the case for constructions such as Across-the-Board (ATB) movement, Gapping, Pseudogapping, and the like, but applies even to ordinary coordination between constituents smaller than whole clauses. It is well established that in general “sharing” is optional between conjuncts: identical or similar elements can be fully repeated between conjuncts, as in (1a), or may be partially or entirely factored out, as in (1b-c):

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- (1) a. [Scott has made a fool of himself], and [he has faced the consequences].
 b. Scott [has made a fool of himself] and [has faced the consequences].
 c. Scott has [made a fool of himself] and [faced the consequences].

The focus of this paper is on a curious restriction on such repetition, apparently previously unnoticed in the literature. The restriction is this: when sentences like those in (1) are turned into questions, it is suddenly no longer possible to repeat the subject in the second conjunct. Coordination now requires smaller constituents, as we see in (2) and (3):

- (2) a. *Has [Scott_i made a fool of himself] and [he_i faced the consequences]?
 b. Has Scott [made a fool of himself] and [faced the consequences]?
 (3) a. *Who has [Scott_i met] and [he_i invited out for coffee]?
 b. Who has Scott [met] and [invited out for coffee]?

What is striking about this restriction is that it cannot be explained by known properties of coordination. As (1) demonstrates, coordinated clauses usually allow repeated subjects; (2b) and (3b) similarly demonstrate that ATB movement out of the relevant conjuncts is also possible. All that appears to be wrong with (2a) and (3a) is that both coreference and ATB movement occur in the same sentence, but ungrammaticality is not generally additive in this way.

The goal of this paper is to pinpoint, at a descriptive level, the factors contributing to the ungrammaticality of (2a) and (3a), and then to develop an analysis of the restriction. The paper proceeds in two parts. The first part of the paper, in section 2, argues that the relevant generalization concerns the coordination of TPs (but not CPs): more specifically, the restriction can be traced to the subject of the second TP, which cannot be a simple unstressed pronoun. The second part of the paper, in section 3, proposes an analysis of this restriction framed within a phasal theory of Spell Out and linearization. The restriction arises, I argue, because the subjects of coordinated TPs are spelled out together on a single phase, and so can be confused with one another by a post-syntactic linearization component. The subject of the second clause, I propose, can be distinguished by the linearization component only if it is focused.

Finally, section 4 suggests that the analysis presented on the basis of English facts throughout the rest of this paper has potential bearing on accounts of an odd coordination construction in German, so-called SLF coordination.

2. Describing the restriction

The sentences in (4) and (5) illustrate the same pattern of unacceptability we saw in the introduction.¹The goal of this section is to pinpoint the factors contributing to the ungrammaticality of sentences like (4a) and (5a).

- (4) Kim_i visited her parents_j and she_i unexpectedly moved back in with them_j.

¹Some speakers report a more subtle restriction than outright ungrammaticality, but in every case speakers have nonetheless found a contrast in the same direction as the one reported here.

- a. *Who did [Kim_i visit] and [she_i unexpectedly move back in with]?
 - b. Who did Kim_i [visit] and [unexpectedly move back in with]?
- (5) The butler_i entered the front hall at 10 o'clock and he_i locked the door then.
- a. *At what time did [the butler_i enter the front hall] and [he_i lock the door]?
 - b. At what time did the butler_i [enter the front hall] and [lock the door]?

I propose that these sentences exemplify a restriction on coordination between two TPs – that is, clausal below a shared element in C⁰ – specifically that the subject of the second clause cannot be an unstressed pronoun. To establish this as the correct generalization requires demonstrating that none of the other factors at play in these sentences is responsible for their ungrammaticality. Initially plausible alternative explanations include:

- (6)
- a. The second conjunct begins with (non-contrastive) repeated material
 - b. The subject of the second conjunct is a pronoun
 - c. The subjects of the two clauses corefer
 - d. ATB movement has taken place

This section explores each of these factors in turn. Though none accounts directly for the pattern of interest, we will see that each helps to illuminate the correct generalization.

2.1. No general requirement for small conjuncts

A plausible first hypothesis is that the data in (1)-(5) reveal a general preference for small conjuncts: that is, if any element is shared between two conjuncts (e.g. an ATB moved element), then as much material as possible must be shared. Such an approach would recall the principle of MaxElide proposed in work on VP ellipsis (Takahashi and Fox, 2005; Merchant, 2008): stated generally, MaxElide requires that ellipsis target the largest possible constituent within some independently-determined domain.

If clausal coordination were subject to this kind of restriction, however, we would predict that when ATB extraction occurs, it would never be possible to repeat any material at all between two conjuncts if that material could in principle be shared. This potential prediction is not borne out: the sentences in (7) and (8) demonstrate that verbs and auxiliaries can be repeated between conjuncts even when coreferential subjects are ungrammatical:

- (7) Scott ate noodles for breakfast and he ate them again for dinner.
- a. *What did [Scott_i eat for breakfast] and [he_i eat again for dinner]?
 - b. What did Scott [eat for breakfast] and [eat again for dinner]?
 - c. What did Scott eat [for breakfast] and [for dinner]?
 - d. What did Scott eat for [breakfast] and [dinner]?
- (8) The gang have been arrested and they have been charged.
- a. *Have [the gang_i been arrested] and [they_i been charged]?

- b. Have the gang [been arrested] and [been charged]?
- c. Have the gang been [arrested] and [charged]?

The grammaticality of (7b-c) and (8b) demonstrates that it is possible for identical material to appear in at the left edge of two coordinated constituents, even when it would be possible for coordination to exclude those elements, as in the (c) examples. The ungrammaticality of the (a) sentences therefore does not illustrate a more general preference for small conjuncts, but instead a restriction on the subjects themselves.

2.2. No general ban on pronominal / backwards referring subjects

A plausible second hypothesis is that the ungrammaticality we have seen so far is connected directly to coreference between the subjects of the two clauses. It is certainly the case that the relevant sentences improve when the second subject is focused, as in (9), and such focus also facilitates a switch in reference. Coreference remains a possible interpretation even with focus on the second subject, however, given an appropriate context.

- (9) a. Has [Scott_i made a fool of himself] and [HE_{i/j} faced the consequences]?
- b. Who did [Kim_i visit] and [SHE_{i/j} unexpectedly move back in with]?
- c. At what time did [the butler_i enter the front hall] and [HE_{i/j} lock the door]?

This suggests that it is focus, rather than disjoint reference, that improves the sentences in (9). In a similar vein, these sentences improve if the second subject is augmented in other ways. (10), for example, is acceptable due to the emphatic reflexive on the subject of the second clause.

- (10) a. * What did the queen commission and she never see finished?
- b. (?) What did the queen commission and she herself never see finished?

Focus sensitive operators such as *only* and *even* have a similar effect when they associate with the subject of the second conjunct. This is shown for *only* in (11) and *even* in (12).¹

- (11) a. Which painting did the queen see and only she appreciate.
- b. *Which painting did only the queen see and she appreciate.
- (12) a. Which courtiers did the queen dislike and even she consider dangerous.
- b. *Which courtiers did even the queen dislike and she consider dangerous.

The sentences in (13) and (14) further confirm that it is the pronominal nature of the second subject, rather than its reference, the leads to ungrammaticality. These examples are parallel to cases seen so far, except that the subject of the second clause refers back to a non-subject from the first clause. The (b) sentences are judged just as bad as ungrammatical cases with coreference between subjects.²

- (13) a. The teacher gave [the children]_i a note and they_i lost it.
 b. *What did the teacher give [the children]_i and they_i lose?
- (14) a. The sphinx told Oedipus_i a riddle and he_i solved it.
 b. *What famous riddle did the sphinx tell Oedipus_i and he_i solve?

It thus appears that the relevant sentences are ungrammatical due to the presence of an unstressed pronoun as the subject of the second conjunct. When a pronominal subject bears focus, acceptability improves.

The requirement for focus does not apply to elements other than subjects.³ As we saw in the previous section, and is shown again in (15), inflectional material, including auxiliaries verbs, can be repeated without focus or emphasis.

- (15) a. What has Ramona [been buying from Scott] and [been selling to Kim].
 b. What did Scott [eat for breakfast] and [eat for dinner also]?
 c. What is Steven [supposed to have been reading] and [supposed to have been writing]?

Though these sentences are more awkward than counterparts without repeated material, the fact that they are grammatical confirms that the relevant generalization is localized to the subjects of the coordinated clauses.

2.3. Not about ATB movement

All illustrating examples discussed so far have involved ATB movement either of a *Wh*-element to Spec-CP or of T⁰ to C⁰. We should therefore ask whether the restriction we have seen is driven by properties of ATB movement, rather than of coordinated structures more generally.

Questions formed from coordinated clauses share another property besides movement, however: unlike coordination of declarative clauses in a language like English, they involve unambiguous TP coordination, coordination that excludes a single visible element in C⁰.

Indeed, the data below demonstrate that this coordination below a shared C⁰, rather than ATB movement more specifically, seems to be responsible for the restriction on pronominal subjects in the second conjunct. (16) involves coordinated declarative clauses below a single embedding complementizer *that*, and once again we see a restriction on coreferential subjects.

- (16) a. *The TSA asks that [passengers_i remove their shoes] and [they_i move quickly through security].
 b. The TSA asks that passengers [remove their shoes] and [move quickly through security].
 c. The TSA asks [that passengers_i remove their shoes] and [that they move quickly through security].

The example in (16c) is particularly interesting, showing that repeating the complementizer — coordinating CPs rather than TPs — lifts the restriction on coreferential subjects. This further supports the conclusion that it is the unambiguous coordination

of TPs — not questionhood, ATB movement, or even more non-root coordination — that gives rise to the restriction.⁴

The same effect is illustrated for the non-finite complementizer *for* in (17). Again, a pronominal subject in the second conjunct is acceptable only when the complementizer is repeated.

- (17) a. Teresa prefers *for* her cars [to be blue] and [to seat at least five people].
 b. *Teresa prefers *for* [her cars_{*i*} to be blue and [them_{*i*} to seat at least five people].
 c. Teresa prefers [for her cars_{*i*} to be blue] and [for them_{*i*} to seat at least five people].

Neither is an overt complementizer necessarily required for unambiguous TP coordination. (18) illustrates a similar, though apparently weaker, ban on pronominal subjects when those subjects occur in ECM infinitives, argued to involve a smaller constituent — smaller than a full CP — than other infinitival complements (Chomsky, 1981; Massam, 1985).²

- (18) a. ??I expect Emily to visit her father and her to be glad to see him.
 b. ??I expect Emily to visit her father and him to be glad to see her.

The sentences in (16) through (18) involve non-finite embedded complements, both subjunctive and infinitival. In principle the same facts should arise with finite embedded clauses. In English, however, the general optionality of overt complementizers makes it difficult to clearly distinguish TP and CP coordination in embedded contexts. Though there are verbs that do strongly require an overt complementizer, these are generally factive, and factivity obscures the interpretive contrast between embedded and matrix coordination. In (19), however, embedded coordination is forced by having a variable in the second conjunct be bound from the matrix clause.⁵

- (19) a. No criminal_{*i*} believes that [they will one day make a mistake] and [(**they*_{*i*}) will get caught].
 b. No criminal_{*i*} believes [that they will one day make a mistake] and [that they will get caught].

The ungrammaticality of the repeated subject in (19a) demonstrates that the ban on repeated subjects in coordination can indeed be extended to finite clauses embedded under a shared overt *that*, further supporting the conclusion that this restriction applies to coordinated TPs but not to larger coordinated clausal constituents, and that the source of the restriction is independent of ATB movement to C^0 .

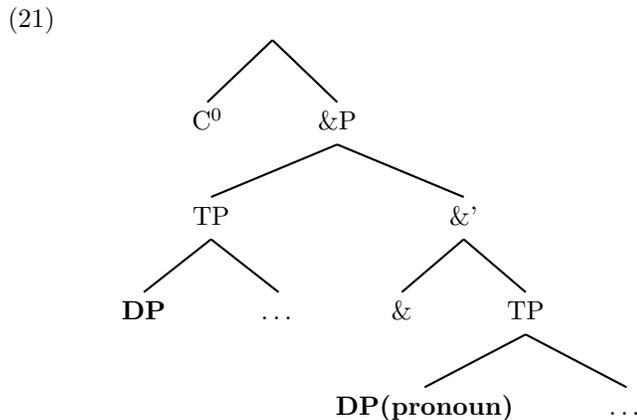
²If ECM subjects have in fact undergone Raising-to-Object, as first proposed by Postal (1974), then the ungrammaticality of (18) cannot be accounted for precisely in parallel to (17), where the subjects remain *in situ*. Section 3 proposes, however, that the relevant restriction should not be reduced to their status as subjects as such, but rather to the fact that the subjects of coordinated TPs are spelled out on the same phase. Section 3.3 illustrates that this account extends to the coordination of other sub-clausal constituents, including VPs.

2.4. Interim summary

We are now in a position to more precisely describe the restriction of interest:

- (20) When two TPs are coordinated below a shared element in C^0 , the subject of the second clause cannot be an unstressed pronoun.

In other terms, the configuration in (21) is banned:⁶



Having made the description of this restriction precise, the next section turns to the second goal of this article, and proposes an account of why the configuration in (21) would be problematic.

3. Analysis

This paper has so far described a restriction on the subjects of coordinated clauses, a restriction that appears to apply not to all clauses but instead only to TPs coordinated below a shared element in C^0 . In this section we turn to providing an explanation for this restriction, focusing on the question of why TPs would differ from CPs in this regard.

The shape of my proposed answer is built on a cyclic approach to the linearization of syntactic structure, in which phases are not only domains of morphological and phonological realization (as well as semantic interpretation), but also domains for which the linear order of terminals is determined, as proposed by Fox and Pesetsky (2005). I argue that the restriction on subjects of coordinated TPs arises because they are linearized on the same phase, whereas in larger coordinated constituents (i.e. CPs) subjects in the same position are insulated from one another by a higher phase head, so that each subject is spelled out independently prior to the creation of the coordinate structure. The remainder of this section makes the details of this analysis precise.

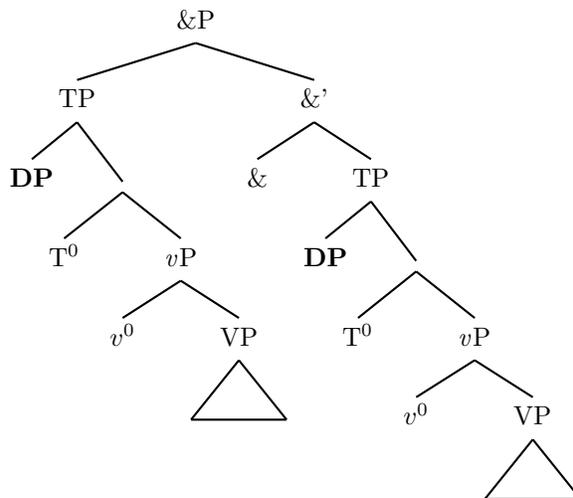
3.1. Why phases?

I have just proposed that the subjects of coordinated TPs are subject to a restriction because they are spelled out on a single cycle, while the subjects of coordinated CPs escape this restriction because they are spelled out on separate cycles.

Within phase-based approaches to the semantic interpretation and phonological realization of syntactic structure, the set of Spell Out triggering phase heads is widely agreed to include at least the heads C^0 and v^0 (Chomsky, 2001, 2005, et seq.).

With this in mind, consider the structure underlying TP coordination, illustrated in (22). Assuming that a phase head triggers the spell out only of its complement (Chomsky, 2005; Nissenbaum, 2000), then because they occupy the highest specifier in the coordinated constituents, neither DP will have been spelled out prior to the creation of the larger $\&P$.³As a consequence, they will be linearized together on the next cycle of Spell Out, triggered by a phase head external to the coordinate structure.

(22) *Coordination of TPs:*



By contrast, any DPs in the complement of v^0 — i.e. any object arguments — would be spelled out on an earlier cycle, crucially prior to the creation of the coordinate structure.⁴We expect such DPs to be ‘invisible’ to one another in subsequent cycles of Spell Out, if we understand Spell Out as the transformation of hierarchical structure into a (syntactically) opaque morphophonological string. The cyclic view of Spell Out therefore derives automatically a contrast between subjects and objects in TP

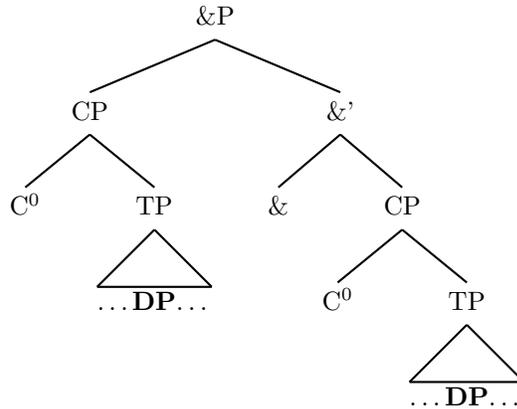
³This assumes that $\&^0$ is not a phase head, in which case the second conjunct would be spelled out independently of the first. As there is not to my knowledge any independent reason to consider $\&^0$ a phase head, I do not consider this possibility further here.

Another possibility is that if T^0 were a phase head *and* phase heads triggered the spell out of both their complement and their specifier, then subjects in Spec-TP indeed be spelled out prior to the creation of a larger coordinate structure. Though both these positions have been adopted separately in the literature on phases, I am unaware of any work that adopts that adopts both together, and so similarly set this possibility aside in the following discussion.

coordination.

The same factors explain the contrast between TP and CP coordination. Consider the structure of coordinated CPs, illustrated in (23); here, as in (22), elements contained within previously spelled out phases are dominated by triangles. So long as C^0 is a phase head, the subjects of both clauses (together with all other TP-internal material) will have been spelled out prior to the creation of the larger coordinate structure. Just as object DPs never have an opportunity to interact in (22), subjects never have an opportunity to interact in (23).

(23) *Coordination of CPs:*



In sum, a cyclic view of Spell Out gives us a way in which the subjects of coordinated TPs should be able to “see” one another, while subjects of coordinated CPs (and all *in situ* objects) cannot. What as not yet been addressed is why there would be any restriction having two DP subjects spelled out on a single cycle. I argue in section 3.2 that this restriction arises because Spell Out encompasses not only morphophonological realization but also linearization, as proposed by (Fox and Pesetsky, 2005), and that it is this linearization aspect of Spell Out is generally unable to distinguish DPs from one another.

3.2. Why would linearization matter?

This section argues that the subjects of coordinated clauses cannot be spelled out on a single cycle because of limitations on the linearizability of identical DPs.

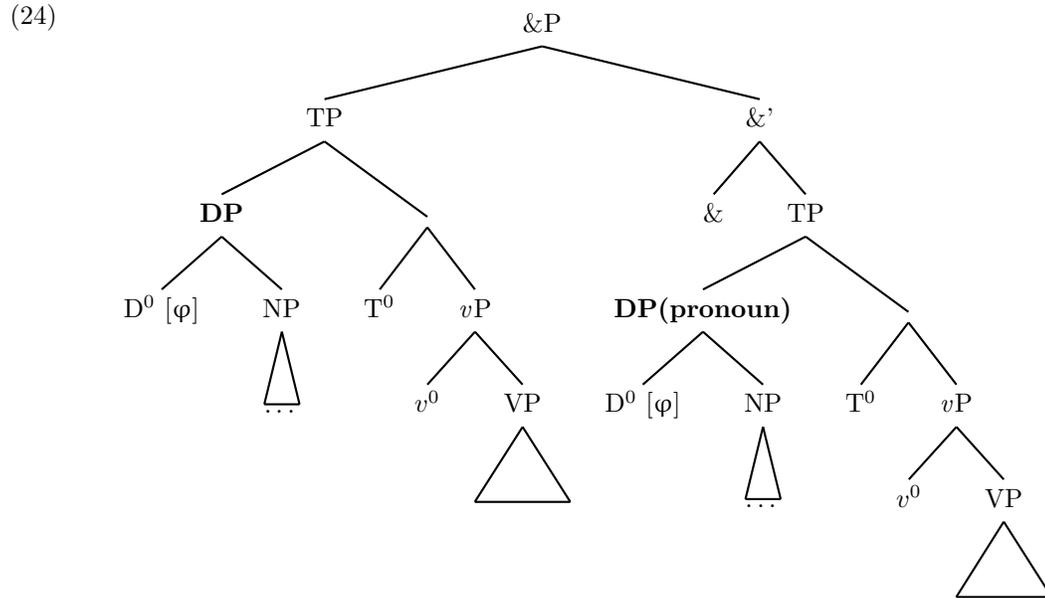
Following Fox and Pesetsky (2005) and Richards (2010), I assume that a central component of Spell Out is the imposition of linear order on syntactic structure: linear order is not established continuously throughout a syntactic derivation, as it is in Kayne (1994)’s original work on the Linear Correspondence Axiom, but is instead established cyclically at an early stage on the transfer to PF. Linearization therefore does not occur in the narrow syntax, but is instead an interface process.

It is a recurring idea in literature on the syntactic interfaces that they may confuse

⁴For concreteness I label the complement of v^0 “VP” — it could just as easily be a lower functional head in the vP domain, or a category-neutral root.

elements that were distinct in the syntax; in other words, that the interfaces are not very good at telling similar or identical things apart. At the LF interface, for example, McGinnis (2004) argues that when a trace (lower copy) has two potential antecedents, one of which c-commands the other, this creates a “lethal ambiguity” for the semantics with respect to variable binding, resulting in ungrammaticality; in a similar vein, Reuland (2011) accounts for some of the distribution of reflexive marking by arguing that a transitive predicate cannot be saturated by two identical variables, precisely because these cannot be semantically distinguished from one another even if they are syntactically distinct.

At the PF interface, more relevantly for the issue discussed here, work following Kayne (1994) has argued that the linearization algorithm crashes if it attempts to order any element with itself. With this in mind, consider again the structure of coordinated TPs:



There is no reason to believe that the narrow syntax lacks the resources to deal with representations such as this. There is also no reason to think that this structure is semantically uninterpretable: each DP is the argument of a different predicate, and as neither c-commands the other there is not even the possibility of something like McGinnis’s Lethal Ambiguity ruling the structure semantically ill-formed.

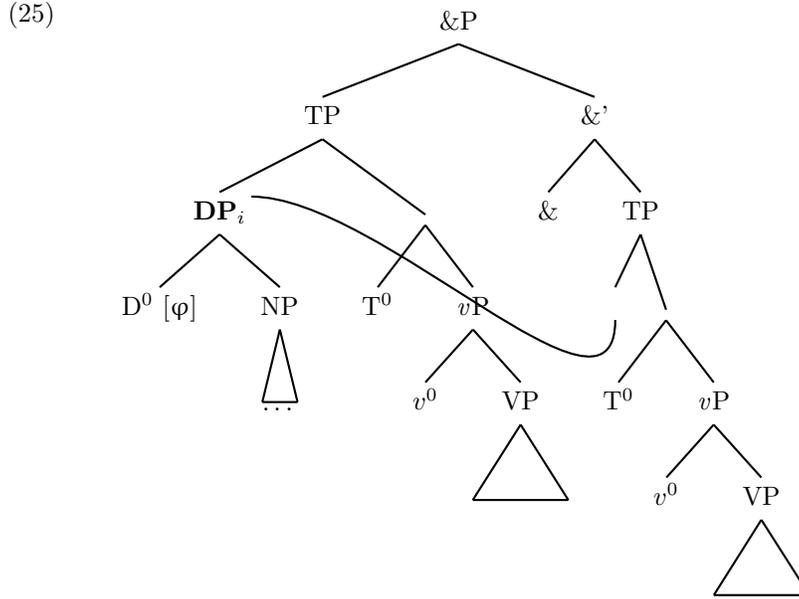
With respect to morphophonological interpretability, however, the situation is less clear. Though the DP subjects in (24) do not directly compose semantically with one another, a linearization algorithm will nonetheless have to order them with respect to one another.

As stated above, a general theme of work on linearization is that a derivation will crash if any element is ordered with respect to itself, i.e. if any statements of the form $\langle \alpha, \alpha \rangle$ are created. Richards (2010) expands the scope of this requirement, proposing that a derivation will crash not only if an element is literally ordered with respect to

itself, but also if two elements that are merely similar to one another are linearized. More specifically, Richards proposes that any two elements that have the same label cannot be linearized. This Distinctness requirement on linearization has the effect of preventing any two DPs from being linearized in a single phase, a restriction he uses to account for a number of phenomena in which more than one DP is prevented from occurring in a single domain, including (in English) quotative inversion and multiple *Wh*-sluicing.⁷

On the face of it, Richards' proposal that no elements with the same label can be linearized on a single cycle is not only too strong to account for the data in this paper — it would rule out any coordination of TPs, because in every case this will result in two DP subjects spelled out on one cycle — but would also more generally rule out any coordination of like categories, which always requires two constituents with the same label to be linearized on a single cycle (assuming again that $\&^0$ is not a phase head).

A weaker restriction on linearization can begin to account for the ungrammaticality of (24). Consider that coordinate structures have also been claimed to allow multidominant representations (Citko, 2005; Gracanin-Yuksek, 2007, as well as earlier work). This means that a multidominant structure such as (25) is in principle possible alongside (24). While in (24) two DPs are each merged in the specifier of a different TP, in (25) a single DP has undergone Parallel Merge (Citko, 2005) into two different positions, one in each coordinated TP.



While the narrow syntax can presumably distinguish structures such as (25) from structures such as (24), perhaps a post-syntactic linearization algorithm cannot. If linearization is unable to unambiguously distinguish two DPs from one another, it would be unable to distinguish a structure containing two DPs from one in which a single DP occurs in two position.

This would perhaps lead to something like McGinnis (2004)’s Lethal Ambiguity at the PF interface: because the linearization algorithm cannot conclusively distinguish two possible underlying syntactic representations, the derivation crashes.

Alternatively, a linearization algorithm might uniformly resolve such an ambiguity in favour of a multidominant structure such as (25): or rather, when linearization is unable to distinguish two elements from one another, it treats them as though they are a single element. This is particularly natural when we consider the role of a linearization algorithm with respect to movement: in cases where an element has undergone movement, whether understood as copy or remerge, a central task of a linearization algorithm must be to determine which position that element will be pronounced in.⁸

Evidence in favour of the latter possibility — that the linearization algorithm treats non-contrastive TP subjects as a single DP that is realized in its leftmost position — comes from examples such as (26), where the second conjunct contains a high adverb despite the absence of an overt subject.⁹

(26) Has [Scott made a fool of himself] and [hence faced the consequences]?

- (27) a. Hence he must face the consequences.
 b. *?He hence must face the consequences.

As the ungrammaticality of (27b) illustrates, an adverb like *hence* cannot occur below the overt subject of a finite clause. This means that (26) cannot involve the coordination of constituents small enough to exclude a single shared subject in Spec-TP (i.e. coordination of VP), and that the second conjunct must contain a subject gap. On the proposal developed here, this is a purely surface gap, arising because the linearization algorithm treats the subjects as a single DP, and realizes that DP in its leftmost position.

The question that now arises is why it is only pronominal subjects, and only de-stressed pronominal subjects, that show the effects of this condition on linearization. If linearization generally cannot tell distinguish DPs from one another, why would (28a) be worse than either (28b) or (28c)?

- (28) a. *What did Scott buy and he eat?
 b. What did Scott buy and HE eat?
 c. What did Scott buy and Ramona eat?

I propose that the answer has to do with the role of focus in both coordination and linearization. Sentences such as (28b) involve contrastive focus on the subject of the second conjunct, in the sense of Jackendoff (1972) and much subsequent work. I suggest that this focus makes it possible for the subjects of the two clauses to be linearized independently, each surfacing in its merge position.

Why would this be? Note that it cannot simply be that the presence of a focus feature allows the linearization component to distinguish the two subject DPs. This can be seen in two ways. First, sentences such as (28b) are grammatical with contrastive focus on both subjects. If it is the presence of a formal focus feature that allows linearization to distinguish one DP from another, the same feature on both should

once again render them non-distinct.

Second, focusing the first subject but not the second has no effect on grammaticality, as seen above in (11) and (12), repeated here. If the presence or absence of a formal focus feature allowed linearization to distinguish the two DPs, we would expect a symmetrical effect, much as Richards (2010) proposes that linearization in Japanese is able to distinguish DPs on the basis of visible Case features.

- (29) a. Which painting did the queen see and only she appreciate.
b. *Which painting did only the queen see and she appreciate.
- (30) a. Which courtiers did the queen dislike and even she consider dangerous.
b. *Which courtiers did even the queen dislike and she consider dangerous.

Much work has noted the broader role of contrast in coordinate structures. Adopting the alternative-based semantics for focus developed by Rooth (1992), Schwabe (2000) and Hartmann (2000) both develop accounts of the role of contrastive focus in defining contrast between conjuncts in elliptical environments such as Right Node Raising and Gapping. In both accounts, contrastively focused elements are required to be among the alternatives defined by their counterpart in a parallel conjunct, and unfocused material may be destressed or elided entirely.

From this perspective it is intuitively obvious that contrastively focused arguments ought to be linearized separately: a single multiply dominated DP cannot be its own alternative. The crux of the analysis pursued here, however, is that linearization is blind not only to semantic detail but to much syntactic information as well. The question therefore remains of how focus interacts with whether the subject of a second TP conjunct is overt.

One crucial property of focus is that it has not only semantic consequences but also prosodic effects at the PF interface. Focus has also played a central role in many accounts of ellipsis phenomena such as sluicing (Ross, 1967): in such accounts, the presence of focus on a constituent prevents it from undergoing ellipsis, generally by triggering movement to a higher focus position (Lobeck, 1990; Merchant, 2001, among many others).

What I suggest here is that independently of movement, focus operators require that their associate be realized within their scope, in order to realize prosodic focus. As a consequence, if any focus operator in the second conjunct associates with the subject, as in (30b-c), linearization is able to “see” that DP and correctly linearize it. It is thus not directly a focus feature on the subject, but instead the subject’s association with a (potentially covert) focus operator that insulates it for purposes of linearization, preventing it from being collapsed with the subject of the other coordinated clause.¹⁰ The asymmetry in the effect of focus between the two clauses arises from the fact that if focus were to occur only on the subject of the first conjunct, however, no conflict in linearization would arise: a single DP realized in the first conjunct is consistent both with a multidominant representation and with a requirement that focus be associated with an overt element.

On this approach, what is special about backwards-referring pronouns is thus not that they are pronominal, but that they are among the few DP arguments to naturally occur without focus. This predicts that other focus-resistant DPs should be similarly

ungrammatical as the second subject in TP coordination. According to Jackendoff (1972), epithets require the absence of contrastive focus, and indeed, (31) shows that the prediction is borne out: epithets like *the fools* are possible as the first subject in TP coordination, but are considerably less acceptable as the second subject:

- (31) I heard a weird rumour about Scott and Ramona. . .
- a. Did the fools buy a car and the two of them crash it the next day?
 - b. *Did the two of them buy a car and the fools crash it the next day?

The broader prediction is that whenever an overt subject appears in the second of two TP conjuncts, it bears some kind of focus. This appears to be the case for all exceptions discussed in this paper, and is made plausible by the central role that contrast plays in coordination more generally.

Just as importantly, however, focus is not the whole story here. If there were simply an interpretive requirement that subjects of coordinated clauses be contrastive, we would not expect to see any difference between coordination of TPs and coordination of CPs. It is only when subjects are realized on a single cycle that they are vulnerable to conflation by linearization, and thus only then that focus can play a visible role in insulating the second subject from that conflation. The next section further illustrates the role that syntactic structure plays in this phenomenon, demonstrating that parallel effects can be found in the coordination of other categories, whenever DPs occur at the edge of two coordinated constituents.

3.3. Other non-phase conjuncts

I have argued that the relevant ungrammaticality of coordinated TPs arises because the subjects of those TPs are spelled out on a single phase, where in the absence of contrastive focus they cannot be distinguished from one another by the linearization algorithm. As a consequence, they are treated as a single DP and linearized in their leftmost occurrence.

On this account there is nothing intrinsic to subjects or to clauses that gives rise to the restriction on coreference. Rather, similar effects should arise in non-clausal coordination, if both conjuncts contain DPs not yet spelled out when the larger coordinate structure is created.

Testing this prediction requires that potential conjuncts contain a DP in the right structural position, but also that each conjunct contains enough other syntactic material that coordination is pragmatically feasible. Cases of coordination below a single shared verb provides a promising candidate for this test. This is illustrated in (32) for double object constructions, and in (33) for coordination of small clauses. In both cases the shared finite verb ensures that the conjuncts are smaller than *vP*, necessary to guarantee that the relevant DPs are not insulated within any previously spelled out phase.

- (32) a. Sue [gave Petunia_i a minivan] and [gave her_i the key (as well)]
 b. *Sue gave [Petunia_i a minivan] and [her_i the key (as well)]
 c. Sue gave Petunia [a minivan] and [the key]

- (33) a. Alice [considers Max_i a liar] and [considers him_i a fool as well].
 b. *Alice considers [Max_i a liar] and [him_i a fool as well].
 c. Alice considers Max [a liar] and [a fool as well].

As the pattern of grammaticality in (32) and (33) demonstrates, in this sub-clausal domain we do appear to find a parallel restriction to the one observed in section 2 for clausal coordination. When the verb is repeated, as in the (a) examples, an overt argument is possible in the second conjunct.¹¹

When the verb is not repeated, as in the (b) sentences, the overt argument in the second conjunct is ungrammatical, just as it was in coordinated TPs. Yet smaller conjuncts excluding all shared arguments are once again grammatical, as in the (c) cases, analogous to grammatical VP coordination below a single (shared) subject.

This provides confirmation that the prediction of the analysis developed in this paper is indeed borne out beyond the narrow confines of clausal coordination.

3.4. Summary and return to matrix declarative coordination

This section has argued that cyclic linearization lies at the heart of the restriction seen on subjects in TP coordination. Because the subjects of coordinated TPs are not spelled out prior to the creation of a larger coordinate structure, they are linearized together on the same phase. At the same time, following Richards (2010), the linearization algorithm is unable to distinguish DPs from one another. The consequence is that any DPs spelled out on the same cycle will be indistinguishable from a single DP merged in two positions, and so subjects of two coordinated TPs are treated for the purposes of linearization as a single DP. Subject-oriented focus in the second conjunct is able to lift this effect, however, by requiring that the associate of focus be pronounced in the scope of the operator that binds it.

Before turning in the next section to how this account can be extended to so-called “SLF” coordination in verb-second Germanic languages, it is useful to pause here and comment on how the analysis applies to the matrix coordination of declarative clauses in English, where coreference between subjects is possible.

The focus in this paper has been on questions and embedded clauses, where a visible element in C⁰ usefully disambiguates the size of the coordinated constituents. In declarative coordination such as (34), however, such evidence is unavailable:

- (34) Kim_i visited her parents and (she_i) unexpectedly moved back in with them.
 (= (4))

In such sentences a backwards-referring subject is possible in the second conjunct even without contrastive focus. On the analysis developed here, this requires that the subjects have been spelled out independently on an earlier phase; in other words, it requires that the conjuncts are CPs rather than TPs.

To what extent is this plausible? Assuming even a moderately articulated structure in the left periphery (Rizzi, 1997), it is reasonable to assume that there are projections above C⁰ in matrix clauses. Indeed, if phase heads trigger Spell Out only for their complement, and not of their specifier, it is necessary that a higher head be available to trigger the spelling out of at least interrogative C⁰ in English: Rizzi (2005) proposes

that this is Force⁰, whose own head and specifier remain themselves unpronounced. If even some cases of matrix declarative coordination involve CP conjuncts, such a high phase head can similarly trigger the spell out of the specifier and head of &P itself, accounting for the surface possibility of sentences like (34).

4. Extension: SLF Coordination

This section extends the proposal developed in section 3 to what has been called SLF (*Subjektllücke in finiten Sätzen/Subject Gap in Finite Clause*) coordination in the verb second (V2) Germanic languages (Höhle, 1983, 1990, et seq.).

SLF coordination is characterized by a first conjunct that appears to be a full V2 clause with a non-subject initial topic, while the second conjunct appears to be verb initial (V1) with a subject gap (the construction is not possible in the absence of such a gap).⁵The sentence-initial topic must originate from within the first clause; that is, it cannot have moved ATB from both conjuncts.

- (35) Das Gepäck ließ er fallen und rannte zum Hinterausgang.
 the.ACC luggage let he fall and ran to-the rear-exit
 “He dropped the luggage and ran to the rear exit.” (Heycock and Kroch, 1994)
- (36) In den Wald ging der Jäger und fing einen Hasen.
 in the wood went the hunter and caught a hare
 “The hunter went into the woods and caught a hare.”

The puzzle of SLF coordination is what Johnson (2002) calls the *size paradox*. The subject gap and verb-initial order of the second conjunct seem to argue that it is a sub-clausal constituent, small enough that the subject in the first conjunct is outside the coordinate structure. At the same time, however, the V2 order of the first conjunct, and the absence of reconstructed readings for its subject (expected if the subject had moved out of *vP*), seem to argue for large conjuncts, large enough that each conjunct would be an independent CP (Johnson, 2002, citing Büring and Hartmann 1998).

Existing analyses resolve this paradox in variously odd ways. Heycock and Kroch (1994) propose that SLF coordination involves the coordination of (non-maximal) constituents of different categories: the first conjunct is an I', while the second is a C'. On their analysis, the single overt subject simultaneously satisfies the EPP requirement of Spec-IP for the first conjunct, while also acting as the topic in Spec-CP of the (verb-initial) second conjunct. The coordinate structure must thus project both IP and CP structure simultaneously.

Büring and Hartmann (1998), by contrast, propose that both conjuncts in SLF

⁵Despite no longer being V2, English also exhibits a fossilized version of this construction in the nursery rhyme *The Itsy-Bitsy Spider* (David Pesetsky, p.c.):

- (i) [Down came **the rain**] and [*e* washed the spider out]
 [Out came **the sun**] and [*e* dried up all the rain]

coordination are CPs, but argue that the second of these CPs obligatorily features a subject topic, a topic that (for unclear reasons) undergoes obligatory topic drop.

Johnson (2002), like Büring and Hartmann, proposes that both conjuncts in SLF coordination are of the same category, but argues that they are both verb-initial phrases smaller than TP. Johnson develops an account of the Coordinate Structure Constraint (CSC) that allows non-ATB extraction of the finite verb and a non-subject topic from the first conjunct (to C^0 and Spec-CP, respectively), but nonetheless requires ATB movement of a shared subject to Spec-TP.

All of these approaches face the question of why SLF coordination exhibits variously odd properties in the first place. In the remainder of this section I argue that the answer should be linked to the interpretation of SLF coordination, which always exhibits semantically asymmetric meanings, cases in which the second clause follows temporally or causally upon the first. Bjorkman (2012, 2013) argues that asymmetric interpretations require the coordination of TPs rather than CPs; if true, this predicts that SLF coordination should be subject to the restriction described in this paper, and not allow coreferential subjects. This accounts for the subject gap in the second conjunct. Given these constraints, I argue further that in V2 languages, any non-subject topic in asymmetric coordination will inevitably be possible only with some violation of the CSC, accounting for the necessity of non-ATB movement in SLF structures.

4.1. The link between clause size and the interpretation of coordination

The basic meaning of clausal coordination is often taken to be truth-functional conjunction, \wedge . This meaning is symmetric, in the sense that $P \wedge Q$ means the same thing as $Q \wedge P$. It is well known, however, that coordination is frequently used to express temporally or causally asymmetric meanings, where the relationship of P to Q is not the same as the relationship of Q to P . Representative examples appear in (37).

- (37) a. I turned off the lights and the room went dark.
b. The horse threw Alan and he broke his arm.
c. We sat down and the movie started.

Beyond semantic asymmetry, this use of coordination is syntactically asymmetric: Bar Lev and Palacas (1980) observe that the meaning of the sentences in (37) is not preserved if the order of the conjuncts is reversed, as in (38).⁶This distinguishes coordination from juxtaposition, a point Bar Lev and Palacas use to argue against the view that asymmetric interpretations of *and* arise from the gricean maxim of orderliness (Grice, 1975; Schmerling, 1975): a pragmatic account of this type could not distinguish coordination from syntactically unconnected clauses occurring sequentially in a discourse.

⁶Another syntactic asymmetry observed with temporal and causal interpretations of *and* is that they allow violations of the CSC in which a phrase moves out of one conjunct but not the other. This has been observed especially for VP coordination (Ross, 1967; Goldsmith, 1985; Lakoff, 1986; Postal, 1998), though Culicover and Jackendoff (1997) demonstrate that it is also possible when coordinated clauses are interpreted conditionally.

- (38) a. The room went dark and I turned off the lights.
 b. Alan broke his arm and the horse threw him.
 c. The movie started and we sat down.

Much work on asymmetric coordination has assumed that it has the same semantics — and thus, implicitly, the same syntax — as symmetric coordination. Bjorkman (2013), however, argues for systematic syntactic differences between symmetric and asymmetric coordination, visible in English only in embedded contexts. Asymmetric interpretations appear to require the coordination of smaller clausal constituents, i.e. TPs.

Bjorkman demonstrates this by looking at the interpretations available to embedded coordination, as in (39) and (40). In (39) embedded clauses are coordinated below a single shared C^0 (thus can only be TPs), and the natural causal relationship between the clauses is unavailable if the order of the clauses is reversed.

- (39) *TP coordination: non-equivalent under reversal*
 a. Wallace reported that [the subway broke down] and [he was unable to get to work].
 b. Wallace reported that [he was unable to get to work] and [the subway broke down]

In (40), by contrast, each conjunct contains its own C^0 . Here there is not only a less tight semantic relationship between the two conjuncts, but it is also possible to infer the same relationships between the two clauses even when the order of the conjuncts is reversed (though some may become more or less natural). Bjorkman argues that this is characteristic of the pragmatic inferences available to sequences of clauses, not of the temporal and causal interpretations of asymmetric coordination.

- (40) *CP coordination: equivalent under reversal*
 a. Wallace claimed [that the subway broke down] and [that he was unable to get to work].
 b. Wallace claimed [that he was unable to get to work] and [that the subway broke down]

This forms the basis of Bjorkman’s claim that the interpretation of *and* depends on the syntactic size of its arguments (and presumably on their semantic types). Relevant for our purposes is the observation that TP coordination is required for strongly asymmetric interpretations.

4.2. Back to SLF coordination

SLF coordination is characterized not only by asymmetric interpretations, but also by identity between the (understood) subjects of the two coordinated clauses. If asymmetric interpretations require small (TP) conjuncts, then these two properties of SLF coordination are in conflict, given the argument in section 3 that distinct subjects are possible in coordination only if they are insulated either by focus or below a higher phase head such as C^0 .

In other words, CP conjuncts would be large enough to allow distinct subjects, but too large for asymmetric interpretations, while TP conjuncts would be small enough for asymmetric interpretations but too small for distinct subjects.¹²

This conflict would be resolved by TP conjuncts, but only if the subjects underwent ATB movement to the topic position in Spec-CP — though both conjuncts would moreover have to similarly contain an identical finite verb or auxiliary that would itself move ATB to C^0 . Here, however, the third characteristic of SLF coordination — that it involves a non-subject topic in initial position — becomes relevant. The presence of this topic prevents the subjects from moving ATB, stranding them inside the two conjuncts.

Faced with such a structure, the linearization algorithm will — as argued in section 3 — treat the two clausal subjects as a single element, being unable to distinguish them from one another, and will linearize them in the leftmost of their positions. Unlike in English, where this position is uniformly clause-initial, in V2 languages this surface subject will appear post-verbally, after a fronted finite verb.

The insight this provides for work on SLF coordination, in particular work following Buring and Hartmann (1998)'s proposal of obligatory subject ellipsis (in the form of topic drop), is why SLF coordination would require an unpronounced subject in the second conjunct, and never a gap of any other type.

At least two puzzles nonetheless remain for this approach to SLF coordination. First, it does require non-ATB movement of the initial topic from the first conjunct. Though an adequate explanation of the CSC and its exceptions remains to be found, however, many authors have described non-ATB movement out of a single conjunct as characteristic of various asymmetric coordinate structures (Ross, 1967; Goldsmith, 1985; Lakoff, 1986; Postal, 1998; Culicover and Jackendoff, 1997). Given this, the availability of non-ATB extraction from the initial conjunct in SLF structures is an expected, though ill-understood, property of an asymmetric coordinate construction.

The second, and perhaps more serious, difficulty is the verb-initial word order of the second conjunct. Based on word-order in embedded clauses, we would expect the finite verb to be clause-final in the absence of movement to C^0 . The verb in the first conjunct move to C^0 in a non-ATB manner, but this would not explain the conjunct-initial position of the second verb. At least two solutions to this issue suggest themselves. One could assume that SLF-coordination involves the coordination of at least C' constituents, departing from the strict correlation between asymmetric interpretations and TP conjuncts proposed by Bjorkman (2013), and specifying that C^0 did not trigger spell-out of its complement until after the creation of the larger coordinate structure and subsequent extraction of the topic (so that the two subjects are still realized on the same cycle). As an alternative, one could propose that finite verbs in German move to a higher position in matrix clauses than they do in embedded clauses, even when not moving as far as C^0 itself, and that this higher position is head-initial. Distinguishing between these proposals requires a broader review of the literature on Germanic verb-second word order than is possible here, and must be left for work focusing on SLF-coordination directly.

5. Conclusion

This paper has described a previously unnoticed restriction on coreference between the subjects of coordinated TPs, and has explained the restriction in terms of cyclic linearization. I argued that DPs are treated as indistinguishable by the linearization component. As a consequence of this, two DPs in a coordinate structure cannot be linearized on the same cycle, and are instead treated as a single DP in a multidominant representation. The subjects of coordinated TPs are subject to this restriction because they are not spelled out before the TPs are joined in a coordinate structure; subjects of larger clausal constituents, by contrast, are insulated from interacting because a phase head C^0 triggers a cycle of linearization before the coordinate structure is built. This analysis extends further to illuminate the analysis of SLF coordination, which has presented a paradox for previous analyses but is accounted for naturally on this analysis once we assume an association between asymmetric interpretations for coordination and smaller (i.e. TP) conjuncts.

The analysis developed in this paper further supports a line of research that suggests that post-syntactic components lack access to some syntactic information — specifically that the PF and LF interfaces cannot always distinguish elements that are distinguished by the narrow syntax. This raises further interesting possibilities for the translation properties of the interfaces, and the question of how syntactic structure is not merely manipulated but is transformed by other components of the language system.

Notes

¹Thank you to Caroline Heycock for bringing the relevance of these data to my attention.

²The judgements in (41) and (14) come from a survey of 14 native English speakers, and were earlier reported to me independently by Norvin Richards and Caroline Heycock. Some individuals find these sentences noticeably better than equivalent sentences where the subjects do corefer: this may be because a switch in reference does encourage contrastive focus on the second subject. Such focus appears to ‘insulate’ a pronominal subject from the restriction under discussion, as discussed further below in section 3.

³We will see in section 3.3 that this applies more generally to arguments at the edge of coordinated constituents.

⁴Pesetsky and Torrego (2001) propose that complementizers *that* and *for* are themselves the result of T^0 -to- C^0 movement. If this is correct, the examples in this section of coordination under a shared complementizer are simply another instance of ATB movement. Caroline Heycock (p.c.) points out another case that seems to argue that these effects arise specifically from ATB movement, involving a contrast between *if* and conditional inversion:

- (41) a. If [he had come in] and [he had forgotten to wipe his shoes], I would have been furious.
b. *Had [he come in] and [he forgotten to wipe his shoes], I would have been furious.

If we assume that *if* occupies the same position targeted by verb movement to C^0 (Den Besten, 1983, et seq.), this contrast demonstrates a central role for movement in deriving the generalization. There are some reasons to suppose that *if* may occupy a different (perhaps higher) position than other complementizers, however. In particular, Bjorkman (2012, 2013) shows

that coordination beneath *that* or *for* requires asymmetric (causal or sequenced) interpretations, but notes that coordination below *if* allows the symmetric interpretation of “logical” *and*. The question of why exactly *if* differs from other complementizers is set aside here.

⁵To further guard against a parse in which the second conjunct (but not the first) has a null complementizer, the examples exhibit a causal relationship between the embedded conjuncts. Bjorkman (2013) argues that such readings prefer TP coordination, though they can be pragmatically inferred in cases of CP coordination (as forced in (42b) by the second complementizer).

⁶For concreteness I adopt Johannessen (1998)’s asymmetrical &P representation for coordination, but nothing hinges on the details of this structure.

⁷Richards suggests that in some languages DPs can be distinguished by their formal features, for example Case features, but suggests that this is not possible in English.

⁸This is somewhat in contradiction of work by Citko (2005, 2011), who has proposed that structures such as (41) are simply unlinearizable so long as the shared element occurs *in situ*.

⁹Thanks to Gillian Ramchand for pointing out the relevance of such cases.

¹⁰This maintains the view that subject gaps arise from multidominant structures (or in other instances from sub-clausal coordination), rather than from ellipsis in the second conjunct. An alternative approach could be developed in terms of ellipsis, on the assumption that elided constituents are not subject to linearization, with minimal differences from what is proposed here.

¹¹I assume that the main verb moves to v^0 , and so the (a) examples are analogous to clausal coordination where a separate C^0 occurs in both conjuncts.

¹²VP coordination is also compatible with asymmetric interpretations, but would require not only non-ATB movement of a topic XP to Spec-CP, but also (depending on the exact size of the conjuncts) ATB movement of the shared subject to Spec-TP. While non-ATB movement out of VP conjuncts is well attested, it appears to be impossible to move both ATB and non-ATB from a single conjunct (Postal, 1998).

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