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REGULAR ARTICLE

Subordination and binary branching

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Abstract

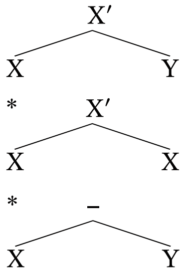
Syntactic representations are overwhelmingly asymmetric and binary branching. We develop an account of this based on the notion that subordination must be licensed through the discharge of a unique selectional requirement. The resulting theory predicts that symmetric structures, if they exist, will allow *n*-ary branching. We argue that this prediction is borne out. (i) Core properties of coordination can be explained if coordinate structures are symmetric. (ii) There is strong evidence that coordinate structures can be *n*-ary branching. This includes new evidence from the interpretation of attributive modifiers in multitermed coordinate structures. Finally, we show that a symmetric account of coordination permits a straightforward explanation of the distribution of coordinators in English.

KEYWORDS
binary branching, coordination, linkers

1 | INTRODUCTION

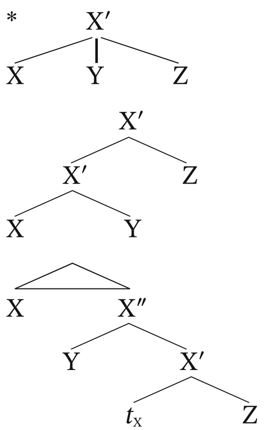
This article is concerned with two constraints that impose asymmetry on syntactic representations. The first is *endocentricity*: a complex category must be projected from exactly one of its daughters, as in (1a). Any other daughters are syntactically subordinate. Endocentricity is in effect a ban on two types of symmetric structure: categories with multiple heads, as in (1b), and categories without a head, as in (1c). In neither of these structures has one daughter been subordinated to the other.

(1) a. b. c.



The second constraint requires that syntactic structures are *binary branching*: that is, a category can have at most two daughters (Kayne 1984). The binary-branching constraint leads to a structural asymmetry between dependents of a head. In the ternary-branching representation in (2a), Y and Z c-command each other, but in the binary-branching representations that replace (2a), either Z asymmetrically c-commands Y, as shown in (2b), or Y asymmetrically c-commands Z, as shown in (2c).

(2) a. b. c.



Both endocentricity and the binary-branching constraint are deeply ingrained in generative grammar and particularly in the Chomskyan tradition. They are often built into the operations that erect structure. For example, the rules of X′ theory determine that every nonterminal node has at most two daughters, one of which is its head. Similarly, in Minimalism, Merge takes two syntactic objects and delivers a new object that inherits its label from one of the input categories (Chomsky 1995).[1]

If we restrict our attention to binary branching for the moment, the standard theory has two key properties: it predicts that binary branching has no exceptions, but it makes no predictions beyond this. This article offers a different perspective. We propose a theory from which it follows that endocentric structures must be binary branching. This is because subordination must be licensed (where subordination is one category being contained in the projection of

[1]Chomsky 2013 separates Merge from the algorithm responsible for labeling. However, labeling is still obligatory, and the label must be found locally to the node that is to be labeled. Taken together, these constraints yield endocentricity.

another) and the system of licensing requires binary branching. Our proposal has a very different empirical profile from the standard Merge-based theory. First, it imposes restrictions beyond binary branching per se. For instance, it rules out movement to a θ position. Second, it predicts an important exception: should there be any nonendocentric syntactic structures, then these are permitted to be *n*-ary branching. We argue that coordination is such a structure. Coordinate structures can be shown to be symmetric, and there is strong evidence that they need not be binary branching.

The article is organized as follows. In section 2, we propose a theory of syntactic representations from which it follows that subordination requires binary branching. The proposal is rooted in a particular encoding of syntactic dependencies (Neeleman & Van de Koot 2002 and 2010) and a generalized version of the θ criterion, one that regulates the licensing of endocentric structures (i.e., subordination). In section 3, we introduce and motivate a symmetric analysis of coordination. We treat coordination as mutual adjunction; that is, each conjunct is adjoined to every other conjunct. This captures a number of puzzling properties of the construction (such as its behavior under selection). In section 4, we show that, given our implementation of the binary-branching constraint, an analysis of coordination as mutual adjunction automatically allows *n*-ary branching. We also demonstrate that an *n*-ary-branching structure is necessary to account for certain interpretive properties of multitermed coordination. In section 5, we show how the hypothesis that coordinators are linkers, in conjunction with the claim that coordination is mutual adjunction, permits a straightforward Optimality-Theoretic account of the distribution of these elements in English. We summarize our main conclusions in section 6.

2 | TOWARD AN ACCOUNT OF THE BINARY-BRANCHING CONSTRAINT

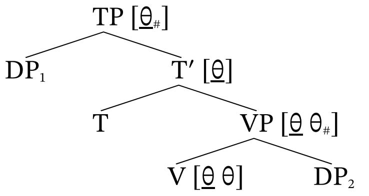
2.1 | The Generalized Licensing Criterion

It is a longstanding assumption that structure must be licensed, at least in some circumstances. Already in Government and Binding Theory, the θ criterion stated that an argument can be present if and only if a unique θ role is assigned to it. Below, we will argue that the θ criterion is a specific instantiation of a more general constraint that connects subordination to grammatical dependencies.

In order to develop this proposal, we must first determine how the syntax encodes grammatical dependencies. We follow Neeleman & Van de Koot 2002 and 2010 in representing such dependencies through a selectional requirement introduced by the dependent category and copied upward along a connected path of nodes until it is satisfied in the node that immediately dominates the antecedent category. This method of encoding is the same for all syntactic dependencies; differences between dependencies are captured in terms of the selectional requirement involved.

As an example, consider the structure in (3), in which a verb selects a subject and an object. The verb introduces an internal θ role, represented simply as θ, that is copied to VP and satisfied by the object, and it also introduces an external θ role, represented as $\underline{\theta}$, that is copied upward to TP and satisfied by the subject.

(3)



This method of encoding thematic relations (and other dependencies) is convenient in that it allows us to state the generalizations we are interested in transparently. These same generalizations could perhaps be formulated using alternative notations, but certainly much less transparently.[2]

As mentioned, we take it that the θ criterion should be subsumed under a more general principle, which we call the Generalized Licensing Criterion. Part A of this principle states that structure must be licensed whenever a category is syntactically subordinated to another category (that is, embedded in the projection of that category):

(4) Generalized Licensing Criterion, part A (to be revised)
Subordination of YP to X^n requires a licensing relation between X^n and YP.

The rationale for this constraint is that the syntactic combination of two categories does not in and of itself create an asymmetry between those categories. The introduction of asymmetry through subordination is an additional structural property, and we propose that it is this additional property that must be licensed.

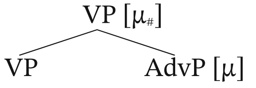
The constraint expressed by (4) is hardly novel. It makes explicit the notion that subordination goes hand in hand with the assignment of a grammatical function. This assumption is implicit in many theories of syntax. In Minimalism, it is often stated in terms of feature valuation. For instance, Wurmbrand 2014's Merge Condition states that merger of α and β is licit only if α can value a feature of β (see also Collins 1997, Chomsky 2000, and Abels 2003, among others). Given that Merge is understood to be an operation that subordinates one category to another, the effects of the Merge Condition and the Generalized Licensing Criterion overlap to a significant degree.

The consequences of (4) depend on how licensing relations are characterized. It is uncontroversial that selection of an argument is one such relation. Thus, satisfaction of θ in (3) licenses subordination of DP_2 to V, while subordination of DP_1 to T′ is licensed by satisfaction of $\underline{\theta}$. But it is not necessary that the selectional requirement that licenses subordination be introduced by the projecting node. It is widely assumed, for example, that modifiers select the category they adjoin to. This is the standard view in semantics, as made explicit in Maienborn 2001, with reference to Higginbotham 1985, Parsons 1990, and Heim & Kratzer 1998, among others (see also Ernst 2002). A temporal modifier, for example, is semantically represented as selecting a predicate. It yields an output in which the temporal variable of that predicate (t) is restricted to the interval mentioned by the modifier. Thus, the semantics of *yesterday* can be written as $\lambda P\, \lambda t\, [P(t)\ \&\ t \subseteq \text{yesterday}_c]$. We

[2]The represention in (3) is based on Government and Binding–style θ-role assignment. Nothing hinges on this. Thematic relations could also be encoded through functional heads attached in the verbal spine. In such an encoding, each functional head selects, on the one hand, the argument and, on the other hand, a node in the verbal extended projection. This makes the additional structure compatible with the Generalized Licensing Criterion below.

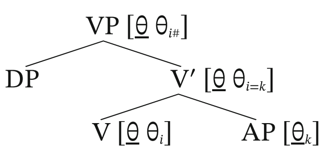
assume that this selectional relation is syntactically encoded in much the same way that thematic relations are. In particular, we assume that it is mediated, as shown in (5), through a selectional requirement μ, which is introduced by the modifier as a syntactic representation of $\lambda P\,[\ \ldots\ P\ \ldots\ ]$ and satisfied by the projecting category. Its satisfaction licenses subordination of the modifier to VP.[3]

(5)



Both (3) and (5) are licensed through the *satisfaction* of a selectional requirement. However, we assume that subordination may also be licensed through *identification* of selectional requirements (Higginbotham 1985). This is of particular relevance for secondary predication. As an example, consider the object-oriented depictive *raw* in *She ate the fish raw*. This sentence expresses that the fish was raw while she ate it, which can be captured by identification of the AP's external θ role and the verb's internal θ role, as in the partial representation in (6), which corresponds to the lower part of a VP-shell structure, with *the fish* attached as specifier of VP. The relevant θ roles are subscripted *i* and *k*, and identification is marked by *i*=*k* in the subscript of the resulting θ role. (For related discussion on secondary predication, see Williams 1994 and Rothstein 2017.)

(6)



Subordination of DP to V′ is licensed through satisfaction of a θ role. Subordination of AP to V cannot be licensed in this way, but in Higginbotham's terminology it still leads to the *discharge* of a θ role, since the total number of θ roles in V′ is two whereas the total number in V and AP combined is three. We therefore propose that subordination of YP to X^n must always lead to the discharge of a selectional requirement and that there are three modes of discharge: satisfaction by YP, satisfaction by X^n, and identification.

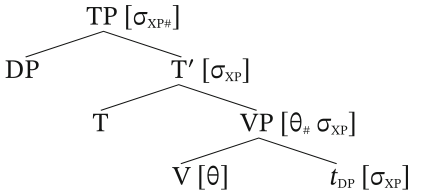
Not all syntactic dependencies can be used to license subordination. For example, it is not possible to project a position that hosts a DP if that DP merely binds an anaphor or pronoun, acts as a controller, or creates an environment in which a negative-polarity item can appear. Thus, the effects of the Generalized Licensing Criterion depend not only on the assumed modes of discharge but also on which dependencies have a licensing capacity.[4]

So far, we have assumed that this set contains θ and μ. However, subordination can also be licensed through movement. Consider (7). While the substructure hosting the trace of

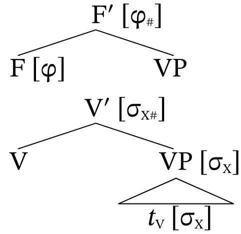
[3]It is possible that μ represents a family of selectional requirements satisfied by different classes of attachment sites. We abstract away from this here. For categories that can only function as modifiers, μ has its source in their lexical entry. For categories that can optionally function as modifiers, μ is introduced by a silent MOD operator that turns the category in question into a modifier (see Maienborn 2001 for a proposal along these lines).

[4]Neeleman & Van de Koot 2002 argues that syntactic binding is also encoded through a selectional requirement. However, the way this selectional requirement is defined implies that it cannot license subordination.

DP is licensed through θ-role assignment, subordination of the moved DP in its landing site must somehow be licensed through chain formation. Within the current proposal, this can be achieved if phrasal movement is encoded through a selectional requirement σ_{XP}, which is introduced by the trace, copied up the tree, and satisfied by the moved category (σ_{XP} is comparable to the slash features of Generalized Phrase-Structure Grammar and Head-Driven Phrase-Structure Grammar). Thus, subordination of DP to T′ in (7) is licensed because DP satisfies σ_{XP}.[5,6]

(7)


Two further subordination-licensing selectional requirements must be postulated to deal with functional structure. Subordination of a category to a functional head, as shown in (8a), is licensed by a selectional requirement, *φ*, which behaves like a θ role: it is introduced by the head and satisfied by the head's complement.[7] Other functional projections host moved heads. Such projections are created, as shown in (8b), through *self-attachment*: the head moves and reprojects (Ackema et al. 1993, Koeneman 2000, and Bury 2003, among others).[8] Like phrasal movement, head movement must be encoded though a selectional requirement. We label this selectional requirement σ_X (to distinguish it from σ_{XP}). Like σ_{XP} it connects the trace to the landing site, and like σ_{XP} its satisfaction licenses the subtree containing the moved category. However, whereas σ_{XP} percolates up from the projecting node, σ_X percolates up from a nonprojecting node (VP in (8b)). It shares this property with μ, the selectional requirement that encodes modification.

(8) a. b.


[5]σ must represent a family of selectional requirements, in order to distinguish between different types of phrasal movement. A proposal can be found in Neeleman & Van de Koot 2010 (based on Williams 2003 and Abels 2008).
[6]The claim that subordination of DP to T′ is licensed in this way does not imply that movement is a free operation. The fact that the moved category satisfies the Generalized Licensing Criterion in its landing site through σ_{XP} leaves unaffected the requirement that movement must be triggered and meet a range of well-formedness constraints.
[7]Again, *φ* is likely to represent a family of selectional requirements satisfied by different types of complement.
[8]It is possible that the head projects different information in its underlying and derived positions (Koeneman 2000). Thus, V-to-T could involve movement of a complex category V + T, with tense features projecting after movement.

We can now refine the definition of part A of the Generalized Licensing Criterion:

(9) Generalized Licensing Criterion, part A (final version)
Subordination of YP to X^n requires a relation between X^n and YP that discharges a selectional requirement α, where $\alpha \in \{\theta, \mu, \sigma_{XP}, \varphi, \sigma_X\}$.

The set of selectional requirements mentioned in the Generalized Licensing Criterion is unlikely to be exhaustive. If additional syntactic dependences are required for the analysis of certain phenomena, then corresponding selectional requirements must be introduced. Thus, our proposal requires a particular encoding of syntactic dependencies, but the typology of dependencies is an independent topic of research.

Part A of the Generalized Licensing Criterion is concerned with the conditions under which endocentric structures can arise: they invariably involve the discharge of a selectional requirement (broadly construed to include a range of attributes that encode syntactic dependencies). This constraint does not by itself guarantee binary branching. However, we now turn to part B of the Generalized Licensing Criterion, which in combination with part A does have this effect.

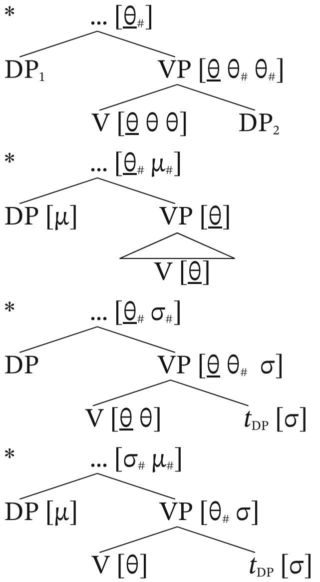
The standard θ criterion not only requires that every argument receives a θ role but also forbids assignment of multiple θ roles to a single position. In other words, thematic licensing must be one to one. Within the current framework, the second part of the θ criterion can be stated as a ban on nodes specified as $[\theta_\# \ \theta_\#]$. But given that θ is a member of a larger set of selectional requirements that license subordination and given that discharge comes in multiple types, we should expect a broader restriction to hold, one that requires the creation of any subordinating node to have a unique license. This constraint is formulated as follows.

(10) Generalized Licensing Criterion, part B
No node created by subordination may be the locus of discharge of more than one selectional requirement taken from $\{\theta, \mu, \sigma_{XP}, \varphi, \sigma_X\}$.

Part B of the Generalized Licensing Criterion rules out a wide array of structures. It comprises 15 cooccurrence restrictions between discharged selectional requirements, many of which have been tacitly or explicitly assumed in the literature as constraints on the combination of syntactic functions. For example, to the best of our knowledge, no one has argued that a functional head can simultaneously be a modifier. This combination of functions is ruled out by (10), since it would require a node specified as $*[\mu_\# \ \varphi_\#]$.

It would take us too far afield to discuss all 15 cooccurrence restrictions that emerge from (10). However, we will look in more detail at the subset that involves the phrasal dependencies encoded by θ, μ, and σ_{XP}. The constraint in (10) rules out nodes specified as (i) $[\theta_\# \ \theta_\#]$ (as already mentioned), (ii) $[\theta_\# \ \mu_\#]$, (iii) $[\theta_\# \ \sigma_{XP\#}]$, (iv) $[\mu_\# \ \sigma_{XP\#}]$, (v) $[\mu_\# \ \mu_\#]$, or (vi) $[\sigma_{XP\#} \ \sigma_{XP\#}]$. In other words, it predicts (i) that no category may simultaneously receive multiple θ roles, thus ruling out configurations like (11a); (ii) that no category may simultaneously be an argument and a modifier, thus ruling out configurations like (11b); (iii) that movement to a thematic position is impossible, thus ruling out (11c); (iv) that modification after movement is impossible, thus ruling out (11d); (v) that no category may be modified twice simultaneously; and (vi) that no category may head two independent phrasal-movement chains. We return to the last two claims in section 2.2.

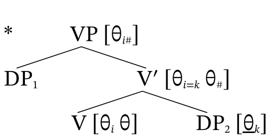
(11) a. *



Some of the empirical implications of part B of the Generalized Licensing Criterion are clearly correct; properties (i), (ii), and (iv) are widely assumed to hold. Property (iii), however, is controversial. The movement theory of control relies precisely on the assignment of θ roles after movement (Hornstein & Polinsky 2010). Put differently, if the Generalized Licensing Criterion is correct, then the movement theory of control must be rejected. We cannot explore this consequence here, but we point to work by researchers who have argued against the hypothesis that control involves movement (Landau 2003, Landau & Bobaljik 2009, and Wood 2012). We would instead analyze control as a dependency that lacks licensing capacity; see Wurmbrand 2002 for a proposal compatible with the theory developed here.

Since θ-role identification falls under the Generalized Licensing Criterion, we further capture the fact that a DP argument cannot simultaneously act as a depictive. Even though there are DP depictives, as in *John left a happy man*, an example like *John hugged a happy man* cannot be analyzed with *a happy man* acting simultaneously as object and as a depictive associated with *John*. The subordination of DP_2 to V in (12) violates (10) because it involves the discharge of two θ roles, one through assignment and the other through identification.

(12) *



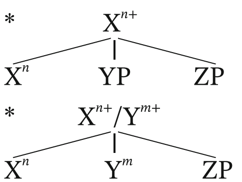
The fact that identification is a form of discharge imposes additional constraints on possible syntactic structures, beyond the cooccurrence restrictions that hold of satisfied selectional requirements. How many structures are excluded depends on which constructions involve discharge through identification, which is an open (empirical) question. However, we will discuss a few additional cases in section 2.2.

2.2 | The source of the binary-branching constraint

Both part A and part B of the Generalized Licensing Criterion are independently motivated. Part A is necessary to explain why subordination requires a syntactic dependency between the subordinating and subordinated categories. Part B is necessary to exclude unattested combinations of syntactic functions. However, as we now show, the effects of the Generalized Licensing Criterion go beyond these facts. The constraint explains why structure created by subordination can be at most binary branching.

Consider the representations in (13). In (13a), two categories are subordinated to the same nonmaximal projection; in (13b), two nonmaximal projections subordinate the same category.

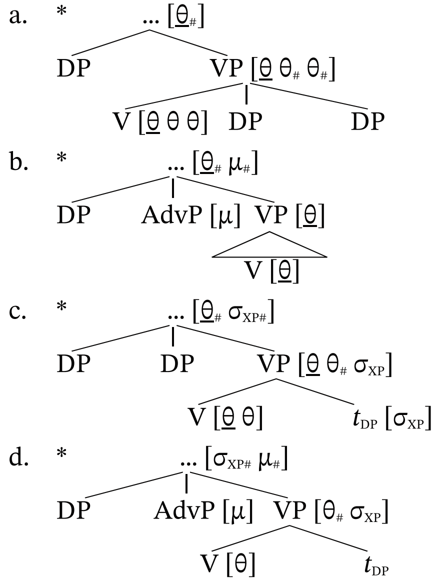
(13) a.
b.



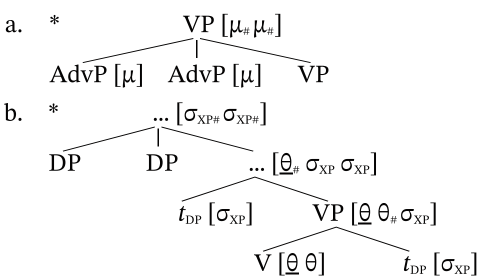
In both representations, there are two pairs consisting of a projecting item and a nonprojecting item. In (13a), these pairs are $\langle X^n, YP\rangle$ and $\langle X^n, ZP\rangle$; in (13b), they are $\langle X^n, ZP\rangle$ and $\langle Y^m, ZP\rangle$. According to part A of the Generalized Licensing Criterion, each pair must be licensed through the discharge of a selectional requirement, which implies that in (13a) and (13b) two selectional requirements must be discharged. But according to part B of the Generalized Licensing Criterion, no node created by subordination may be the locus of discharge of more than one selectional requirement. Hence, subordination must create binary-branching structures.

Although this argumentation covers all relevant cases, it may be helpful to consider specific examples of illegitimate ternary-branching structures.

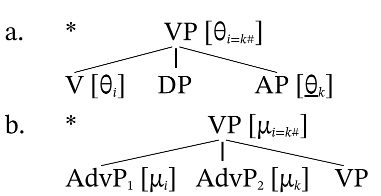
To begin with, the ban on nodes specified as $[\theta_{\#}\ \theta_{\#}]$ implies not only that an argument may not receive two thematic roles (see (11a)) but also that a ditransitive verb cannot simultaneously assign two thematic roles in the ternary-branching structure in (14a). In the same vein, it is not possible to create a ternary-branching structure by merging an argument in a position that is simultaneously sister to a predicative category and to a modifier. As shown in (14b), this would imply creation of a node specified as $[\underline{\theta}_{\#}\ \mu_{\#}]$. It is also not possible to move a DP to a position that is simultaneously sister to a node in the verbal spine and sister to an argument, leading to the creation of a node specified as $[\underline{\theta}_{\#}\ \sigma_{XP\#}]$, as in (14c), or to a position that is simultaneously sister to a modifier and sister to a node in the verbal spine, leading to the creation of a node specified as $[\sigma_{XP\#}\ \mu_{\#}]$, as in (14d).

(14)


Furthermore, ternary-branching structures containing two modifiers, as in (15a), are ruled out, and so are structures in which two moved categories end up as sisters, as in (15b).

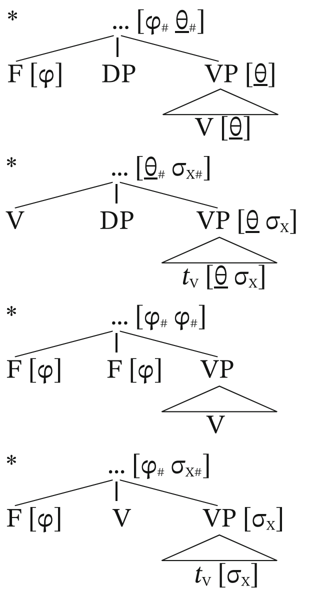
(15)


The examples above involve the satisfaction of selectional requirements, but (10) also restricts identification. Thus, it is not possible to attach an object and an object-oriented depictive in a ternary-branching structure. The structure (16a) requires the discharge of two selectional requirements: θ is identified with θ (as required if subordination of AP to V is to be licensed), and θ is satisfied (as required if subordination of DP to V is to be licensed). In general, violations of part B of the Generalized Licensing Criterion cannot be circumvented through identification. Consider (16b) as a further example. In contrast to (15a) only one instance of μ is satisfied in the root VP. However, that instance of μ is created through identification of the selectional requirements of $AdvP_1$ and $AdvP_2$, so that the top node of (16b) is still the locus of discharge of two selectional requirements.

(16)


The account extends straightforwardly to structures containing a functional head. Such a head cannot be part of a ternary-branching structure containing some XP in addition to the category the head selects. This is because subordination of that XP must also be licensed, resulting in a node in which two selectional requirements are discharged. We illustrate this in (17a) for structures in which a base-generated functional head combines with a VP predicate and its external argument. The structure (17b) is a variant in which the functional head is created by movement. A functional head also cannot be part of a ternary-branching structure together with a second functional head, whether base generated, as in (17c), or moved, as in (17d), since in the resulting structures the root node is the locus of discharge of φ and a second selectional requirement.

(17) a. b. c. d.



Thus, part A and part B of the Generalized Licensing Criterion jointly explain why subordination cannot create ternary-branching structures. This is conceptually pleasing, since it removes the necessity to state the ban on *n*-ary branching as a constraint on the input of Merge. Not only that, the proposal is more open to falsification than the requirement that Merge operates on exactly two syntactic objects. It cannot be correct if we find instances of subordination in which multiple selectional requirements are discharged or in which no selectional requirements are discharged at all.

We have already mentioned control as a potential counterexample of the former type (on the movement theory of control). A counterexample of the latter type may be presented by expletives. These elements are commonly analyzed as items that fill a syntactic position but do not have a semantic relationship with the rest of the clause. If the lack of such a relationship were to translate into a lack of syntactic selection, expletives would falsify our proposal: they would be subordinated without a license. We can see three potential solutions (other than introducing an ad-hoc EPP-style selectional requirement on T).

First, an expletive could be a semantically bleached argument: it could be selected but lack semantic content. This would lead to a well-formed structure if the θ role assigned to the expletive is a “pseudo θ role” (Chomsky 1981) or if the expletive can acquire content through association with some other category. Assignment of a pseudo θ role provides a straightforward account of *it* expletives that appear as subjects of weather verbs, whereas *it* expletives linked to a CP (as in *it seems true that* …) may involve the expletive acquiring content (Bennis 1986 and Ruys 2010, among others). There is a parallel vein in the literature on *there* expletives (see Williams 1994, Hazout 2004, J. Hartmann 2008, and Van Craenenboeck 2020).

Second, an expletive could be a bleached modifier. That is, it could select the category it attaches to but not provide the kind of semantic specification typical of regular modifiers. Bennis 1986 identifies Dutch expletive *er* as a candidate for this type of analysis (treating it as an adverbial that marks an empty presupposition set). A related proposal can be found in Van Craenenbroeck 2020, where some *there* expletives are treated as locative modifiers with reduced semantic content.

Finally, an expletive could be a bleached predicate. On this view, the expletive θ marks an argument and subsequently moves into the subject position, on a par with what happens in locative inversion (Den Dikken 1995, Moro 1997, and J. Hartmann 2008).

In sum, although we cannot do justice to the extensive literature on expletives, we may conclude that there are ways in which they can be accommodated in the theory outlined above.

3 | COORDINATION AS A SYMMETRIC STRUCTURE

We have argued that the ban on *n*-ary branching follows from the independent constraint according to which subordination requires licensing. Hence, we expect to find *n*-ary-branching configurations where structure is generated without subordination. In this section we argue that coordination fits the bill.

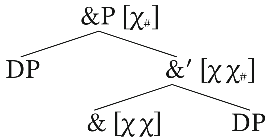
3.1 | Coordination and the Generalized Licensing Criterion

On our proposal, coordination cannot be reduced to subordination. This is because a subordination analysis of coordination leads to fully acceptable structures in which either part A or part B of the Generalized Licensing Criterion is violated. We first consider structures in which part A is at stake.

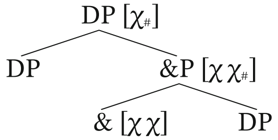
Coordination cannot involve subordination of one conjunct to another. This is because it is possible to coordinate categories that do not introduce any selectional requirements (namely gapless arguments, as in *John and Mary*). In such structures, subordination of one conjunct to another would violate part A.

Hence, reducing coordination to subordination is only possible if the coordinator is characterized as introducing multiple selectional requirements. In (18a), the coordination *Thelma and Louise* is analyzed as headed by the coordinator (Munn 1987, Kayne 1994, Zoerner 1995, Johannessen 1998, and De Vries 2005, among others). In (18b) it is analyzed with the second conjunct an adjunct to the first (Munn 1992, 1993, Bošković & Franks 2000, K. Hartmann 2000, and Zhang 2010, among others). Selectional requirements introduced by the coordinator are represented by χ.

(18) a.



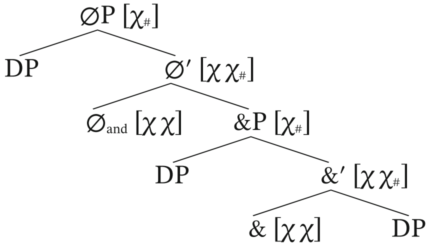
b.



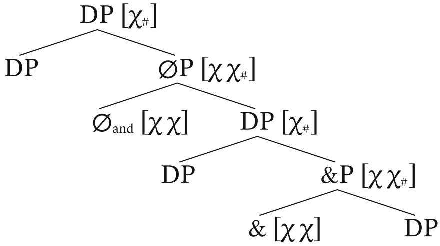
As they stand, these analyses are self-defeating. Given that an arbitrary number of conjuncts can be added without this requiring additional coordinators, the coordinator must be permitted to contain an arbitrary number of selectional requirements, all but two of which are optional. This makes the claim that conjuncts are selected by the coordinator close to vacuous.

In order to sidestep this problem, one could assume that a null coordinator is added for every conjunct beyond two. This coordinator takes a coordinate structure as its first argument and the additional conjunct as its second argument (Zoerner 1995 and De Vries 2005). In other words, *Hal, Thelma, and Louise* is analyzed as [*Hal* [$\emptyset_{\text{and}}$ [*Thelma* [*and Louise*]]]]. Such an analysis can again be instantiated through full projection of the coordinator, as in (19a), or through adjunction, as in (19b).

(19) a.



b.



The main obstacle that this analysis faces is how to account for the distribution of overt and covert coordinators. This issue comes in two parts. First, if there is a single overt coordinator, it must attach to the final conjunct. Thus, [*Hal* [$\emptyset_{\text{and}}$ [*Thelma* [*and Louise*]]]] is grammatical, but *[*Hal* [*and* [*Thelma* [$\emptyset_{\text{and}}$ *Louise*]]]] is not. It is not clear why this should be so. Second, there must be a covert disjunctive coordinator in order to account for examples like *Hal, Thelma, or Louise*. However, it is not possible for this coordinator to combine with a conjunctive coordinate structure (*Hal, Thelma, and Louise* cannot mean *Hal or Thelma and Louise*) or for the covert conjunctive coordinator to attach to a disjunctive coordinate structure (*Hal, Thelma, or Louise* cannot mean *Hal and Thelma or Louise*).

Zoerner 1995's account for these observations is that covert coordinators are landing sites for LF raising of the overt coordinator. Thus, at LF *Hal, Thelma, and Louise* looks like [*Hal* [*and* [*Thelma* [t_{and} *Louise*]]]]). On this account the "no-mixing" restriction follows straightforwardly, while the position of the overt coordinator is a result of the covert nature of the movement. However, the account reintroduces the problem that the coordinator must have an arbitrary number of selectional requirements. It assumes—unproblematically—that a coordinator selects a complement and a specifier. It also assumes—highly problematically—that these selectional requirements are reactivated after each step of coordinator raising. This is not what happens in other head-movement chains. The θ roles that a verb assigns in VP cannot be assigned a second time after verb raising. Reactivation can be avoided by assuming that a coordinator contains an arbitrary number of optional selectional requirements (two of which are "consumed" in each head position). But this is the exact same problematic hypothesis that we encountered before. In sum, argument coordination can only adhere to part A of the Generalized Licensing Criterion at the cost of assumptions about selection that seem undesirable.

Other grammatical coordinate structures violate part B of the Generalized Licensing Criterion if analyzed as subordination. A case in point is (20), where the verbs *give* and *lend* are coordinated. Since each of these verbs is triadic, coordination involves the discharge of no fewer than three θ roles through identification.

(20) Susan [gave$_V$ or lent$_V$] her two best friends all of her mother's books.

The only way to avoid this conclusion is to argue that examples like (20) involve phrasal coordination, with the surface form derived through some form of ellipsis:

(21) Susan [[$_{VP}$ gave ~~her two best friends~~ ~~all of her mother's books~~] or [$_{VP}$ lent her two best friends all of her mother's books]].

The question of whether coordination of heads (and of other nonmaximal categories) exists is familiar territory, sometimes discussed under the heading of "bar-level sharing." Some authors have argued against coordination of nonmaximal categories (Kayne 1994 and Wilder 1997), but there is general consensus that it must be permitted (Borsley 2005, De Vries 2005, and Zhang 2010). There are two arguments against reducing coordination of nonmaximal categories to phrasal coordination plus ellipsis.

For a start, there may be a mismatch between the interpretations of the purported underlying and derived structures. For example, (21) implies that it is either the case that all the books were given or that all the books were lent, but (20) permits a construal in which some books were given and some books lent. Borsley 2005: 471 makes a similar point (see also Zhang 2010). Borsley notes that in (22a) there are 16 tunes involved, while there are 32 involved in its putative source in (22b).

(22) a. Hobbs whistled and hummed a total of 16 tunes.
b. Hobbs whistled ~~a total of 16 tunes~~ and hummed a total of 16 tunes.

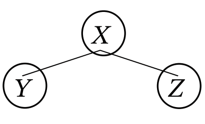
In addition, the rules required to derive (20) from (21) are not well motivated. English does not have a general rule of backward ellipsis, given the ungrammaticality of (23a). This leaves (multiple) right-node raising as the only feasible option for deriving (20). However, examples like (20) lack the tell-tale intonation of right-node raising. Moreover, while right-node raising of pronouns is awkward (Bresnan 1974: 615), examples like (23b) are unobjectionable.

(23) a. *Susan [[$_{VP}$ gave ~~her two best friends~~ all of her father's records] or [$_{VP}$ lent her two best friends all of her mother's books]].
b. She [gave$_V$ or lent$_V$] it to him.

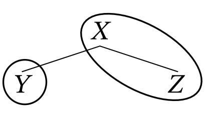
In conclusion, a subordination analysis of coordination leads to violations of part A and part B of the Generalized Licensing Criterion in fully acceptable sentences. This implies that coordination cannot be reduced to subordination. We instead propose an analysis of coordination that characterizes the structure as symmetric.

3.2 | Coordination as mutual adjunction

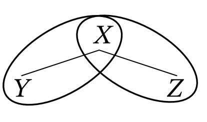
We analyze coordination as a structure of mutual adjunction (see also Cormack & Smith 2005 and Philip 2012). What this means is that the top node of a coordinate structure is a segment shared by multiple categories. (On segments, see May 1985, Chomsky 1986, Kayne 1994, and Truckenbrodt 1999.) Consider a structure $[_X\ Y\ Z]$. If *X*, *Y*, and *Z* form three distinct categories, as in (24a), we are dealing with complementation or specification. If *X* and *Z* are segments of the same category while *Y* forms a category on its own, as in (24b), we are dealing with adjunction (with *Y* adjoined to *X*-*Z*). Finally, if *X* simultaneously functions as the top segment of two complex categories, *X*-*Y* and *X*-*Z*, as in (24c), then *Y* and *Z* are coordinated.

(24) a.


Complementation, specification

b.


Adjunction

c.


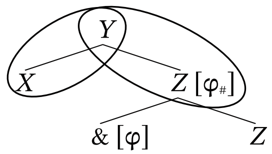
Coordination

The analysis implies that in a coordinate structure multiple categories occupy the same syntactic position. They can do so since they are rooted in the same segment. Thus, the proposal maximally exploits the category–segment distinction to accommodate what is special about coordination.

We should stress that we analyze coordination as mutual adjunction and not as mutual modification. Adjunction is a syntactic configuration; modification is a grammatical dependency. It is true that modifiers are adjuncts that select the category they attach to, but not every adjunct is a modifier. For example, a constituent that moves and adjoins does not select the category it attaches to, and neither does a secondary predicate (on the analysis in section 2).

If coordination is mutual adjunction, the structure cannot be headed by the coordinator, which must hence be assigned a different function, an issue explored in section 5. For now, we simply stipulate that in English (and other VO languages) a coordinator must be attached to the final conjunct and can optionally be attached to any medial conjuncts. Unless otherwise indicated, this generalization will be adhered to in subsequent tree structures (see (28), for instance). We further assume that coordinators are functional heads that select the conjunct they are attached to and pass on all the properties of their complement (that is, they are full functors; see section 5 for more detailed discussion):

(25)



Recall that the Generalized Licensing Criterion applies to structures of subordination. Whenever a category is subordinated to another, it must be assigned a syntactic function through the discharge of a unique selectional requirement. In (24c), there is no subordination, and hence there is no demand for a selectional requirement to be discharged nor for any discharge to be limited to a single selectional requirement. This straightforwardly permits coordination of arguments (without discharge) and coordination of transitive verbs (with multiple discharge through θ identification).

The exact empirical consequences of our proposal depend on when nodes are allowed to be construed as segments of the same category. Central to the notion of multisegmented categories is the requirement that segments have certain properties in common. We propose the following definition.

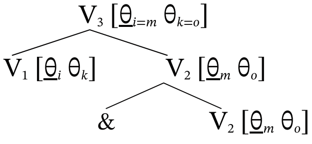
(26) A node α is part of the same category as a node β that it immediately dominates iff (i) the categorial features of α are a subset of those of β and (ii) α and β are identical in arity.

It is uncontroversial that this definition is met by the adjoined-to category in an adjunction structure. As we now show, it also regulates coordination.

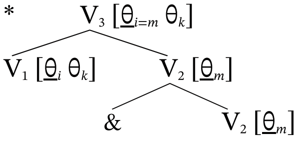
To begin with, the two verbs in (27a) constitute a well-formed coordinate structure. V_1, V_2, and V_3 are all transitive, and so V_1-V_3 and V_2-V_3 can both be construed as categories: see (28a). By contrast, the two verbs in (27b) cannot join in a coordinate structure. If V_3 is transitive, it can form a category with V_1 but not V_2: see (28b). If it is intransitive, it can form a category with V_2 but not V_1: see (28c).

(27) a. I saw him [$_{V_3}$ [$_{V_1}$ buy] and [$_{V_2}$ read]] a book.
b. *I saw him [$_{V_3}$ [$_{V_1}$ buy] and [$_{V_2}$ sleep]] a book.

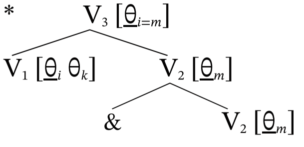
(28) a.



b. *



c. *

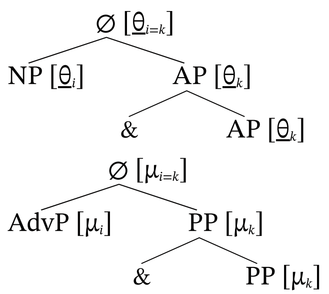


In (26), we have replaced the standard requirement that segments have the same categorial features with a subset requirement. This does not affect the syntax of standard adjunction structures. However, it allows for coordination of unlike categories (on which see Sag et al. 1985 and Bayer 1996), as in the following.

(29) a. Danny became [[$_{\text{NP}}$ a political radical] and [$_{\text{AP}}$ very antisocial]].
b. We walked [[$_{\text{AdvP}}$ slowly] and [$_{\text{PP}}$ with great care]].

Consider the structures in (30), which represent the coordinations in (29). Given that the empty set of categorial features is a subset of every set of categorial features, the top node in (30a) can be construed as being part of two multisegmented categories, Ø-NP and Ø-AP, as required for coordination. Similarly, the top node in (30b) can be construed as belonging to Ø-AdvP and Ø-PP.

(30) a. b.



This analysis makes an important prediction about the behavior of unlike coordination under selection. Suppose that any category attached in a selected position must meet the selecting head's requirements. Usually, there is only one such category. However, when the head combines with a coordinate structure, it combines with as many categories as there are conjuncts. If each of these must be compatible with the selecting head, it follows that selected coordinate structures, like nonselected ones, are subject to the following generalization.

(31) 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 & Pullum 2002: 1323)

For example, a head that subordinates the structure in (30a) in effect combines with two categories (Ø-NP and Ø-AP). It follows that only heads that can combine with NPs and APs in the first place can take (30a) as their complement.

With this in mind, consider the c-selectional properties of *become*. This copula selects nominal and adjectival predicates but not PPs. Assuming that selection for a predicate is encoded through a selectional requirement π, we may specify the lexical entry of *become* as follows.

(32) [π]; if a category C satisfies π, then $C \in \{\text{N, A}\}$.

As a consequence, (29a) and (33a) are ruled in (since both Ø-NP and Ø-AP meet the restriction in (32)), but (33b–e) are ruled out (since Ø-PP violates the restriction in (32)).

(33) a. Danny became [[$_{AP}$ very antisocial] and [$_{NP}$ a political radical]].
b. *Danny became [[$_{PP}$ under suspicion] and [$_{NP}$ a political radical]].
c. *Danny became [[$_{NP}$ a political radical] and [$_{PP}$ under suspicion]].
d. *Danny became [[$_{PP}$ under suspicion] and [$_{AP}$ very antisocial]].
e. *Danny became [[$_{AP}$ very antisocial] and [$_{PP}$ under suspicion]]

The constraint according to which all conjuncts must be compatible with the selectional properties of the local head extends beyond category. A case that does not involve selection for category is identified in Pollard & Sag 1987, where it is noted that the verb–particle combination *end up* selects an *-ing* form while *turn out* selects a *to* infinitive. These selectional requirements affect both conjuncts in the examples in (34) and (35).

(34) a. Hobbs turned out to like Rhodes and to hate Barnes.
b. *Hobbs turned out to like Rhodes and hating Barnes.
c. *Hobbs turned out liking Rhodes and to hate Barnes.

(35) a. Hobbs ended up liking Rhodes and hating Barnes.
b. *Hobbs ended up liking Rhodes and to hate Barnes.
c. *Hobbs ended up to like Rhodes and hating Barnes.

The generalization in (31) does not follow in any obvious way from the claim that coordination is asymmetric. If the coordinator were a regular functional head taking the final conjunct as its complement and the initial conjunct as its specifier, then only the categorial features of the final conjunct would percolate up (Grimshaw 2005). This would lead us to expect that only the final conjunct must be compatible with the verb's selectional properties. If the coordinator headed an adjunct, as proposed in Munn 1992 and 1993, then only the categorial features of the first conjunct should be selectable. Neither proposal is compatible with the data discussed above.

The generalization in (31) is not uncontroversial. Bruening & Al Khalaf 2020 argues that coordination of arguments (as opposed to predicates and modifiers) must involve conjuncts that have the same category. It is not clear, however, that this claim stands up to scrutiny. Patejuk & Przepiórkowski 2022 lists numerous attested examples of unlike-argument coordination. Indeed, the sentences in (36) seem fully grammatical. They deteriorate sharply if the verbs are replaced by alternatives that tolerate only one of the conjoined categories as their internal argument, as in (37).

(36) a. John thought [$_{CP}$ that his budget would run out soon] and [$_{PP}$ about the difficulties this would cause].
b. Fiona noticed [$_{CP}$ that the numbers for the tax year did not add up] and [$_{DP}$ a range of other errors in Bill's accounting].
c. The strikers fought [$_{DP}$ the college's injustice] and [$_{PP}$ against those that kept it in place].

(37) a. *John noticed [$_{CP}$ that his budget would run out soon] and [$_{PP}$ about the difficulties this would cause].
b. *Fiona said [$_{CP}$ that the numbers for the tax year did not add up] and [$_{DP}$ a range of other errors in Bill's accounting].
c. *The strikers resisted [$_{DP}$ the college's injustice] and [$_{PP}$ against those that kept it in place].

Coordination of arguments does give rise to a tricky issue, though: there are grammatical examples in which a verb selects a conjunction of a DP and a CP even though it does not take CP complements in isolation (contra (31)). A well-known example is given in (38) (compare **You can depend on that he will be on time*).

(38) You can depend on my assistant and that he will be on time.
(Sag et al. 1985: 165)

Bruening & Al Khalaf argue that examples of this type involve coordination of like categories, with the CP conjunct a DP headed by a silent noun. If this proposal is on the right track, we expect violations of the generalization in (31) to be restricted to cases in which a CP is coordinated with a DP. Our impression is that counterexamples to (31) do fit this description.

A remaining issue is that the rule of CP-to-DP conversion cannot apply generally but only in certain contexts. It cannot apply to complements. It can apply in coordinations but only to the second conjunct: the example in (39) is ungrammatical, in clear contrast to (36b). We leave this issue for future research, but see Bruening & Al Khalaf 2020 for a proposal.

(39) *You can depend on that he will be on time and my assistant.

The discussion above might suggest that all coordinations are rooted in a category-less node. Indeed, this is the analysis advanced in Przepiórkowski & Patejuk 2021, which uses the framework of Lexical-Functional Grammar. It is not an approach compatible with the Minimalist framework, where selection of arguments requires projection. In an example like (27a), two coordinated verbs jointly select a DP, which implies that they must project a VP to host this argument. As projection takes place under immediate domination, the coordination cannot be rooted in a node lacking categorial features.

The restriction extends to other structures in which nonmaximal projections are coordinated. Grimshaw 2005 argues that all nodes in the spine of an extended projection must share the same categorial features. If so, category-less nodes and therefore coordination of unlike categories will only be tolerated if two complete extended projections are coordinated. Coordination of smaller units requires matching categorial features.

In sum, at least some core properties of coordinate structures, including mismatches in category, follow straightforwardly from a mutual-adjunction analysis.

3.3 | Coordination and c-command

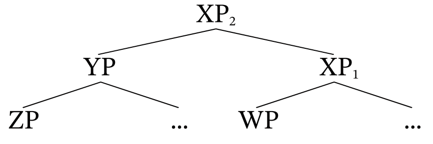
The hypothesis that coordinate structures are headed by a coordinator predicts that the left conjunct c-commands the right conjunct. Although there are important dissenting voices (see in particular Progovac 1997, 1999, 2000, and 2003), it is widely assumed that this prediction is correct. A core supporting data point is the grammaticality of examples like *every man and his dog*. In such examples, the universal that forms the left conjunct binds a pronoun in the right conjunct (Munn 1993).

By contrast, a natural interpretation of mutual adjunction is that neither conjunct c-commands the other. After all, for two categories to stand in a c-command relationship, the commander must exclude the commandee; that is, no segment of the former may dominate the latter:

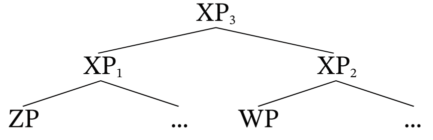
(40) A category α c-commands a category β iff (i) no segment of α dominates β and (ii) the first node that dominates α also dominates β.

On this definition of c-command, an adjunct c-commands into the category it is adjoined to, but the adjoined-to category does not c-command into the adjunct. Thus, in (41a) YP c-commands WP, but XP_2-XP_1 does not c-command ZP. In a coordinate structure, all the conjuncts share the top segment, which entails that no conjunct excludes any other. Thus, in (41b), XP_3-XP_1 does not c-command WP, and XP_3-XP_2 does not c-command ZP (we have omitted the coordinator in (41b), but this does not affect the argument).

(41) a.



b.



What, then, of the bound-variable reading of *every man and his dog*? We adopt the proposal of Progovac 1997, 1999, 2000, and 2003 that this requires quantifier raising of *every man*. Hence, we first need to take a step back and consider the conditions under which a quantifier contained in a coordinate structure can take scope outside of it.

As has been observed for VP coordination by a range of authors, a quantifier may raise out of a left conjunct as long as it binds a variable in the right conjunct (Rodman 1976, Ruys 1992, and Fox 2000). The effect is illustrated in (42) for universal quantifiers and in (43) for in-situ *wh* phrases. The example (43a) is acceptable on a single-pair reading, an observation that fits well with the widely accepted proposal in Dayal 2002 that only the pair-list reading of multiple-*wh* questions requires covert movement of the lower *wh* phrase.

(42) a. A soldier [[found every traitor] and [left unseen]].
*∀ > ∃
b. A soldier [[found [every traitor]$_1$] and [shot him$_1$]].
∀ > ∃

(43) a. *Which student [[likes which professor] and [hates the dean]]?
(On a pair-list reading)
b. [Which student [[likes which professor]$_1$] and [wants him$_1$ to be on his committee]]?

Note that it is not enough for there to be an element in the right conjunct that the quantifier can interact with. For example, an existential in the right conjunct does not license quantifier raising out of the left conjunct, as (44a) illustrates. However, once a pronoun is present in the right conjunct, scopal interaction with an existential in subject position is unproblematic, as is interaction with an existential in the right conjunct: (44b, c) demonstrate this.

(44) a. A (different) student [[likes [every professor]] but [hates some TAs]].
*'[Every professor]$_1$ is such that a different student likes him$_1$ but hates some TAs.'
b. A (different) student [[likes [every professor]$_1$] but [hates some of his$_1$ TAs]].
'For [every professor]$_1$ there is a student that likes him$_1$ but hates some of his$_1$ TAs.'
c. A (different) student [[likes [every professor]$_1$] but [wants him$_1$ to fire some TAs]].
'For [every professor]$_1$ there is a student that likes him$_1$ but wants him$_1$ to fire some TAs.'

Thus, quantifier raising out of a coordinate structure is possible only if the raised quantifier binds a variable in each conjunct. This is clearly reminiscent of the Coordinate-Structure Constraint, but we will not attempt to establish the connection here (see Al Khalaf 2015 for discussion).[9]

The hypothesis that the coordinator heads the coordinate structure predicts that coordinated DPs will display a pattern different from (42)–(44). Since the first conjunct c-commands the second conjunct as a matter of course, it is not only predicted that variable binding into the second conjunct is possible but also that in a structure [$DP_\forall$ & $DP_\exists$] the universal should be able to scope over the existential. By contrast, the mutual-adjunction analysis predicts that the universal must undergo quantifier raising in order to scope over the second conjunct, which in turn implies that this reading is only available if the second conjunct contains a variable (exactly as in (42)–(44)). In other words, in [$DP_\forall$ & $DP_\exists$] we would not expect it to be possible for the existential to depend on the universal.

The data are as predicted by the mutual-adjunction analysis:

(45) a. Every man and a woman walked in.
$*\forall > \exists$
b. [Every man]$_1$ and his$_1$ wife walked in.
c. [Every man]$_1$ and a woman he$_1$ used to date walked in.
$\forall > \exists$

As before, the effect extends to *wh* expressions in situ:

(46) a. *Which priest united which refugee and three compatriots?
(On a pair-list reading)
b. Which priest united [which refugee]$_1$ and his$_1$ family?
(On a pair-list reading)

Progovac's proposal for *every man and his dog* receives further support from the example in (47), where the variable bound by the universal quantifier is an epithet, rather than a pronoun.

(47) I remember [every corrupt politician]$_1$ and the false promises [the bastard]$_1$ made.

[9]Examples like *every man$_1$ and his$_1$ dog* are often contrasted with cases like **his$_1$ owner and every dog$_1$*. One may think that the latter example should be grammatical if the universal can raise out of the coordinate structure. However, as already argued in Chomsky 1976, a pronoun cannot be bound by a quantifier that appears to its right on the surface (for discussion, see Hornstein 1995 and Barker 2012, among others).

As pointed out by Hornstein & Weinberg 1990: 134, an epithet bound by a quantifier is subject to Principle C (unlike a bound pronoun). The example in (48), where the quantifier phrase uncontroversially c-commands the epithet, is ungrammatical.

(48) *[Every corrupt politician]$_1$ certainly likes the false promises that [the bastard]$_1$ makes.

Consequently, an epithet that acts as a bound variable must be in the scope of its binder, but, like other R-expressions, it cannot be bound from a c-commanding A-position. Instead, the quantifier must raise from a non-c-commanding position to take scope over the epithet (Hornstein & Weinberg 1990). Since (47) is grammatical, it follows that the left conjunct (*every corrupt politician*) does not c-command the right conjunct but rather binds the epithet after quantifier raising.

We conclude that, in line with the mutual-adjunction analysis, there is no surface c-command between conjuncts (although a conjunct may take scope over the coordinate structure as a whole as a consequence of quantifier raising).

3.4 | Other asymmetries

Like variable binding, morphological phenomena are sometimes used to argue for asymmetric accounts of coordination. In particular, the distribution of cases in a coordinate structure is not always symmetrical, and there are situations in which the verb agrees with one conjunct but not the other. In Johannessen 1998 the term *unbalanced coordination* is used to refer to such phenomena.

Unbalanced case has received relatively little attention. A recent article, Weisser 2020, shows that, in certain coordinate structures that appear asymmetric on the surface, underlying case is in fact symmetric. For various other classes of data, Przepiórkowski 2021 argues that genuine mismatches in case can be observed; crucially, however, these do not motivate a structural asymmetry between conjuncts. For example, Polish allows coordination of accusative and genitive DPs (if the latter have a partitive reading) but does not impose constraints on their relative order.

More is known about agreement with coordinate structures. Three patterns can be distinguished, two of which are much more common than the third.

The first common pattern is *resolution*, where the features of all conjuncts are input to a computation that derives a set of output features relevant for agreement. Resolution treats all conjuncts on a par and therefore provides no evidence for syntactic asymmetry (it does provide evidence for asymmetries between certain features or feature values).

The second common pattern is *closest-conjunct agreement*, where a predicate agrees with the conjunct linearly closest to it (either the first conjunct, when the predicate precedes the coordinate structure, or the final conjunct, when it follows it; see Corbett 2006, Benmamoun et al. 2010, and Marušič et al. 2015; see Nevins & Weisser 2019 for an overview and further references). Again, this pattern does not provide evidence for syntactic asymmetry.

The third, less frequent pattern is *distant-conjunct agreement*, as found in Slovenian (Marušič et al. 2015, among others). The standard description of the phenomenon is that a predicate can agree with the first conjunct of a coordinate subject that precedes it though not with the last conjunct of a coordinate subject that follows it. Thus, (49a) and (49b) both allow closest-conjunct agreement, but distant-conjunct agreement is only found in (49a).

(49) a. Knjig-e in peres-a so se podražil-a/?podražil-e. Slovenian
book-F.PL$_1$ and pen-N.PL$_2$ AUX.PL REFL got.dear-N.PL$_2$/got.dear-F.PL$_1$
'Books and pens have become more expensive.'
b. Podražil-a/*podražil-e so se peres-a in knjig-e.
got.dear-N.PL$_1$/got.dear-F.PL$_2$ AUX.PL REFL pen-N.PL$_1$ and book-F.PL$_2$

These data may be construed as evidence for syntactic asymmetry. However, the exact circumstances that allow distant-conjunct agreement in Slovenian are not fully understood. Our impression, based on work with three linguistically trained native speakers, is that the interpretation of the coordinate subject is an important factor.

A coordination '*A* and *B*' can simply describe a set {*A*, *B*}, but it also allows a comitative reading that can be characterized as '*A* and also *B*'. In some languages, the comitative reading can be marked with a dedicated coordinator (e.g., Dutch *en* vs. *alsmede*). As it turns out, in Slovenian, a comitative reading facilitates distant-conjunct agreement if (in descriptive terms) *A* is foregrounded and *B* backgrounded. Our informants found distant-conjunct agreement marginal in (49a) but fully grammatical in (50) (where italicization marks foregrounding).

(50) *Knjig-e* pa tudi peres-a so se podražil-e.
book-F.PL$_1$ and also pen-N.PL$_2$ AUX.PL REFL got.dear-F.PL$_1$

In an out-of-the-blue context, '*A* and *B*' can be read with *A* foregrounded and *B* backgrounded but not the other way around. This may explain the contrast between (49a) and (49b). In context, however, comitative coordinate structures permit foregrounding of the second conjunct. Under those circumstances our informants found postverbal distant-conjunct agreement unobjectionable:

(51) (Peresa so se resnično podražila. 'Pens really got more expensive.')
Podražil-e so se ne samo peresa ampak tudi *knjig-e*.
got.dear-F.PL$_2$ AUX.PL REFL not only pen-N.PL$_1$ but also book-F.PL$_2$
'Not only pens but also books got more expensive.'

The link between distant-conjunct agreement and the interpretation of coordinate subjects requires much more research, but if the observations in (50) and (51) stand up to scrutiny, it is not clear that the phenomenon supports an asymmetric analysis of coordination after all.

There are other data that have been used to argue for asymmetric coordination. It has been claimed that reconstruction following across-the-board movement is only partial: it targets the trace in the first conjunct but not that in any subsequent conjunct. Similarly, across-the-board head movement can give rise to structures in which the moving head agrees with the subject in the first conjunct but not with subjects in subsequent conjuncts. Bruening & Al Khalaf 2017 shows that in reality there is no argument for asymmetry from partial reconstruction. Reconstruction is to all traces left behind by across-the-board movement, and any apparent asymmetries have a linear source, independently motivated by reconstruction into parasitic gaps. Asymmetries in agreement following head movement can be explained under an asymmetric theory of coordination, but they can also be understood as instances of closest-conjunct agreement if agreement takes place *after* head movement. Space limitations do not permit us to discuss these matters in more detail.

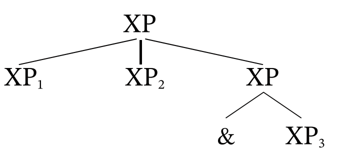
4 | *N*-ARY-BRANCHING COORDINATE STRUCTURES

4.1 | Flat and articulated coordinate structures

We now come to the crux of the article. We have argued (in section 2) that subordination requires a license, as stated in part A of the Generalized Licensing Criterion. Given this restriction, part B of the Generalized Licensing Criterion implies that structures of subordination must be binary branching. We have also argued (in section 3) that coordinate structures do not involve subordination. On a mutual-adjunction analysis all conjuncts project, so that no category is subordinated to another. This implies that coordinate structures are not subject to the Generalized Licensing Criterion, which in turn implies that they do not have to be binary branching.

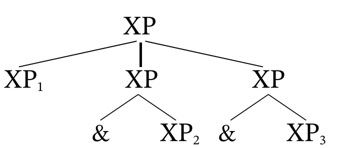
In order to develop our case, we will concentrate on coordinate structures consisting of three XP conjuncts, showing that such structures can be ternary branching, as in (52a), where only the final conjunct carries a coordinator, and (52b),where an identical coordinator is attached to the medial conjunct. The conclusions we draw extend to coordinate structures with more than three conjuncts and presumably to coordinations of heads, but since these do not raise any additional issues, we will ignore them here.

(52) a.



XP_1 | XP_2 | and XP_3

b.

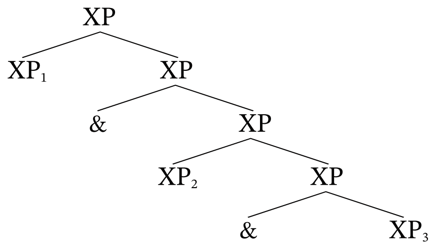


XP_1 | and XP_2 | and XP_3

(The lines below these trees represent their prosodic structure, to be discussed in a moment.)

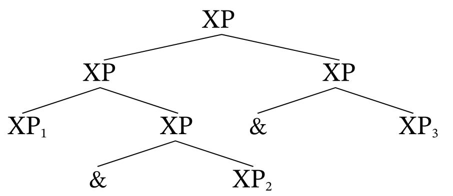
Of course, a complex coordinate structure may also be formed by embedding; that is, a coordinate structure may contain a conjunct that is a coordinate structure in its own right. This is illustrated by the right-branching tree in (53a), where the second conjunct consists of a coordinate structure (XP_2 *and* XP_3), and the left-branching tree in (53b), which has a coordinate structure (XP_1 *and* XP_2) as its first conjunct.

(53) a.



XP_1 ‖ and XP_2 | and XP_3

b.



XP_1 | and XP_2 ‖ and XP_3

In English coordinate structures, a coordinator must be attached to the final conjunct. Given that (53a) and (53b) have an articulated structure, a coordinator must hence appear between each pair of conjuncts, as indicated. The structure in (52) is different in this respect. It requires a single coordinator, attached to XP_3; attachment of a coordinator to the medial conjunct is optional.

The embedding of one coordinate structure within another is reflected in the prosody (Wagner 2010 and Kentner & Féry 2013). As indicated, the ternary-branching trees in (52) map onto flatter prosodic structures than the articulated representations in (53) (| and ‖ mark prosodic boundaries of increasing strength).[10] This has various effects. For one thing, it captures the distribution of full and reduced coordinators (Zoerner 1995). The latter require a weaker prosodic boundary between the conjuncts they connect than the former. Hence, the articulated structure in (53a) can be realized as *Hal and Thelma 'n' Louise* but not as *Hal 'n' Thelma 'n' Louise* or *Hal 'n' Thelma and Louise*. Conversely, (53b) can be realized as *Hal 'n' Thelma and Louise* but not as *Hal 'n' Thelma 'n' Louise* or *Hal and Thelma 'n' Louise*. Only the flat structure in (52b) can be pronounced *Hal 'n' Thelma 'n' Louise*.

A reviewer suggests that our claim that multitermed coordinate structures with a single coordinator are *n*-ary branching runs into trouble with examples like (54a) and especially (54b), where the second and third conjuncts of such a coordination appear to have been extraposed as a unit, stranding the first conjunct.

(54) a. I lived in Berlin last year, and in Munich and in Paris.
b. I lived in Berlin last year, in Munich, and in Paris.

However, there is a body of work that argues that apparent extraposition out of coordinate structures in fact results from partial ellipsis of a clausal conjunct: Johnson 2004, Chaves 2007, and

[10] In German, Kentner & Féry 2013's results show that (52b) and (53b) differ in the way suggested. However, Kentner & Féry also show that (53a) tends to receive a prosody similar to (52a). In English the prosody given in (53a) is possible and is exclusive to articulated right-branching structures.

Zhang 2010, among others. One argument for this approach comes from Johnson's example in (55a), whose ungrammaticality follows from the ellipsis analysis but remains unexplained under extraposition: compare (55b), where *each other* does not find a plural antecedent, with (55c), where it does.

(55) a. *I introduced Carrie to each other and Will. (Johnson 2004)
b. [I introduced Carrie to each other] and [Will$_1$ ~~I introduced~~ t_1 ~~to each other~~].
c. I introduced [Carrie [$t_{\&DP}$]] to each other [and Will].

If the above is on the right track, (54a, b) should be analyzed as in (56a, b), respectively.

(56) a. [$_S$ I lived in Berlin last year], and [$_S$ [in Munich and in Paris]$_1$ ~~I lived~~ t_1 ~~last year~~].
b. [$_S$ I lived in Berlin last year], [$_S$ [in Munich]$_1$ ~~I lived~~ t_1 ~~last year~~], and [$_S$ [in Paris]$_2$ ~~I lived~~ t_2 ~~last year~~].

Note that this analysis explains why a clear prosodic break must separate the final two conjuncts in (54b) but not those in (54a): such breaks are indicative of clausal coordination.

Further support for an account of (54a, b) in terms of ellipsis comes from the distribution of coordinators in variants of (54a, b) in which only the final conjunct has shifted rightwards. If we are dealing with genuine extraposition, there must be a single underlying coordinate structure. Therefore, one would expect that a single coordinator preceding the final locational modifier should suffice. If we are dealing with ellipsis, the "stranded" conjuncts form an independent coordinate structure, which requires its own coordinator. The data support the ellipsis analysis:

(57) a. *I lived in Berlin, in Munich last year, and in Paris.
b. I lived in Berlin and in Munich last year, and in Paris.

With this issue out of the way, we turn to observations that confirm that coordinate structures can be *n*-ary branching. Our case for the existence of the flat structures in (52) is partly based on data discussed in previous literature (though not used to explicitly argue for *n*-ary-branching structures) and more particularly on a new argument that concerns the interpretation of attributive modifiers.

4.2 | Literature review

There is a fundamental difference between the coordinate structures in (52) and (53): the former are made up of three conjuncts that are syntactically, semantically, and prosodically on a par, while the latter consist of two conjuncts, one of which is a coordinate structure in its own right. This directly explains why multitermed coordination with a single coordinator is subject to a no-mixing restriction (see section 3.1). If *Hal, Thelma, and Louise* has a flat structure, it must denote a single three-termed coordination. It follows from this that it must have a uniform interpretation and cannot mean the same as *Hal or Thelma and Louise*. Similarly, *Hal, Thelma, or*

Louise cannot be interpreted as *Hal and Thelma or Louise*. Mixing of conjunction and disjunction is only found in articulated structures.

Even when the no-mixing restriction is adhered to, the structures in (52) and (53) have different truth conditions (Borsley 1994, 2005, Winter 2006, and Wagner 2010, among others). One way that this can be brought out is through the interpretation of sentences with coordinate subjects. The example in (58) has a distributive reading, whereby each man lifted the piano on his own, as well as a collective reading, whereby the two men lifted it together.

(58) [Tom and Dick] lifted the piano.
  a. Distributive: 'Tom lifted the piano, and Dick lifted the piano.'
  b. Collective: 'Tom and Dick together lifted the piano.'
  (Borsley 1994: 238)

With this in mind, consider the sentence in (59), which has a multitermed coordinate subject, with the coordinator *and* appearing before the second and third conjuncts. This sentence is therefore compatible with both the flat structure in (52b) and the articulated structures in (53a, b). As Borsley 1994: 238 points out, the sentence is four-ways ambiguous (see also Hoeksema 1988: 26). It can mean that each man lifted the piano on his own (distributive), that all three men lifted it together (collective), that Tom lifted it on his own while Dick and Harry lifted it together (mixed, distributive–collective), or that Tom and Dick lifted it together while Harry lifted it on his own (mixed, collective–distributive).

(59) [Tom and Dick and Harry] lifted the piano.
  a. Distributive: 'Tom lifted the piano, Dick lifted the piano, and Harry lifted the piano.'
  b. Collective: 'Tom, Dick, and Harry together lifted the piano.'
  c. Mixed, distributive–collective: 'Tom lifted the piano, and Dick and Harry together lifted the piano.'
  d. Mixed, collective–distributive: 'Tom and Dick together lifted the piano, and Harry lifted the piano.'
  (Borsley 1994: 238)

The two mixed readings are available because either *Dick and Harry* or *Tom and Dick* can be interpreted as nested coordinate structures in their own right. If *Dick and Harry* form one conjunct and the simple nominal *Tom* the other, the distributive–collective reading results (see (53a)). If *Tom and Dick* form one conjunct and *Harry* the other, we end up with the collective–distributive reading (see (53b)). The alternative ternary-branching structure in (52b) gives us the distributive and collective readings.

The example in (59) can be contrasted with that in (60), where there is a single coordinator, compatible only with the flat structure in (52a).

(60) [Tom, Dick, and Harry] lifted the piano.
  (Borsley 1994: 239)

As predicted, this example allows only two readings: the distributive reading in (59a), whereby each man lifted the piano on his own, and the collective reading in (59b), whereby the three men lifted the piano together. The mixed readings in (59c) and (59d) are absent. This follows from a ternary-branching analysis: no two conjuncts form a coordinate structure to the exclusion of the third.

Winter 2006 observes a similar effect with adverbials of alternation:

(61) a. John alternately feels [guilt and anger and hate] for his family.
b. %John alternately feels [guilt, anger, and hate] for his family.
(Winter 2006: 9)

The sentence in (61a), where *and* appears between each pair of conjuncts, is ambiguous: see (62). It could be that John alternates between a state of guilt and a state of simultaneous anger and hate. It is also possible that he alternates between a state of simultaneous guilt and anger and a state of hate. For some speakers, there is a third interpretation, in which John alternates between the three states of guilt, anger, and hate; for less permissive speakers, *alternately* requires a two-state alternation, and hence this third interpretation is unavailable. The sentence in (61b) has only one interpretation, the same as the third interpretation of (61a), according to which John's feelings alternate between the three states; hence (61b) is infelicitous for speakers who only accept the use of *alternately* with two-state alternations.

(62) a. Two-state alternation: guilt/[anger and hate]
✓(61a); *(61b)
b. Two-state alternation: [guilt and anger]/hate
✓(61a); *(61b)
c. Three-state alternation: guilt/anger/hate
%(61a); %(61b)

The contrast between the two sentences is easily understood, given that (61a), where *and* appears twice, is compatible with both the articulated structures in (53) and the flat structure in (52b). The former yield the two-state alternations, while the latter yields the three-state alternation. The sentence in (61b), on the other hand, must have a flat structure, since it contains only a single coordinator. Hence, only the three-state-alternation interpretation is available.

Borsley 2005 reports a related pattern for examples containing *respectively*. This adverb "establishes a pairing between elements of two sets having the same cardinality" (Dalrymple & Kehler 1995: 536; see also the references cited there). The example in (63) demonstrates the effect. A pairing is established between *the two girls* and the binary coordination *Hobbs and Barnes*, leading to an interpretation in which Hobbs saw one girl and Rhodes the other.

(63) The two girls were seen by [Hobbs and Rhodes], respectively.
(Borsley 2005: 469)

In the example in (64), *the two girls* is paired with a multitermed coordination with a coordinator between each pair of conjuncts.

(64) The two girls were seen by [Hobbs and Rhodes and Barnes], respectively.
a. 'Hobbs saw one girl, and Rhodes and Barnes saw the other.'
b. 'Hobbs and Rhodes saw one girl, and Barnes saw the other.'
(Borsley 2005: 470)

Here, a pairing can be established between *the two girls* and either the binary coordination of *Hobbs* (as one conjunct) and *Rhodes and Barnes* (as the other) or the binary coordination of *Hobbs and Rhodes* (as one conjunct) and *Barnes* (as the other). In the first case Hobbs saw one girl and Rhodes and Barnes saw the other, while in the second case Hobbs and Rhodes saw one girl and Barnes saw the other. Neither interpretation is available, however, when the coordinator appears only once, and so (65) is ungrammatical.

(65) *The two girls were seen by [Hobbs, Rhodes, and Barnes], respectively.
(Borsley 2005: 470)

The contrast follows, because the string *DP and DP and DP* permits the two articulated analyses in (53), while the string *DP, DP, and DP* only permits the flat structure in (52a). Hence, (65) requires a pairing of *the two girls*, which has a cardinality of two, with *Hobbs, Rhodes, and Barnes*, which has a cardinality of three, resulting in a semantic anomaly. Again, it turns out that multitermed coordination with a single coordinator cannot be interpreted as built up from binary coordination relationships.

A final data set confirming the same conclusion comes from the distribution of *both*, which can introduce a coordination whose cardinality is exactly two.[11] Borsley 1994 and 2005 demonstrate that *both* can combine with the articulated structures in (53) but not with the flat structure in (52b). When a coordinator appears between each pair of conjuncts, the possibility of nested binary coordination is uncontroversial. Therefore, *both* can appear in *Tom and* [*both* [*Dick and Harry*]], as well as in *both Tom and Dick and Harry* if either *Tom and Dick* or *Dick and Harry* is interpreted as a unit, that is, as a coordinate structure in its own right:

(66) a. [both [Tom [and Dick and Harry]]]
b. [[both [Tom and Dick]] and Harry]
c. [both [[Tom and Dick] and Harry]]
(Borsley 1994: 237)

These examples contrast with the ones in (67), which contain a single coordinator and which resist insertion of *both*. This suggests that, unlike in (66), the three conjuncts in (67a, b) cannot be combined in a binary fashion. The example in (67a) shows that *Tom, Dick* cannot be interpreted as a coordinate structure in its own right; (67b) shows that the same is true of *Dick and Harry*.

(67) a. *both Tom, Dick and Harry
b. *Tom, both Dick and Harry
(Borsley 1994: 237)

In sum, the evidence we have looked at so far has shown that in three-element conjunctions with a single coordinator neither the final two conjuncts nor the initial two conjuncts have a distinct conjunctive relationship (see McCawley 1988 and Winter 2006 for additional arguments to the same effect). This finding corroborates the claim that such examples have a flat structure, as in (52a).

[11]There is (for some speakers) a sharp contrast between *both kind, passionate, and considerate* and **both John, Mary, and Sue*. This suggests that *both* can have more than two conjuncts in its scope but not if these are countable and form a set with a cardinality larger than two. The examples in the main text involve countable conjuncts.

4.3 | An argument from modification

The data discussed so far clearly support the hypothesis that in a multitermed coordinate structure marked by a single coordinator no two conjuncts express a semantic coordination relationship in their own right or form their own syntactic coordinate structure. Thus, these data provide evidence for the structure in (52a). By contrast, corresponding examples with a coordinator between each pair of conjuncts turn out, as expected, to be compatible with an interpretation whereby either the first and second conjuncts or the second and third conjuncts form a coordinate structure embedded in a larger coordinate structure, as in the trees in (53). Even here, however, the three conjuncts can be equal in status, as demonstrated by (61), where an alternation between three states is a possible interpretation of both types of multitermed coordination. It seems, then, that multitermed coordination with a repeated coordinator can have a flat structure, as in (52b), in addition to the two nested binary-branching structures in (53).

While it may be possible to reconcile the above generalizations with a binary-branching analysis, doing so could have some undesirable theoretical consequences, of the kind related in section 3.1. What is certain, however, is that the binary-branching and flat analyses of multitermed coordination make very different predictions about constituency. If we are dealing with a binary-branching structure, either the first two conjuncts (in a left-branching structure) or the last two conjuncts (in a right-branching structure) form a constituent to the exclusion of the remaining conjunct. On the other hand, on the *n*-ary-branching analysis in (52) no two conjuncts form a constituent to the exclusion of the other. These predictions can be tested by looking at the scope of modifiers within multitermed coordinate structures.[12]

In the case of a simple binary coordinate structure, the presence of a modifier immediately preceding the coordinate structure results in ambiguity between a reading in which the modifier attaches to and scopes over the first conjunct only, the reading represented in (68a), and one in which it attaches to and scopes over the entire coordinate structure, the reading represented in (68b).

(68) Mary will buy [yellow pansies and tulips].
  a. [yellow pansies] [and tulips]
  b. [yellow [pansies and tulips]]

Consider now the predictions for multitermed coordinations. If we are dealing with a binary-branching structure, either the first or last two conjuncts form a constituent to the exclusion of the other. One would expect modifiers to be able to attach to this constituent; that is, a modifier should be able to scope over two adjacent conjuncts to the exclusion of the third.

This possibility indeed exists in examples in which there is a coordinator between each pair of conjuncts (unsurprisingly, since such coordinations can uncontroversially be binary branching). Like (68) above, the example in (69) is ambiguous between a reading in which the adjective *yellow* takes scope over only the conjunct immediately to its right, *pansies*, and one in which it scopes over the larger constituent *pansies and tulips*. The former reading is represented in (69a); the

[12]We have replicated the patterns of nominal modification discussed below in Dutch, German, Hindi, Japanese, and Slovenian, modulo various language-specific issues (for example, Hindi and Japanese lack postnominal modifiers, and Japanese marks coordination in more than one way). Space limitations do not allow us to present further data here.

latter reading, represented in (69b), arises from a right-branching structure (as in (53a)), where the final two conjuncts form a constituent to the exclusion of the first.

(69) Mary will buy [crocuses and yellow pansies and tulips].
  a. crocuses and [yellow pansies] and tulips
  b. crocuses and [yellow [pansies and tulips]]

A three-way ambiguity can be observed when the adjective *yellow* precedes the entire coordinate structure, as in (70). As before, the adjective may exclusively attach to and scope over the nominal immediately to its right, *crocuses*, as shown in (70a). Additionally, on a left-branching parse, the adjective may attach to the larger constituent *crocuses and pansies*, as shown in (70b). Finally, the adjective can be attached to the entire coordinate structure and hence scope over all three conjuncts, as shown in (70c).

(70) Mary will buy [yellow crocuses and pansies and tulips].
  a. [yellow crocuses] and pansies and tulips
  b. [yellow [crocuses and pansies]] and tulips
  c. [yellow [crocuses and pansies and tulips]]

We now turn to equivalent examples with a single coordinator. Unlike the examples in (69) and (70), which have a coordinator between each pair of conjuncts and are hence compatible with the binary-branching structures in (53), the examples in (71) and (72) must have a ternary-branching structure like (52a). Since in this structure no two conjuncts form a constituent to the exclusion of the third, any reading in which *yellow* scopes over exactly two conjuncts should be unavailable. This is indeed the case. The example in (71) is unambiguous; the adjective can only take scope over the nominal immediately to its right, *pansies*. Hence a right-branching analysis must be abandoned.[13]

(71) Mary will buy [crocuses, yellow pansies, and tulips].
  a. crocuses, [yellow pansies], and tulips
  b. *crocuses, [yellow [pansies and tulips]]

Equally, we can rule out a left-branching analysis. The example in (72) is ambiguous between a reading in which *yellow* takes scope over only the first conjunct, (72a), and one in which it takes scope over the entire coordinate structure, (72c). The reading in which the adjective takes scope only over the first two conjuncts, (72b), is absent, however.[14]

[13]Note that if *crocuses, yellow pansies and tulips* is read as an asyndetic coordination of *crocuses* and *yellow pansies and tulips*, it permits the reading that the pansies and tulips are yellow. However, asyndetic coordination gives rise to a sense of incompleteness or open-endedness (see section 5). If this sense is absent, the relevant reading is not accessible. The complication repeats itself elsewhere and can be controlled for in the same way.

[14]The observations reported here extend to nonpredicative prenominal modifiers like *fake* and *former*. Thus, the interpretations of the examples in (i) and (ii) run parallel those of the examples given in the main text. With these modifiers, the various readings can be distinguished easily, since a fake *X* and a former *X* do not qualify as *X*.

(i) a. fake guns (and) swords and knives
  b. guns (and) fake swords and knives
(ii) a. former ambassadors (and) ministers and counselors
  b. ambassadors (and) former ministers and counselors

(72) Mary will buy [yellow crocuses, pansies, and tulips].
  a. [yellow crocuses] [pansies] [and tulips]
  b. *[yellow [crocuses, pansies]] [and tulips]
  c. [yellow [crocuses, pansies, and tulips]]

The same pattern is found with adjuncts that follow the constituent they modify. This is demonstrated in (73)–(76), where the prepositional phrase *on scooters* can modify one or more of the conjuncts, depending on its site of attachment.

(73) The park was full of [dog walkers and tourists and children on scooters].
  a. dog walkers and tourists and [children on scooters]
  b. dog walkers and [[tourists and children] on scooters]
  c. [[dog walkers and tourists and children] on scooters]

(74) The park was full of [dog walkers, tourists, and children on scooters].
  a. dog walkers, tourists, and [children on scooters]
  b. *dog walkers, [[tourists and children] on scooters]
  c. [[dog walkers, tourists, and children] on scooters]

(75) The park was full of [dog walkers and tourists on scooters and children].
  a. dog walkers and [tourists on scooters] and children
  b. [[dog walkers and tourists] on scooters] and children

(76) The park was full of [dog walkers, tourists on scooters, and children].
  a. dog walkers, [tourists on scooters], and children
  b. *[[dog walkers, tourists] on scooters] and children

All the examples have a reading in which the modifier attaches to and therefore scopes uniquely over the nominal immediately to its left (the (a) reading). When it is in final position, as in (73) and (74), there is also a reading in which it scopes over the entire coordinate structure (the (c) reading). Finally, the examples in (73) and (75), where a coordinator occurs between each pair of conjuncts and hence the binary-branching structures in (53) are possible, have an additional reading (the (b) reading) in which *on scooters* takes scope over the embedded two-termed coordination to its left. As predicted, however, this reading is not available in the examples in (74) and (76), which contain only a single coordinator. Since this is indicative of a ternary-branching structure, (74b) and (76b) are ruled out.

The pattern repeats itself with coordinated VPs modified by a manner adverbial: the (b) readings available in (77), (79), (81), and (83) drop out in (78), (80), (82), and (84).

(77) John hurriedly [got up] and [put on a suit] and [walked to the office].
  a. [hurriedly [got up]] and [put on a suit] and [walked to the office]
  b. [hurriedly [got up] and [put on a suit]] and [walked to the office]
  c. [hurriedly [got up] and [put on a suit] and [walked to the office]]

(78) John hurriedly [got up], [put on a suit], and [walked to the office].
  a. [hurriedly [got up]], [put on a suit], and [walked to the office]
  b. *[hurriedly [got up], [put on a suit]] and [walked to the office]
  c. [hurriedly [got up], [put on a suit], and [walked to the office]

(79) John [got up] and hurriedly [put on a suit] and [walked to the office].
 a. [got up] and [hurriedly [put on a suit]] and [walked to the office]
 b. [got up] and [hurriedly [put on a suit] and [walked to the office]]

(80) John [got up], hurriedly [put on a suit], and [walked to the office].
 a. [got up], [hurriedly [put on a suit]], and [walked to the office]
 b. *[got up], [hurriedly [put on a suit] and [walked to the office]]

(81) John [got up] and [put on a suit] and [walked to the office] in a hurry.
 a. [got up] and [put on a suit] and [[walked to the office] in a hurry]
 b. [got up] and [[put on a suit] and [walked to the office] in a hurry]
 c. [[got up] and [put on a suit] and [walked to the office] in a hurry]

(82) John [got up], [put on a suit] and [walked to the office] in a hurry.
 a. [got up], [put on a suit], and [[walked to the office] in a hurry]
 b. *[got up], [[put on a suit] and [walked to the office] in a hurry]
 c. [[got up], [put on a suit], and [walked to the office] in a hurry]

(83) John [got up] and [put on a suit] in a hurry and [walked to the office].
 a. [got up] and [[put on a suit] in a hurry] and [walked to the office]
 b. [[got up] and [put on a suit] in a hurry] and [walked to the office]

(84) John [got up], [put on a suit] in a hurry, and [walked to the office].
 a. [got up], [[put on a suit] in a hurry], and [walked to the office]
 b. *[[got up], [put on a suit] in a hurry] and [walked to the office]

5 | THE STATUS AND DISTRIBUTION OF COORDINATORS

Let us take stock. We have argued for the Generalized Licensing Criterion as a central syntactic principle. From this principle it follows (among other things) that subordination requires binary branching. As a corollary of this account of the binary-branching constraint, we predict that symmetric structures can be *n*-ary branching. We have argued that this is indeed the case, proposing an analysis of coordination as mutual adjunction and providing evidence for *n*-ary branching. While the resulting characterization of coordination has advantages over alternative proposals, it does not provide us with an account of the status and distribution of coordinators. The aim of this section is to improve on this by providing an explicit analysis of coordinators in flat multitermed coordinate structures.

Our analysis of coordination does not require insertion of a coordinator, at least not in principle. After all, the coordinator is not the head of the structure, and mutual adjunction is possible in its absence. Indeed, asyndetic coordination is common crosslinguistically and perhaps available universally (Payne 1985 and Haspelmath 2007). It is found especially in Australia and South America (Haspelmath 2013), though its use as the only means of building coordinate structures is increasingly rare (Payne 1985, Mithun 1988, and Stassen 2013), a trend attributed by Mithun 1988 to the spread of literacy. English examples of asyndetic conjunction and disjunction are the following.[15]

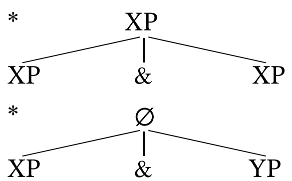
[15] An anonymous reviewer questions whether asyndetic coordination is genuine coordination, suggesting that it may not allow right-node raising or across-the-board movement. However, right-node raising is in fact attested in structures with

(85) a. He had brought [gifts, flowers, chocolate, champagne], and yet he felt unwelcome.
b. I found no more than [two, three] mistakes in your article.

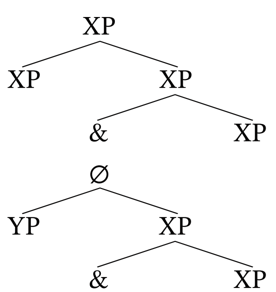
In English multitermed coordinations, there may thus be zero, one, or multiple coordinators. If there is one coordinator, it is attached to the final conjunct; if there are multiple coordinators, these are attached to all noninitial conjuncts. The three patterns are on a par in terms of the grammar, but it has been noted, for example by Büring & K. Hartmann 2015, that asyndetic coordination gives an impression of incompleteness or open-endedness. In (85a), four members of the set of things that were brought are mentioned, but there may be additional unmentioned members. Similarly, *two, three* in (85b) denotes a low number, but there is no commitment that this is exactly two or three. In line with this, the intonation of the final conjuncts in (85a) and (85b) is as if it is *not* the final conjunct.

These, then, are the data to be accounted for; we now turn to the analysis.

One may think that in a theory that permits *n*-ary branching, coordinators will be attached in a completely flat structure (as in Dik 1968, Goodall 1987, and Muadz 1991). However, that is not true on the proposal advanced here. In the structures in (86), the coordinator cannot subordinate or be subordinated to the conjuncts. Either option would lead to a structure that is subject to the Generalized Licensing Criterion and that hence cannot be ternary branching. But if the coordinator cannot subordinate or be subordinated to the conjuncts, it must itself be a conjunct—clearly an incoherent result.

(86) a. b.


Therefore, the coordinator must be attached to a conjunct. In English and other VO languages, it is attached to the conjunct it precedes (Ross 1967, Zwart 2009, and Philip 2012, among others):

(87) a. b.


asyndetic coordination, as in the example in (i), from a novel; and across-the-board movement seems acceptable as long as the categories extracted from form an open-ended or incomplete list, as in (ii).

(i) … the little child, so tenderly loved by, so fondly loving, the mother whose ewe-lamb she was …
(Elizabeth Gaskell, *Sylvia's lovers*)

(ii) Which musician does John have pictures of, books about, records by, … —you name it?

The subtree that hosts the coordinator in (87a, b) is generated through subordination. Its formation must therefore involve discharge of a selectional requirement. We propose that the coordinator is a functional head that selects the XP it attaches to. Like other functional heads, a coordinator is a functor (or a relativized head, in the terminology of Di Sciullo & Williams 1987); that is, it allows projection of properties of its complement. Indeed, coordinators are *total* functors (or *maximally* relativized heads): they allow projection of *all* such properties (which is why the nodes immediately above & in (87a, b) are labeled XP). Note that full transparency for projection explains why coordinators can be attached to nonmaximal categories.

This hypothesis may appear sui generis, but in fact it puts coordinators in a large class of well-studied elements known as *linkers* (Den Dikken 2006).[16] Linkers are usually analyzed as functional heads that mark an independently existing relationship between two categories. They are common in the noun phrase, where they occur on a range of categories. An example is Mandarin *de* (see Paul 2012 for discussion and references):

(88) a. Meili$_{DP}$ **de** pengyou — Mandarin
Mary LNK friend
'Mary's friend'
b. benlai$_{AP}$ **de** yisi
original LNK meaning
'the original meaning'
c. [$_{S}$ ni jilai] **de** xin
you send LNK letter
'the letter you sent'
d. [$_{PP}$ dui wenti] **de** kanfa
towards problem LNK opinion
'an opinion about the problem'
(Paul 2012)

There is an extensive literature on linkers, which we cannot explore in any detail here. For our current purposes, one generalization is crucial: in asymmetric structures linkers are attached to the subordinated category and linearized between that category and the head of the larger structure. Thus, a linker attached to an XP in a noun phrase appears in one of the two configurations in (89a, b); the linearizations in (89c, d) are ruled out (except when movement takes place).

(89) a. [[XP LNK] N]
b. [N [LNK XP]]
c. *[[LNK XP] N]
d. *[N [XP LNK]]

Thus, a linker connects two categories by being attached to one (XP in (89)) and pointing to the other (N in (89)). This generalization goes back to Dik 1983 and 1997's Relator Principle

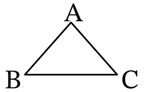
[16]Languages employ two different types of marker in coordinate structures (Zwart 2009 and Mitrović & Sauerland 2016). The first, exemplified by *and* and *or*, marks the coordination *relationship* through structural and linear intervention. We propose that such coordinators are linkers. The second type consists of morphemes that independently occur in the language (Szabolcsi 2015). We do not consider this type of morpheme to be a linker and will ignore it in what follows.

(with the proviso that the notion of relator is broader than our notion of linker). Empirical support for it can be found in Philip 2012 and 2013, based on a sample of 79 genetically and geographically diverse languages. To be sure, by "pointing to N," we mean "appear linearly between XP and N," not "be adjacent to N." Linkers may be separated from the head noun by other material, as in Mandarin *ke'ai* ***de*** *heise* ***de*** *mao* = cute LNK black LNK cat 'a cute black cat'.

Several works (Dik 1983, Zwart 2009, and Philip 2012) have argued that coordinators should be analyzed as linkers. In particular, typological studies have shown that coordinators, like subordinating linkers, mark a relationship by linear intervention: they invariably intervene between two conjuncts (Dik 1997, Johannessen 1998, and Zwart 2009). We follow this line of analysis here, arguing that the distribution of coordinators can be captured in this way.

In asymmetric structures, a linker marks a bivalent relation. In the Mandarin example just given, one linker marks the relation between 'cute' and 'black cat' and the other the relation between 'black' and 'cat'. Coordinate structures are different. *A, B, and C* expresses a *three-way* relation. This is true of the syntax, since on our account A, B, and C are adjoined to each other. It is also true of the semantics, since the coordination as a whole denotes a set whose members are A, B, and C. The three-way relation between A, B, and C can be decomposed into three two-way relations that hold between A and B, A and C, and B and C, respectively:

(90)



We will refer to these relations as A & B, A & C, and B & C. How would a linker mark such a constellation of relations? The symmetry of the structure implies that any conjunct could in principle host a coordinator. Yet not all placements are equally successful in marking the three two-way relations in (90). Recall that linkers mark a relation by attaching to one category and pointing to another. Since coordinators in English precede the conjunct they attach to, they point leftward. Hence, in *A, B, and C* the coordinator marks two relations, A & C and B & C, as shown in (91) in the first column, the one headed "A B &-C." However, a leftward shift of the coordinator reduces the number of relations it marks. As shown in the next two columns, in **A and B, C* only A & B is marked, while in **and A B C* no two-way relation is marked at all.

(91)

	A B &-C	*A &-B C	*&-A B C	A &-B &-C
A & B	Implied	Marked	Unmarked	Marked
A & C	Marked	Unmarked	Unmarked	Marked
B & C	Marked	Unmarked	Unmarked	Marked

Note that "mutually adjoined to" and "comembers of set *S*" are transitive relationships. It therefore stands to reason that marking A & C and B & C implicitly marks A & B. By contrast, marking just A & B leaves A & C and B & C unmarked. It is of course possible to explicitly mark A & B as well, but this requires an additional coordinator, as in *A and B and C*: see the last column of (91).

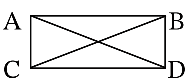
With this much in place, we can capture the distribution of coordinators in English through three constraints, listed in (92), that interact in Optimality-Theoretic fashion (Prince & Smolensky 2004). The first constraint militates against the inclusion of any coordinator (thus minimizing structure). The second constraint requires that all two-way coordinate relationships are marked (explicitly or implicitly). The third constraint requires that all such relationships are marked explicitly.

(92) a. No coordinators! (NoCo)
b. Mark coordinate relationships! (MkCo)
c. Explicitly mark coordinate relationships! (ExMk)

We assume that MkCo dominates ExMk universally. This must be so, because the opposite ranking would obliterate the empirical effects of MkCo. We further assume that in English NoCo is not ranked with respect to the other two constraints. This, then, allows any one of the following three rankings to apply to a given coordinate structure in English.

(93) a. NoCo ≫ MkCo ≫ ExMk
b. MkCo ≫ NoCo ≫ ExMk
c. MkCo ≫ ExMk ≫ NoCo

We will consider the effects of these rankings for a coordinate structure with four members. Such a coordination encodes six two-way relations that jointly make up a four-way relation.

(94)


On the ranking in (93a), it is more important to avoid coordinators than it is to mark any coordinate relations. Consequently, the coordination will be realized asyndetically, as *A, B, C, D*. As we saw in (85a), this is indeed an option in English.

On the ranking in (93b), coordinators must be attached up to the point that all coordinate relations are marked, whether explicitly or implicitly. If a single coordinator is used, MkCo is satisfied if the coordinator is attached to the final conjunct but not if it is attached to any preceding conjunct:

(95)

	A B C &-D	*A B &-C D	*A &-B C D	*&-A B C D
A & B	Implied	Implied	Marked	Unmarked
A & C	Implied	Marked	Unmarked	Unmarked
A & D	Marked	Unmarked	Unmarked	Unmarked
B & C	Implied	Marked	Unmarked	Unmarked
B & D	Marked	Unmarked	Unmarked	Unmarked
C & D	Marked	Unmarked	Unmarked	Unmarked

MkCo is also satisfied by various structures with multiple coordinators, as shown in the top half of (96). However, whereas NoCo is violated only once by *A, B, C, and D*, it is violated twice by these alternative structures. The structures in the bottom half of (96) in addition leave some coordinate relations unmarked. As a consequence, the structures in (96) are all ruled out on the ranking under consideration.

(96)

	*A B &-C &-D	*A &-B C &-D	*&-A B C &-D
A & B	Implied	Marked	Implied
A & C	Marked	Implied	Implied
A & D	Marked	Marked	Marked
B & C	Marked	Implied	Implied
B & D	Marked	Marked	Marked
C & D	Marked	Marked	Marked
	***A &-B &-C D**	***&-A B &-C D**	***&-A &-B C D**
A & B	Marked	Implied	Marked
A & C	Marked	Marked	Unmarked
A & D	Unmarked	Unmarked	Unmarked
B & C	Marked	Marked	Unmarked
B & D	Unmarked	Unmarked	Unmarked
C & D	Unmarked	Unmarked	Unmarked

On the ranking in (93c), coordinators will be attached up to the point that all coordinate relationships are marked explicitly. This cannot be achieved with one or two coordinators. The structures in (95) and (96) either leave some coordinate relationships unmarked or mark them only implicitly. But ExMk can be satisfied if a coordinator is attached to all noninitial conjuncts, as in the first column in (97). No other distribution of three coordinators has this effect.

(97)

	A &-B &-C &-D	*&-A B &-C &-D	*&-A &-B C &-D	*&-A &-B &-C D
A & B	Marked	Implied	Marked	Marked
A & C	Marked	Marked	Implied	Marked
A & D	Marked	Marked	Marked	Unmarked
B & C	Marked	Marked	Implied	Marked
B & D	Marked	Marked	Marked	Unmarked
C & D	Marked	Marked	Marked	Unmarked

Even when NoCo is ranked lowest, as in (93c), it still imposes constraints. In particular, it blocks attachment of *four* coordinators. While **and A and B and C and D* satisfies ExMk, it induces an extra violation of NoCo compared with *A and B and C and D*. It is therefore ruled out.[17,18]

In sum, the proposed marking system permits three patterns: asyndetic coordination, attachment of a coordinator to the final conjunct, and attachment of coordinators to all noninitial conjuncts. Other logically possible patterns are correctly predicted to be ungrammatical. This result flows from (i) an analysis of coordination as mutual adjunction, (ii) an analysis of coordinators as linkers, and (iii) a triplet of constraints expressing the conflicting desiderata of structural economy and the overt expression of syntactic/semantic relations.

[17] *Both* in *both Sue and Andy* and *either* in *either Sue or Andy* are best analyzed as distributive operators, rather than coordinators (Johannessen 1998, Hendriks 2001, De Vries 2005, and Johannessen 2005, among others). Thus, *Sue and Andy got married* can mean that they married each other, but *Both Sue and Andy got married* requires two weddings.

[18] **A-& B-& C-& D-&* should likewise be ruled out when the coordinator follows the category it attaches to. Certain OV languages (such as Japanese and the Dravidian languages) appear to display this pattern, but it can be shown that the relevant morpheme is not a linker (see footnote 16).

One issue remains: why should it be that asyndetic coordination triggers a sense of incompleteness or open-endedness? The answer suggested by our account is that the effect is due to the coordinate relation remaining unmarked. It stands to reason that marking a coordinate relation comes with the premise that the full set of elements of which the relation holds is marked. If so, the logic of interpretive competition predicts that lack of marking should have the opposite effect: the set denoted by the coordinate structure may have additional members.

6 | CONCLUSION

Most syntactic structures are binary branching, as first argued by Kayne 1984 and as assumed in almost all generative literature since. The question we are interested in is *why* syntactic structures should have this property. In Minimalism, the answer is that Merge, the operation that builds syntactic structure, is defined so as to combine exactly two elements into one constituent. This restriction is underpinned by considerations of simplicity or computational efficiency. Collins 1997: 76 argues, for example, that "phrase structure is binary because binary Merge is the smallest operation that will ensure that some structure actually gets built." It is true that assigning a sentence a fully flat structure is equivalent to assigning it no structure at all, and so it is also true that binarity of Merge guarantees that structure gets built that has empirical bite. However, the restriction that Merge is binary is in essence a restatement of what is to be explained. It is certainly not a hypothesis that can be tested empirically beyond the generalization that it expresses.

The alternative proposal we have explored in this article starts from a broad constraint that regulates subordination (the embedding of a maximal projection in a larger structure). The Generalized Licensing Criterion requires (i) that subordination is licensed through the discharge of a selectional requirement and (ii) that no node created by subordination may be the locus of discharge of two or more selectional requirements. This has a host of syntactic consequences, many of which are uncontroversial. In addition, it implies that structures created by subordination are binary branching.

The resulting theory is vulnerable to falsification. For example, we have shown that if the movement theory of control is correct, then our account of the binary-branching constraint must be wrong (and vice versa). In fact, the theory subsumes 15 feature cooccurrence constraints and will fall if any of these is proved incorrect.

Crucially, our proposal predicts an exception to the binary-branching constraint: it allows symmetric structures to be *n*-ary branching. A large chunk of this article was devoted to showing that this exception exists. First, we demonstrated that the Generalized Licensing Criterion implies that coordinate structures are symmetric. Second, we argued that they are built through mutual adjunction, a hypothesis that captures various facts, including the behavior of coordinate structures under selection and the absence of c-command between conjuncts. Third, we presented evidence that coordinate structures are *n*-ary branching. Relevant data included the interpretation of left- and right-attached modifiers in multitermed coordinate structures. Finally, we showed that our analysis of coordination permits a straightforward account of the distribution of coordinators in English.

The resulting system also guarantees that structure gets built, albeit more indirectly than a binary Merge operation. Symmetric structure must be interpreted as coordination, and so any other interpretation requires an asymmetric binary-branching representation.

If our characterization of coordination is correct, then the binary-branching constraint does not hold generally, and consequently an account of it based on an all-purpose binary Merge operation must be rejected.

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DATA-AVAILABILITY STATEMENT

Many of the data presented in this article are either directly taken from the literature or illustrate well-established generalizations. For these data, appropriate references are provided. New or less familiar data are given in (45)–(51), (54), and (57) and in section 4.3. These data have been constructed by or with the help of native speakers and have each been checked by at least two additional native speakers. Although there was some variation among speakers, in all cases there was unanimous agreement on the contrasts reported.

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