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REMARK

Coordination and binary branching

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Abstract

In "Subordination and Binary Branching", a recent (2023) *Syntax* paper, Ad Neeleman and colleagues proposed a new analysis of subordination. The main aim of this paper is to refute that analysis, using data from the coordination of unlike categories and unlike grammatical functions. Additionally, building on Neeleman et al.'s observations about the arbitrarily *n*-ary—not just binary—nature of coordination, I sketch a more Minimalist approach to subordination and coordination that is devoid of the problems that Neeleman et al.'s analysis faces, but otherwise covers a similar range of data. On this approach, "subordination" is a synonym of "result of PairMerge" and "coordination" is a synonym of "result of SetMerge", where SetMerge is understood as an operation creating an arbitrary set, as opposed to the usual more specialized Merge operation, which creates a binary set.

KEYWORDS

coordination of unlike categories, heterofunctional coordination, Minimalism, PairMerge, Polish, SetMerge, subordination

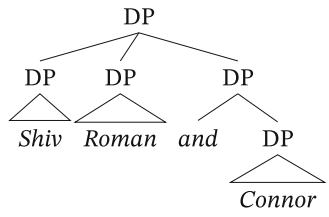
1 | INTRODUCTION

In *Subordination and Binary Branching* (SBB), Neeleman et al. (2023) review the well-known—but often ignored—arguments for flat (symmetrical) coordinate structures (see, e.g., Borsley, 1994, 2005) and adduce a new argument, based on the scope of modification. Given that such arguments have never been convincingly addressed in the thread of research that assumes the binary (asymmetrical) structure of coordination, I embrace SBB's conclusion that

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coordinations with *n* conjuncts involve *n*-ary branching, as in (1), and I assume it without further discussion in the rest of this paper.

(1)



Given that coordinations involve *n*-ary branching, Neeleman et al. (2023: 80) note that "an account of [coordination] based on an all-purpose binary Merge operation must be rejected". At the same time, they provide a theory of subordination that does not assume binary Merge but still results in strictly binary subordinate structures. §2 summarizes their theory of subordination and coordination.

The main aim of this reply to SBB is to refute Neeleman et al.'s (2023) analysis of subordination. §3 shows that it overgenerates: it furnishes some coordinate structures with subordinate analyses and generates some ungrammatical coordinations of unlike categories. More importantly, §4 demonstrates that it also undergenerates: it is incompatible with the so-called *wh&wh* constructions common in Slavic and some neighboring languages.[1] An additional aim is to sketch a possible way of preserving the view of SBB, namely that subordinations are strictly binary and coordinations are arbitrarily *n*-ary, and to reconcile it with the Minimalist view that all structure is built via simple Merge-like operations. In this conceptual rather than empirical §5, I reconsider the types of Merge postulated in the literature and propose that structure is built via two operations: PairMerge, combining exactly two elements into an ordered pair, and SetMerge, but understood as combining *any* number of elements into an unordered set. On this view, "subordination" is a synonym of "result of PairMerge" and "coordination" is a synonym of "result of SetMerge". §6 concludes the paper.

2 | GENERALIZED LICENSING CRITERION AND ITS PREDICTIONS

This section presents the *Generalized Licensing Criterion* (GLC)—the main principle postulated by Neeleman et al. (2023) in SBB—and discusses its intended predictions regarding subordination (in §2.1) and coordination (in §2.2).

2.1 | Subordination

GLC consists of two clauses: GLC-A in (2) and GLC-B in (3):

(2) Subordination of YP to X^n requires a relation between X^n and YP that discharges a selectional requirement α (where $\alpha \in \{\theta, \phi, \mu, \sigma_{XP}, \sigma_X\}$).

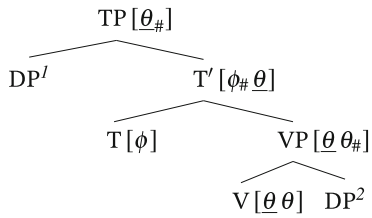
[1]Appendix A compares this construction to similar constructions in English, while Appendix B refutes an analysis of Slavic *wh&wh* which—if correct—would invalidate the argument of §4.

(3) No node created by subordination may be the locus of discharge of more than one selectional requirement taken from $\{\theta, \phi, \mu, \sigma_{XP}, \sigma_X\}$.

In (2) and (3), θ is the requirement of assigning a theta role (internal or external; the latter marked as $\underline{\theta}$) by a lexical item, ϕ is the analogous requirement by a functional head (e.g., the expectation of T to combine with VP), μ is the selectional requirement of a modifier with respect to the modified projection, and σ_{XP} and σ_X are selectional requirements of constituents containing original positions of moved elements—a phrase (in the case of σ_{XP}) or a head (in the case of σ_X)—eventually satisfied by the moved element.

The way θ and ϕ come into being, percolate, and are discharged is illustrated in (4).

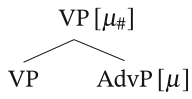
(4)



The lexical items V and T come with selectional requirements: an internal theta role θ and an external role $\underline{\theta}$ in the case of V and the selection for a VP, ϕ, in the case of the functional head T. DP^2 satisfies θ, so θ is marked as discharged, $\theta_{\#}$, at VP. On the other hand, $\underline{\theta}$ is not discharged here, so it percolates up the tree to VP. Similarly, ϕ is discharged by the VP, so it is marked as such at T′. And finally, $\underline{\theta}$ is discharged by DP^1 at the top of the tree in (4).

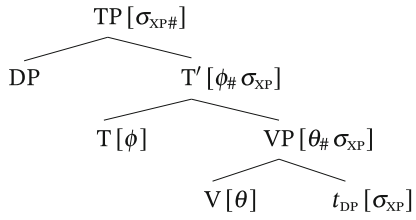
The way μ works is similar, the only difference being that it originates in a non-head (namely a modifier); a typical configuration in which μ is discharged is given in (5).

(5)



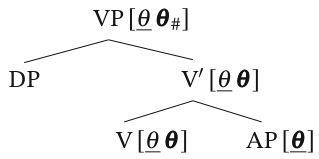
Finally, σ_{XP} and σ_X are introduced by traces and they percolate up to be discharged by the moved element. The following tree illustrates this in the case of σ_{XP} (ignoring $\underline{\theta}$ possibly introduced by V).

(6)



Apart from such direct ways of discharging a selectional requirement, Neeleman et al. (2023) also allow for discharging via 'identification', that is, via the unification of two (or more) requirements. This happens, for example, when the external theta role of a secondary predicate (e.g., *raw*) is identified with an internal theta role of a verb (e.g., *ate*, as in *She ate the fish raw*). This is schematically shown in (7), where the unified theta roles are in bold.

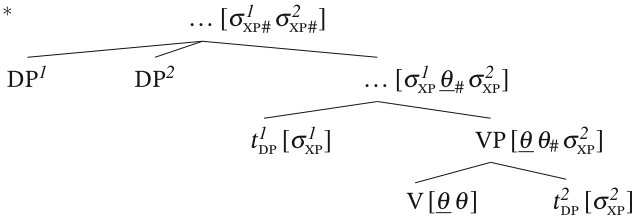
(7)



In this case, GLC licenses the node V′ as created by subordination because two roles—$\boldsymbol{\theta}$ in V (*ate*, in the example at hand) and $\underline{\boldsymbol{\theta}}$ in AP (*raw*)—are reduced to the single $\boldsymbol{\theta}$ role in V′ (*ate raw*), discharged in VP by the DP (*the fish*).

Note that, in accordance with GLC in (2) and (3), exactly one selectional requirement is discharged in each non-terminal node in all trees (4)–(7). An example of a configuration forbidden by GLC is given in (8), where two selectional requirements σ_{XP} are discharged at the topmost node.

(8) *

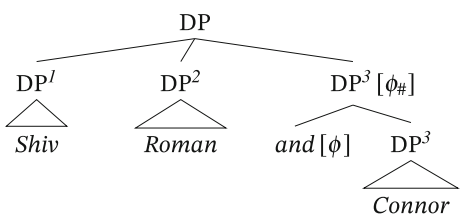


2.2 | Coordination

Because the scope of GLC is limited to *subordinate* structures, coordination is not restricted to binary branching. SBB reviews well-known arguments against such a restriction (see, e.g., Borsley, 1994, 2005) and adds a new strong argument (from the scope of modification) for flat coordinate structures. I accept the validity of such arguments and, for reasons of space, do not discuss them here. Let us just note that such arguments have long been considered conclusive within theories such as LFG (Lexical-Functional Grammar) and HPSG (Head-driven Phrase Structure Grammar), where all conjuncts are taken to be sisters (see, e.g., Dalrymple et al., 2019: ch. 6, and Abeillé & Chaves, 2021).

The specific structure for a coordination such as *Shiv, Roman, and Connor* is given in (9):

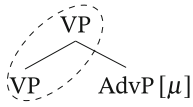
(9)



The coordinator *and* is treated here as a functional head, a total functor that selects (via ϕ) an argument (here, DP^3) and passes up all the properties of this argument, so that the higher DP^3 in (9) has exactly the same features as the lower DP^3.

Neeleman et al. (2023) assume that such structures are created via *multiple* adjunction. A typical *single* adjunction structure is that in (5), repeated with some notational modifications in (10):[2]

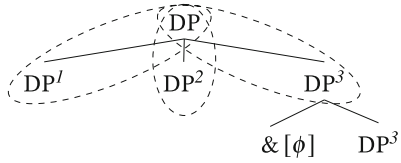
(10)



In such structures, there are multiple nodes corresponding to a single category. In the case of (10), the two nodes marked as VP are segments of the single VP category, as indicated by the dashed ellipse.

Similarly, in coordinate structures, each conjunct adjoins to all other conjuncts, so the structure in (9) may be represented as in (11); there are three bisegmental categories here: DP–DP^1, DP–DP^2, and DP–DP^3.

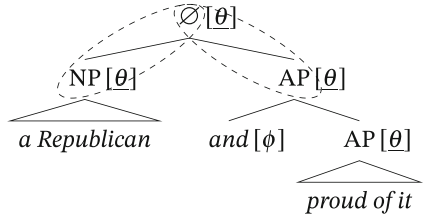
(11)



SBB extends this analysis to cases of unlike category coordination, such as the classical (12) (Sag et al., 1985: 117, (2b)), involving coordination of a noun phrase *a Republican* and an adjectival phrase *proud of it*; the corresponding bisegmental categories in (13) are ∅–NP and ∅–AP.

(12) Pat is [a Republican and proud of it].

(13)



The assumption that makes this analysis possible is formulated in Neeleman et al. (2023: 56) as follows:

(14) 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 β, and (ii) α and β are identical in arity.

In (13), the empty set ∅ is a subset of the set of categorial features represented as NP, and similarly for AP, so the two bisegmental categories ∅–NP and ∅–AP satisfy condition (i) of (14). They also satisfy condition (ii), as all relevant nodes have the same selectional requirement of an external theta role $\underline{\theta}$.

Given that the topmost node in such unlike category coordinations belongs to all multisegmental categories, which contain categorial features of particular conjuncts, restrictions on this

[2]I assume that—while, say, AdvP [μ] in (5) and (10) indicates that the AdvP node contains the selectional requirement μ—VP [$\mu_{\#}$] in (5) does *not* mean that the VP node contains a feature $\mu_{\#}$. That is, I assume that $\alpha_{\#}$ in Neeleman et al.'s (2023) trees (for any selectional requirement α) is just a notational convention for making explicit the lack of the selectional requirement α on a given node. Hence the disappearance of [$\mu_{\#}$] in (10).

node must be satisfied by all conjuncts. For example, to the first approximation, BECOME selects for an NP (as in *Danny became a political radical*) or an AP (e.g., *Danny became very antisocial*), but not, say, a PP (hence, **Danny became under suspicion*), and these restrictions must be satisfied by all conjuncts, as the following examples demonstrate (Neeleman et al., 2023: 57–58, (29a) and (33a–e)).

(15) a. Danny became [a political radical and very antisocial].

b. Danny became [very antisocial and a political radical].

c. *Danny became [under suspicion and a political radical].

d. *Danny became [a political radical and under suspicion].

e. *Danny became [under suspicion and very antisocial].

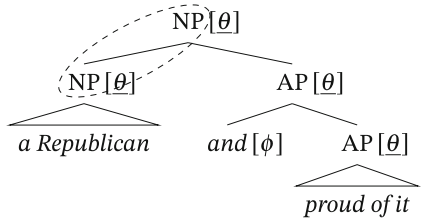
f. *Danny became [very antisocial and under suspicion].

This is a very attractive picture of coordination, one that does not try to explain unlike category coordination away.[3] The next two sections argue that the approach to *subordination* sketched in §2.1 is less attractive.

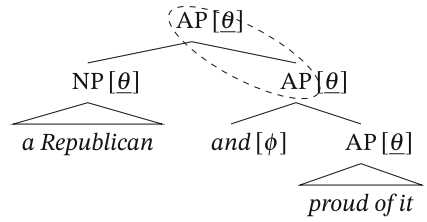
3 | COORDINATION OF PREDICATES

Consider again the structure of *a Republican and proud of it* in (13) in §2.2. It shares an important aspect of the analysis of secondary predication in (7) in §2.1, namely the identification of two selectional requirements. This means that structures of this kind are also licensed by GLC and may be analyzed as cases of subordination:

(16)



(17)



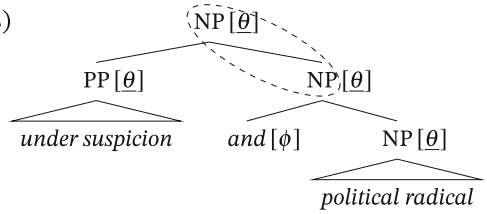
In both (16) and (17), the top node is licensed by GLC because the two external theta roles of *a Republican* and of *proud of it* are identified and reduced to one. As a result, the top node's categorial features are shared with only one of the conjuncts, that is, these analyses correspond to asymmetrical approaches to coordination of the kind explicitly argued against in Neeleman et al. (2023: §3). This means that GLC overgenerates by allowing for subordinate analyses of certain coordinate structures.

But the problem is more serious, as it also leads to successful analyses of ungrammatical strings. Note that *a Republican and proud of it* is an NP on the analysis in (16) and an AP according

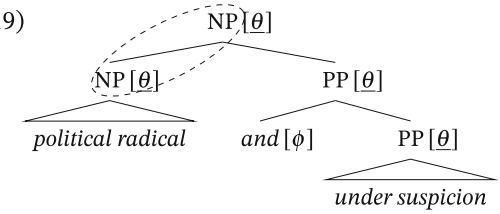
[3]See Bruening and Al Khalaf (2020) for such an attempt, Patejuk and Przepiórkowski (2023) for a rebuttal, Bruening (2023: 1) for an acknowledgement that "[Patejuk & Przepiórkowski, 2023] are correct, and there is no requirement that conjuncts match in syntactic category", and Przepiórkowski (2022b) for further arguments for the coordination of unlikes.

to (17). More generally, an arbitrary coordinate structure of predicates, with any number of conjuncts, may be analyzed via binary subordination, with the category of the whole coordination the same as that of any of the conjuncts. This is exemplified in (18) and (19), where coordinations of an NP and a PP are analysed as NPs, that is, as satisfying selectional restrictions of BECOME, contrary to facts in (15c,d).

(18)



(19)



This means that—on the setup presented in SBB—coordination of categorially unlike predicates is predicted to be grammatical as long as at least one of the conjuncts satisfies selectional restrictions. In particular, all of unacceptable (15c–f) are in fact predicted to be grammatical, as they all contain an NP conjunct or an AP conjunct.[4]

I do not consider this overgeneration problem to be fatal to Neeleman et al.'s (2023) analysis. The simplest solution would be to require that discharging a selectional requirement in GLC be understood more narrowly, as a direct elimination of a requirement (i.e., as slash elimination, in terms of categorial grammars), to the exclusion of elimination via identification. This would require a different analysis of secondary predication than envisaged in SBB, but it is not difficult to imagine such an analysis.[5] Nevertheless, this challenge suggests that perhaps the role of GLC in delineating subordination and coordination should be reconsidered.

4 | HETEROFUNCTIONAL COORDINATION

Slavic languages are multiple *wh*-fronting languages (see (20)), and it is well known that the fronted *wh*-phrases may be coordinated (see (21); both examples from Gribanova, 2009: 134, with (21) originally from Kazenin, 2001).

(20) Kto kakoj gorod zaxvatil? (Russian)
who.NOM which.ACC city.ACC conquered.3SG
'Who conquered which city?'

(21) [Kto i kakoj gorod] zaxvatil? (Russian)
who.NOM and which.ACC city.ACC conquered.3SG
'Who conquered which city?', lit. '[Who and which city] conquered?'

The so-called *wh&wh* construction in (21) illustrates a broader phenomenon—called, variously, Lexico-Semantic Coordination, Hybrid Coordination, and, most transparently, Heterofunctional

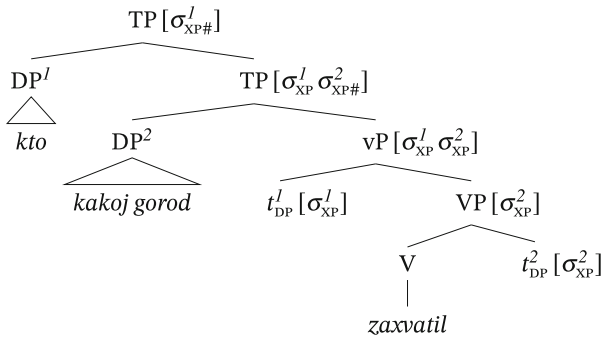
[4]As mentioned by an anonymous reviewer, on the SBB account, any coordination of unary predicates gives rise to a similar subordination analysis, which results in spurious ambiguities (but not necessarily in overgeneration, as in the case of unlike category predicates discussed above).

[5]For example, the secondary predicate, apart from requiring an external theta role, could also select for an internal theta role, to be discharged by the verb (whose internal theta role would have to be identified with the external theta role of the secondary predicate in the process).

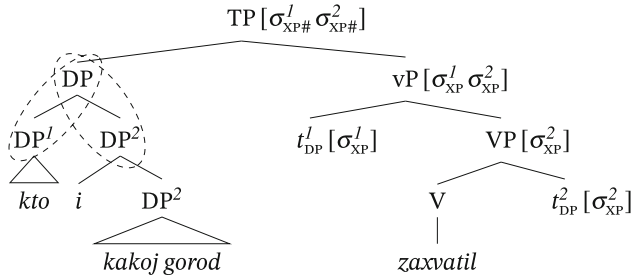
Coordination (HC)—in which certain quantificational expressions bearing different grammatical functions may be coordinated.[6] As repeatedly argued, in Slavic and at least Hungarian, such constructions cannot all be analysed in terms of ellipsis; the relevant arguments may be found, for example, in Kazenin (2001), Gribanova (2009: 136–137), and Paperno (2012: 99–102) (for Russian), in Skrabalova (2007: §§2 and 5) (for Czech), and in Lipták (2003) and Bîlbîie and Gazdik (2012: §3.3) (for Hungarian), and they are not repeated here for reasons of space.[7] That is, I take it as established that examples such as (21) involve direct coordination of *wh*-phrases.

The vanilla multiple *wh*-fronting example in (20) is not a problem for GLC; its schematic structure—showing that selectional requirements associated with phrase movement are discharged one by one—is given in (22).[8]

(22)



(23)



What is incompatible with GLC is the HC example in (21), whose structure is shown in (23). This kind of structure—but with the usual derivational representation of coordination as headed by the conjunction (as in Munn, 1987, Zoerner, 1995, Johannessen, 1998, etc.)—is argued for, and generated via sideward movement, in Zhang (2007: §2.3), and it is assumed by Gribanova (2009: §2.2) to be valid for all languages that allow for the coordination of heterofunctional *wh*-phrases. It is also assumed in Gračanin-Yüksek (2007: ch. 6) as one of two structures of such coordinations in Croatian, in Haida and Repp (2011), in Citko and Gračanin-Yüksek (2013: §2.2) as the only representation of such coordinations in Bulgarian and

[6]On the empirical scope of HC, see especially Paperno (2012: ch. 3) and Patejuk (2015: ch. 5), with semantic analyses provided by Paperno (2012: chs. 4–5) and Przepiórkowski (2022a, 2022c). An anonymous reviewer asks whether there is a connection between Slavic HC and English constructions such as *He read the book and quickly*. It seems that there is not; see Appendix A for discussion.

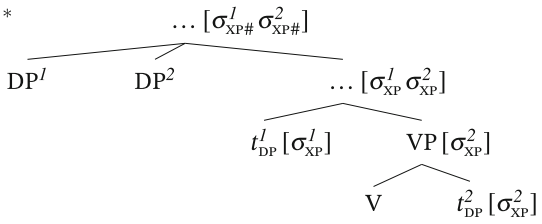
[7]The case of Romanian is less clear (see, e.g., Bîlbîie & Gazdik, 2012 and Citko & Gračanin-Yüksek, 2013). See also Zhang (2007: §2.2) for arguments pertaining to English, Russian, and Chinese.

[8]For readability, this structure ignores various heads, projections, and selectional requirements other than σ_{XP}, and it assumes that fronted *wh*-phrases are adjoined to TP (cf. Gribanova, 2009).

one of two or three representations of HC available in each of the other Slavic languages, and so on, and most recently in Bošković (2022, 2023). In brief, the availability of structures such as (23) in all Slavic languages is almost universally assumed by scholars working on HC. (An exception is discussed—and refuted—in Appendix B.)

The structure in (23) should be compared with Neeleman et al.'s (2023) example in (8) above, simplified below as (24), of a structure rejected by GLC.

(24) *



In both, the problem is exactly the same: two σ_{XP} selectional requirements are discharged at one node, in direct violation of the part of GLC in (3) ("No node created by subordination may be the locus of discharge of more than one selectional requirement … ").

Neeleman et al. (2023: 51) admit that their proposal "cannot be correct if we find instances of subordination in which multiple selectional requirements are discharged". In particular, GLC cannot be repaired by the following modification of GLC-B, consisting in adding the words *type of*:

(25) No node created by subordination may be the locus of discharge of more than one *type of* selectional requirement taken from $\{\theta, \phi, \mu, \sigma_{XP}, \sigma_X\}$.

On the positive side, such a version of GLC would license the binary HC structure in (23), where two requirements of type σ_{XP} are discharged, and it would also make it possible to analyze reflexivization via a simultaneous assignment of two θ-roles, as postulated, for example, in Reinhart and Siloni (2005) and Dimitriadis and Everaert (2014), but without the need to first bundle them into a single θ-role. Unfortunately, this version of GLC would also allow for n-ary subordinate structures such as (24) or such as a VP dominating a ditransitive V and its both arguments simultaneously licensed via a multiple discharge of the V's requirements of type θ. I see no way of repairing GLC that would not require a stipulation of the binary nature of subordination. But such a stipulation would result in GLC losing much of its explanatory appeal.

5 | A MINIMALIST ALTERNATIVE

Let us take stock. Given that—as convincingly argued by Borsley (1994, 2005), Neeleman et al. (2023), and others—coordinations may involve arbitrarily n-ary structures, the usual Merge, as defined in (26), cannot be the (only) structure-building operation in syntax.

(26) $Merge(\alpha, \beta) = \{\alpha, \beta\}$

However, as demonstrated in §§3 and 4, the alternative view proposed in Neeleman et al. (2023) to explain the existence of binary subordinations and n-ary coordinations both overgenerates and

undergenerates. How could this conundrum be solved within the Minimalist set of assumptions?[9] Let us start by taking a closer look at Merge-like operations postulated in the Minimalist literature.

It is sometimes pointed out that the single Merge operation defined in (26) is not sufficient to explain all linguistic phenomena, including adjunction and coordination. For these phenomena, the additional operation of PairMerge was introduced in Chomsky (2000, 2004) and has since been assumed in countless analyses:[10]

(27) $\mathit{PairMerge}(\alpha, \beta) = \langle \alpha, \beta \rangle$

Unfortunately, PairMerge is even less helpful than ordinary Merge in building a symmetrical n-ary coordination structure advocated in SBB, as it is not only strictly binary but also inherently asymmetric.

A more specialized "FormSequence" operation creating an arbitrarily n-ary ordered list is suggested in Chomsky (2020), whose simplified version may be defined as in (28).[11]

(28) $\mathit{SequenceMerge}(\alpha_1, \ldots, \alpha_n) = \langle \alpha_1, \ldots, \alpha_n \rangle$

Chomsky (2020: 50) argues that an ordered list is necessary to represent coordination, citing examples involving *respectively*, for example

(29) John and Bill are young and tall, respectively.

However, while an operation such as (28) does form a structure out of n elements, it is an *asymmetric* structure, in which the order of the elements matters. As such, it does not faithfully model the n-ary *symmetric* structure argued for in SBB.

Moreover, as convincingly argued by Chaves (2012: 301), "the correct generalization is that a one-to-one mapping between pluralities [in *respectively* constructions] is established via some pragmatic ranking due to context, surface order, or world knowledge". An example of non-linguistic context providing the mapping is (30) (Chaves, 2012: (8a)), which does not involve any coordinate structures:

(30) The following two sections will deal with these two issues, respectively.

Hence, *respectively* facts do not provide an argument for the *ordered* n-ary SequenceMerge.

However, the three types of Merge-like operations discussed above immediately suggest another one, one that completes the square of oppositions: ordered versus unordered and binary versus n-ary, namely the arbitrarily n-ary unordered SetMerge:

(31) $\mathit{SetMerge}(\alpha_1, \ldots, \alpha_n) = \{\alpha_1, \ldots, \alpha_n\}$

[9] Throughout this paper, I *assume* Minimalism without necessarily *endorsing* it. As argued, for example, in Pullum and Scholz (2001, 2005), as well as in Langendoen and Postal (1984) and Postal (2004, 2023), there are good reasons to prefer model-theoretic approaches, such as HPSG or LFG, to proof-theoretic approaches, such as Categorial Grammar or Minimalism.

[10] To emphasize the contrast, the usual binary Merge in (26) is sometimes called SetMerge, but I will define SetMerge more generally in (31) below.

[11] As noted in Freidin (2021: 18, n. 34), it is not clear whether this sequence-forming operation is in addition to or a replacement of PairMerge.

I propose that the two types of structures in natural languages—*n*-ary coordinations and binary subordinations—are best analyzed within Minimalism as a direct consequence of the availability of exactly two of the four potential structure-building operations listed above, namely SetMerge and PairMerge. That is, syntactic structures may be recursively defined as follows:[12]

(32) **Syntactic Structures** (SSs):

1. if α is an element of the lexicon, then α is an SS (call such an SS "lexical item");
2. if α and β are SSs, then so is $PairMerge(\alpha, \beta) = \langle \alpha, \beta \rangle$ (call such an SS "subordination");
3. if $\alpha_1, \ldots, \alpha_n$ are SSs, then so is $SetMerge(\alpha_1, \ldots, \alpha_n) = \{\alpha_1, \ldots, \alpha_n\}$ (call such an SS "coordination");
4. nothing else is an SS.

On this view, "coordination" is a linguistic term for the result of SetMerge, and "subordination" is a term for the result of PairMerge. It immediately follows from this definition that coordinations may consist of an arbitrary number of constituents (at least 2, if a non-trivial structure is to be built), while subordinations are strictly binary.

I also assume two conditions on these two operations, analogous to those in SBB:

(33) **PairMerge Condition**:
Any structure created by PairMerge is the locus of discharge of exactly one type α of selectional requirements (where $\alpha \in \{\theta, \sigma_{XP}, \ldots\}$).

(34) **SetMerge Condition**:
Any structure created by SetMerge (i) has the same selectional requirements as each argument, and (ii) is a segment of the same category as each argument.

The PairMerge Condition in (33) is an analogue of GLC, but the requirement that exactly one selectional requirement is discharged is relaxed here to the requirement that exactly one *type of* selectional requirement is discharged. The empirical motivation for this relaxation is provided by the HC facts discussed in §4, and perhaps also by multiple theta role assignment to arguments of reflexive verbs, which currently requires bundling these theta roles into a single role (Dimitriadis & Everaert, 2014; Reinhart & Siloni, 2005). Apart from that, this condition has a similar effect to GLC: it does not allow for different kinds of requirements to be discharged in a single subordination node, so it would be falsified by a proof that the movement theory of control is right (where both θ and σ_{XP} are discharged) or by a structure where an element is simultaneously an argument and a modifier (where θ and μ would be discharged).

Moreover, as argued in §3, the identification of selectional requirements cannot count as discharging a requirement for the purpose of PairMerge Condition. On the other hand, the identification of *all* selectional requirements (if any) is a necessary feature of structures created by

[12] According to this recursive definition, PairMerge and SetMerge are recursive operations in the same sense in which programming routines may be recursive: outputs of these operations may act as inputs to these operations. This should be contrasted with an operation such as, say, Herd: if $e_1, \ldots, e_n$ are elephants, then $Herd(e_1, \ldots, e_2) = \{e_1, \ldots, e_2\}$. Since only single elephants (and not whole herds) may be arguments of this operation, its result—a herd of elephants—cannot be an argument of Herd, so this is not a recursive operation.

SetMerge. This is regulated by the SetMerge Condition in (34), which repeats SBB's assumptions about coordinate structures almost verbatim.

In fact, while replacing GLC with the similar PairMerge Condition makes it possible to avoid the problems discussed in §§3 and 4, otherwise the proposal of this section may be viewed as a relatively minor variant of the account in SBB. To see that, note first that Neeleman et al. (2023) are not explicit about the nature of fundamental syntactic operations, but—given their analysis of coordination—they are bound to assume the existence of an operation that forms a symmetric structure out of n elements, that is, an operation such as SetMerge.

Where I postulate another operation that creates subordinate structures, PairMerge, they aim to restrict SetMerge to a binary operation via GLC in the case of subordination. This seems to be a major difference between the two views, but it is not clear to me whether it really is substantial. The reason is that, on the view in SBB, subordination is not just asymmetrical in the sense that a selectional restriction of one element gets discharged, but also in the orthogonal sense that one element is the head and provides the label for the whole structure. As discussed in SBB, these are different asymmetries: the element whose selectional restriction is discharged may be either the head (in the case of θ, ϕ, and σ_{XP}) or the non-head (in the case of μ and σ_{X}). So, also on the setup in SBB, there must be a mechanism—perhaps a labeling algorithm of the kind discussed in Chomsky (2013)—that distinguishes one of the two elements of subordinate structures, effectively creating a pair.[13] That is, where I explicitly assume PairMerge, Neeleman et al. (2023) must also assume some kind of a pair-forming operation, which distinguishes one element of the binary set as the head.

In summary, the explicit adoption of PairMerge and SetMerge as the two structure-building operations in syntax, regulated by the conditions in (33) and (34), results in empirical predictions which are very similar to those in SBB, but it is immune to the problems discussed in §§3 and 4.

6 | CONCLUSION

The key claim in SBB is that subordination is necessarily binary while coordination is arbitrarily n-ary. A new principle, the *Generalized Licensing Criterion* of (2) and (3), is postulated to explain this state of affairs, a principle that lists specific kinds of subordination relations and contains a stipulation that exactly one selectional requirement must be discharged in each node involving subordination. This opens the possibility that, when such requirements are not discharged, nodes do not have to be binary, and Neeleman et al. (2023) argue that coordination is indeed arbitrarily n-ary.

The main aim of this paper was to present two challenges to GLC. The first, discussed in §3, concerned the coordination of predicates, which—according to GLC—may be analyzed as subordination, which in turn leads to overgeneration of unlike category coordinations. The second and more serious challenge, presented in §4, was based on the phenomenon of HC, where a number of selectional requirements are discharged at one node, in direct violation of GLC. Unless these problems find non-stipulative solutions, GLC cannot be maintained in its current form.

[13] Chomsky's (2005: 15–16) dissent notwithstanding, a two element set with one element distinguished is nothing less than a pair. This is made explicit in Kuratowski's (1921) definition of a pair $\langle a, b\rangle$ as the set $\{\{a, b\}, \{a\}\}$—or, even more so, in its short version, as the set $\{\{a, b\}, a\}$—that is, a structure consisting of the two-element set $\{a, b\}$ and (the singleton set containing) the distinguished element a.

However, this does not mean that the claim about binary subordination and *n*-ary coordination needs to be given up. In §5, I suggested that this dichotomy immediately follows from the availability of two recursive structure-building operations in syntax, namely PairMerge (resulting in binary subordinations) and SetMerge (resulting in *n*-ary coordinations). A case could be made for the higher cognitive plausibility of these two operations—corresponding to non-recursive operations available to some non-linguistic organisms—than the more specialized binary Merge,[14] but I do not attempt to fully develop such a case here.

Whether or not the proposal sketched in §5 turns out to be on the right track, I hope that the challenges presented in §§3 and 4 inspire research on empirically adequate theories of binary subordinations and arbitrarily *n*-ary coordinations.

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DATA AVAILABILITY STATEMENT

Many of the data presented in this article are taken from the literature; for these data, appropriate references are provided. Example (A5) in Appendix A was offered by a reviewer. Two examples in the appendix that illustrate prosody, (A6) and (A7), are the author's, and were discussed with native speakers. Two further examples come from the English Web 2015 corpus: (A8) and (A9). Most of the Polish examples in Appendix B are from Citko (2013) (and are explicitly marked as such), but (B7)–(B8) and (B13) are the author's and were confirmed by other native speakers of Polish. Additionally, the attested (B14) was found via Google.

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REFERENCES

Abeillé, A., and R. Chaves. 2021. "Coordination." In *Head-Driven Phrase Structure Grammar: The Handbook*, edited by S. Müller, A. Abeillé, R. D. Borsley, and J.-P. Koenig, 725–776. Berlin: Language Science Press.

Bîlbîie, G., and A. Gazdik. 2012. "Wh-Coordination in Hungarian and Romanian Multiple Questions." *Empirical Issues in Syntax and Semantics* 9: 19–36. http://www.cssp.cnrs.fr/eiss9/.

Borsley, R. D. 1994. "In Defense of Coordinate Structures." *Linguistic Analysis* 24(3–4): 218–245.

Borsley, R. D. 2005. "Against ConjP." *Lingua* 115: 461–482. https://doi.org/10.1016/j.lingua.2003.09.011.

Bošković, Ž. 2022. "*Wh&Wh Coordinations*." Unpublished manuscript. University of Connecticut. https://ling.auf.net/lingbuzz/006842.

Bošković, Ž. 2023. "*Multiple Wh-Fronting in a Typological Setting: What Is behind Multiple Wh-Fronting?*" Unpublished manuscript. University of Connecticut. https://ling.auf.net/lingbuzz/007218.

Bruening, B. 2023. "Selectional Violations in Coordination (A Response to Patejuk and Przepiórkowski to appear)." https://doi.org/10.1162/ling·a·00506. To appear in *Linguistic Inquiry*.

Bruening, B., and E. Al Khalaf. 2020. "Category Mismatches in Coordination Revisited." *Linguistic Inquiry* 51(1): 1–36. https://doi.org/10.1162/ling_a_00336.

Chaves, R. P. 2012. "Conjunction, Cumulation and Respectively Readings." *Journal of Linguistics* 48(2): 297–344.

[14]It is well known that many animals have cognitive representations of various relations (see, e.g., Hauser, 2000, de Waal, 2016, etc.), including social and family relations, so such animals, including higher primates, must have cognitive representations of ordered pairs that are independent of language. Similarly, they must have language-independent representations of at least certain kinds of sets ("this pride of lions", "that herd of elephants", etc.). By contrast, it is not clear that animals have representations of binary sets distinct in any way from general representations of arbitrary sets.

Chomsky, N. 2000. “Minimalist Inquiries: The Framework.” In *Step by Step*, edited by R. Martin, D. Michaels, and J. Uriagereka, 89–155. Cambridge, MA: MIT Press.

Chomsky, N. 2004. “Beyond Explanatory Adequacy.” In *Structures and beyond: The Cartography of Syntactic Structures*, Vol 3, edited by A. Belletti, 104–131. Oxford: Oxford University Press.

Chomsky, N. 2005. “Factors in Language Design.” *Linguistic Inquiry* 36(1): 1–22.

Chomsky, N. 2013. “Problems of Projection.” *Lingua* 130: 33–49.

Chomsky, N. 2020. *The UCLA Lectures*. https://ling.auf.net/lingbuzz/005485.

Citko, B. 2013. “The Puzzles of *Wh*-Questions with Coordinated *Wh*-Pronouns.” In *Challenges to Linearization*, edited by T. Biberauer and I. Roberts, 295–329. De Gruyter Mouton: Berlin/Boston. https://doi.org/10.1515/9781614512431.295.

Citko, B., and M. Gračanin-Yüksek. 2013. “Towards a New Typology of Coordinated *Wh*-Questions.” *Journal of Linguistics* 49(1): 1–32. https://doi.org/10.1017/s0022226712000175.

Condoravdi, C., M. Dalrymple, D. Haug, and A. Przepiórkowski. 2019. “Modification of DPs by Epistemic Adverbs.” In *Proceedings of the 29th Semantics and Linguistic Theory Conference (SALT 29)*, edited by K. Blake, F. Davis, K. Lamp, and J. Rhyne, 477–495. https://doi.org/10.3765/salt.v29i0.4613.

Coppock, E., and L. Champollion. 2022. *Invitation to Formal Semantics. Draft of January 18, 2022*. https://eecoppock.info/bootcamp/semantics-boot-camp.pdf.

Dalrymple, M., J. J. Lowe, and L. Mycock. 2019. *The Oxford Reference Guide to Lexical Functional Grammar*. Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780198733300.001.0001.

de Waal, F. 2016. *Are we Smart Enough to Know how Smart Animals Are?* New York: W. W. Norton & Company.

Dimitriadis, A., and M. Everaert. 2014. “How Many Theta Roles in a Reflexive Verb?” *Acta Linguistica Hungarica* 61(3): 247–269. https://doi.org/10.1556/ALing.61.2014.3.1.

Freidin, R. 2021. “The Strong Minimalist Thesis.” *Philosophies* 6(4): 1–19. https://doi.org/10.3390/philosophies6040097.

Gračanin-Yüksek, M. 2007. *About Sharing*. PhD dissertation. Cambridge, MA: Massachusetts Institute of Technology.

Gribanova, V. 2009. “Structural Adjecency and the Typology of Interrogative Interpretations.” *Linguistic Inquiry* 40(1): 133–154. https://doi.org/10.1162/ling.2009.40.1.133.

Haida, A., and S. Repp. 2011. “Monoclausal Question Word Coordinations across Languages.” In *NELS 39: Proceedings of the 39th Annual Meeting of the North East Linguistic Society*, edited by S. Lima, K. Mullin, and B. Smith, 352–372.

Hauser, M. D. 2000. *Wild Minds: What Animals Really Think*. London: Allen Lane.

Heim, I., and A. Kratzer. 1998. *Semantics in Generative Grammar*. Malden, MA: Blackwell.

Johannessen, J. B. 1998. *Coordination*. Oxford: Oxford University Press.

Johnson, K. 2012. “Towards Deriving Differences in how *Wh* Movement and QR Are Pronounced.” *Lingua* 122(6): 529–553.

Kazenin, K. I. 2001. “*On Coordination of Wh-Phrases in Russian*.” Unpublished manuscript. University of Tübingen and Moscow State University. https://www.lingexp.uni-tuebingen.de/sfb441/b2/papers/whcord.pdf.

Kilgarriff, A., V. Baisa, J. Bušta, M. Jakubíček, V. Kovář, J. Michelfeit, P. Rychlý, and V. Suchomel. 2014. “The Sketch Engine: Ten Years on.” *Lexicography* 1: 7–36.

Kilgarriff, A., P. Rychlý, P. Smrž, and D. Tugwell. 2008. “The Sketch Engine.” In *Practical Lexicography. A Reader*, edited by T. Fontenelle, 297–306. Oxford: Oxford University Press.

Kuratowski, K. 1921. “Sur la notion de l’ordre dans la théorie des ensembles.” *Fundamenta Mathematicae* 2: 161–171. https://doi.org/10.4064/fm-2-1-161-171.

Langendoen, D. T., and P. M. Postal. 1984. *The Vastness of Natural Languages*. Oxford: Basil Blackwell.

Larson, B. 2013. *The Syntax of Non-syntactic Dependencies*. PhD dissertation. College Park, MD: University of Maryland.

Lipták, A. 2003. “Conjoined Questions in Hungarian.” In *Multiple Wh-Fronting*, edited by C. Boeckx and K. K. Grohmann, 141–160. Amsterdam: John Benjamins. https://doi.org/10.1075/la.64.10lip.

Lipták, A. 2011. “Strategies of Wh-Coordination.” *Linguistic Variation* 11(2): 149–188. https://doi.org/10.1075/lv.11.2.02lip.

Munn, A. 1987. “Coordinate Structure and X-Bar Theory.” *McGill Working Papers in Linguistics* 4: 121–140.

Neeleman, A., J. Philip, M. Tanaka, and H. van de Koot. 2023. "Subordination and Binary Branching." *Syntax* 26(1): 41–84. https://doi.org/10.1111/synt.12244.

Paperno, D. 2012. *Semantics and Syntax of Non-standard Coordination*. PhD dissertation. Los Angeles: University of California.

Patejuk, A. 2015. *Unlike Coordination in Polish: An LFG Account*. PhD dissertation. Cracow: Institute of Polish Language, Polish Academy of Sciences.

Patejuk, A., and A. Przepiórkowski. 2023. "Category Mismatches in Coordination Vindicated." *Linguistic Inquiry* 54(2): 326–349. https://doi.org/10.1162/ling_a_00438.

Postal, P. M. 2004. "The Openness of Natural Languages." In *Skeptical Linguistic Essays*, edited by P. M. Postal, 173–201. Oxford: Oxford University Press.

Postal, P. M. 2023. *Natural Languages Are Not Generative Systems 2023*. Unpublished manuscript. https://ling.auf.net/lingbuzz/007222.

Potter, D., and M. Frazier. 2021. "English *Wh&Wh* Constructions: Conjoin and Move." In *Proceedings of the 38th West Coast Conference on Formal Linguistics*, edited by R. Soo, U. Y. Chow, and S. Nederveen, 355–365. Somerville, MA: Cascadilla Proceedings Project.

Progovac, L. 1999. "Events and Economy of Coordination." *Syntax* 2(2): 141–159.

Przepiórkowski, A. 2022a. "A Compositional Intersective Account of Heterofunctional Coordination." In *Proceedings of Semantics and Linguistic Theory*, Vol 32, edited by J. R. Starr, J. Kim, and B. Öney, 270–293. https://doi.org/10.3765/salt.v1i0.5333.

Przepiórkowski, A. 2022b. "Coordination of unlike Grammatical Cases (and unlike Categories)." *Language* 98(3): 592–634. https://doi.org/10.1353/lan.0.0272.

Przepiórkowski, A. 2022c. "Polyadic Cover Quantification in Heterofunctional Coordination." In *Proceedings of Sinn Und Bedeutung*, Vol 26, edited by D. Gutzmann and S. Repp, 677–696. https://ojs.ub.uni-konstanz.de/sub/index.php/sub/issue/view/30.

Pullum, G. K., and B. C. Scholz. 2001. "On the Distinction between Model-Theoretic and Generative-Enumerative Syntactic Frameworks." In *Logical Aspects of Computational Linguistics: 4th International Conference*. Lecture Notes in Artificial Intelligence, Vol 2099, edited by P. de Groote, G. Morrill, and C. Retoré, 17–43. Berlin: Springer-Verlag. https://doi.org/10.1007/3-540-48199-0_2.

Pullum, G. K., and B. C. Scholz. 2005. "Contrasting Applications of Logic in Natural Language Syntactic Description." In *Logic, Methodology and Philosophy of Science: Proceedings of the Twelfth International Congress*, edited by P. Hájek, L. Valdés-Villanueva, and D. Westerståhl, 481–503. London: College Publications Department of Computer Science, KCL.

Raţiu, D. 2011. "A Multidominance Account for Conjoined Questions in Romanian." In *Romance Linguistics 2010: Selected Papers from the 40th Linguistic Symposium on Romance Languages (LSRL), Seattle, Washington, March 2010*, edited by J. Herschensohn, 257–269. Amsterdam: John Benjamins. https://doi.org/10.1075/cilt.318.16rat.

Reinhart, T., and T. Siloni. 2005. "The Lexicon-Syntax Parameter: Reflexivization and Other Arity Operations." *Linguistic Inquiry* 36(3): 389–436.

Sag, I. A., G. Gazdar, T. Wasow, and S. Weisler. 1985. "Coordination and how to Distinguish Categories." *Natural Language and Linguistic Theory* 3(2): 117–171.

Skrabalova, H. 2007. "Wh-Questions with Conjoined Wh-Words." In *Czech in Generative Grammar*, edited by M. Dočekal, P. Karlik, and J. Zmrzlíková, 161–174. Lincom: Munich.

Tomaszewicz, B. 2011. "Against Spurious Coordination in Multiple Wh-Questions." In *Proceedings of the 28th West Coast Conference on Formal Linguistics*, edited by M. B. Washburn, K. McKinney-Bock, E. Varis, A. Sawyer, and B. Tomaszewicz, 186–195. Somerville, MA: Cascadilla Proceedings Project.

Zhang, N. N. 2007. "The Syntactic Derivations of Two Paired Dependency Constructions." *Lingua* 117: 2134–2158. https://doi.org/10.1016/j.lingua.2007.02.001.

Zhang, N. N. 2009. *Coordination in Syntax*. Cambridge: Cambridge University Press.

Zoerner, C. E., III. 1995. *Coordination: The Syntax of &P*. PhD dissertation. Irvine: University of California.

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APPENDIX A. HETEROFUNCTIONAL COORDINATION IN ENGLISH

As discussed, for example, in Gračanin-Yüksek (2007), English displays a phenomenon similar to Slavic HC, but it is limited to the coordination of optional dependents (Gračanin-Yüksek, 2007: 28):

(A1) What and where did Sally sing?
(A2) *What and where did Sally buy?

Different analyses have been proposed for English HC, but most of them agree that the above contrast may be explained by the underlying biclausality of this construction.[15] That is, the grammaticality of (A1) directly reflects the grammaticality of both underlying clauses indicated in (A3), while the ungrammaticality of (A2) is the result of the ungrammaticality of the second underlying clause, as shown in (A4).

(A3) What ~~did Sally sing~~ and where did Sally sing?
(A4) What ~~did Sally buy~~ and *where did Sally buy?

In Slavic and Hungarian, direct translations of *both* (A1) and (A2) are fully grammatical, which is one of the many arguments for the direct coordination analysis of HC in these languages found in the literature. Hence, the argument in §4 was based on Slavic-type HC, and it could not have been based on English.

An anonymous reviewer asks for a comparison between Slavic-type HC and English constructions such as (A5).

(A5) She read the book and quickly.

On the analysis of Progovac (1999: 154–157), this is a coordination of two predicative structures (PredPs): one corresponding to *(She) read the book*, and the other to the predication of *quickly* over the event introduced by the preceding verb. This results in a rather different structure than Slavic-type HC, which involves direct coordination of dependents. In fact, the two constructions have a very different prosodic structure, which suggests different underlying syntactic structures. HC—both Slavic-type and English-type—does not necessitate a prosodic break before the conjunction and after the second conjunct, and does not require additional stress on the second conjunct. That is, the prosody indicated in (A6) is possible but not typical.

(A6) What—and WHERE—did Sally sing?

On the other hand, structures such as (A5) typically involve such a break before the conjunction and some additional stress on the second conjunct:

(A7) She read the book—and QUICKLY.

This is confirmed by corpus data. In the English Web 2015 corpus accessible via SketchEngine,[16] the sequence *and quickly* typically occurs without any preceding punctuation in

[15] See Larson (2013) and Potter and Frazier (2021) for a voice of dissent.
[16] http://www.sketchengine.eu/ (Kilgarriff et al., 2008, 2014).

direct coordinations with other adverbs (e.g., *She responded curtly and quickly* …), but usually with a preceding comma or dash indicating a prosodic break in the discussed construction, as in the following examples:

(A8) Now we need the President to appoint another worker rights champion to follow in her footsteps—*and quickly*.
(A9) The diversity of positive responses to the letter reflects the strong feeling that the widespread use of disproportionate force must be addressed*, and quickly*.

The current consensus seems to be that such constructions are coordinations of underlying VPs with subsequent ellipsis (Zhang, 2009: 186; Bruening & Al Khalaf, 2020: 4). Progovac (1999: 156–157) constructs an argument against ellipsis based on (i) her observation that *both* forces multiple eventualities (so, e.g., *Both Maria and Peter will bring a bottle of wine* necessarily involves two events of bringing a bottle, while the version without *both* is ambiguous and may refer to a single event), (ii) the ungrammaticality of examples such as (A10), and (iii) the assumption that *read the book* introduces an event, and—on the ellipsis analysis—*quickly* introduces a state (of this event being quick).

(A10) *She both read the book and quickly.

On the assumption (iii), the coordination in (A10) involves two eventualities (an event and a state), so the condition (i) on *both* is satisfied, so (A10) should be grammatical, contrary to (ii). I agree with (i) and (ii), and I believe they can be reconciled with the ellipsis analysis if, instead of (iii), it is assumed that *quickly* simply predicates over the event, rather than introducing a state. That is, the (dynamic) semantic representation of *read the book* would be $\exists e.\ read(e) \wedge theme(e) = \iota x.book(x)$, while the representation of *quickly* would simply be $quickly(e)$ (rather than, say, $\exists s.\ quickly(s) \wedge arg(s) = e$). Then both conjuncts refer to the same event e, violating the requirement of *both* and thus resulting in the ungrammaticality of (A10).

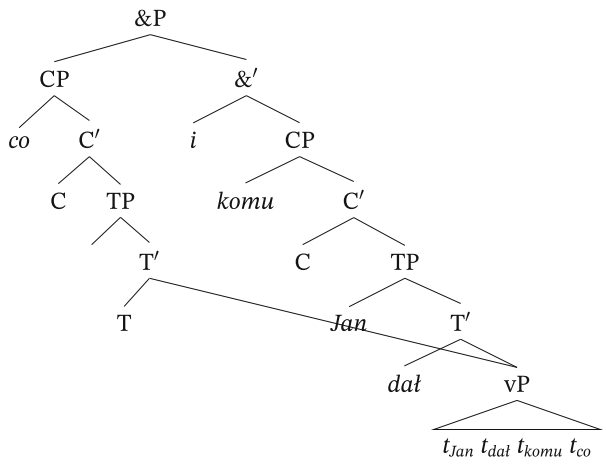
To summarize, whether constructions such as (A5) are treated as the coordination of underlying PredPs, as in Progovac (1999), or underlying VPs, as in more recent literature, their structure is very different from Slavic-type HC, which involves direct coordination of dependents, and also from English-type HC, which—on many accounts—involves coordination of underlying CPs.

APPENDIX B. AGAINST ARGUMENTS FOR BULK SHARING IN HC

In §4, I showed that HC directly falsifies the GLC postulated in Neeleman et al. (2023). The only potential escape hatch that I can see which would make it possible to avoid this conclusion is to argue, against almost all of the literature, that all apparently monoclausal instances in Slavic and Hungarian HC are in fact always biclausal and involve multidominance structures of the kind proposed in Rațiu (2011) and Citko (2013) (so-called bulk-sharing structures). On such a biclausal analysis, example (B1) has the structure in (B2) (Citko, 2013: 324–325, (72)–(73)).

(B1) [Co i komu] Jan dał? (Polish)
what.ACC and whom.DAT Jan.NOM.SG.M gave.3SG.M
'What did Jan give to whom?'

(B2)



This is essentially a coordination of two CPs, which happen to share a vP from which the subject, the head verb, and the two *wh*-phrases originate. Assuming that the selectional requirement σ_{XP} related to *co* 'what' percolates along the spine of the left CP, and the analogous requirement related to *komu* 'whom' percolates along the spine of the right CP, these two requirements are discharged in different places, and GLC is not violated.

The one exception—signaled above—to the common assumption that all Slavic languages and at least Hungarian allow for monoclausal HC, in which *wh*-phrases are coordinated directly, is the claim in Citko (2013) that Polish in fact only allows for biclausal structures of HC: structures such as (B2) and another kind of biclausal multidominance structure (called non-bulk-sharing), which is the only possible structure for similar examples in English.[17] If it were possible to extend that analysis to all Slavic languages and to Hungarian, then GLC would be saved from the challenge discussed in §4.

However, there are multiple reasons for rejecting Citko's (2013) analysis of HC which assumes bulk-sharing instead of direct coordination.

First of all, the bulk-sharing analysis goes against the commonly accepted view and, hence, it would require providing alternative explanations for the multiple arguments for monoclausal structures found in the literature. To the best of our knowledge, such alternative explanations have not been offered. In fact, the claim of Citko (2013) that Polish involves *only* biclausal HC is absent in a subsequent publication, Citko and Gračanin-Yüksek (2013),[18] which assumes three kinds of structures for HC in various languages, including the monoclausal structure as the only possibility in Bulgarian and as one of two or three possibilities in other Slavic languages, including Polish.

Second, and perhaps most seriously, there is a very general problem with such bulk-sharing structures, namely it is far from clear how such structures are to be interpreted semantically. Recall that, in the standard generative semantics setup (Coppock & Champollion, 2022;

[17]See Potter and Frazier (2021: 357–358) for arguments *against* such a non-bulk-sharing approach to English. See also Appendix A.

[18]While both publications are dated 2013, Citko (2013) was written in 2009 (as mentioned in Citko, 2013: 295, fn.*) and Citko and Gračanin-Yüksek (2013) was first submitted in September 2010. Also, as explicitly stated in Citko and Gračanin-Yüksek (2013: 2–3), the proposal presented in that paper "draws on accounts advanced by [Gračanin-Yüksek (2007) and Citko (2013)]" and "combines the insights of both of these accounts".

Heim & Kratzer, 1998), syntactic trees provide the backbone for compositional semantics, traces are interpreted as variables, and moved quantifiers (including *wh*-phrases) trigger lambda abstraction, which binds such variables. However, in the structure in (B2), the CP on the left contains two traces corresponding to *wh*-phrases (t_{komu} and t_{co}), but only one binder (*co* 'what'), and so does the CP on the right (where the binder is *komu* 'whom').[19] This problem is not solved by proposals such as that in Johnson (2012), which aim at providing compositional semantics for simple multidominance structures resulting from movement. So until a more general and robust theory of semantic interpretation of multidominance structures is developed, such structures should be treated with suspicion.

Finally, as demonstrated in the remainder of this appendix, all arguments offered in Citko (2013) for preferring biclausal (multidominance) structures such as (B2) over the usual monoclausal (non-multidominance) structures are flawed and some of them may actually be understood as arguing *against* the (solely) biclausal analysis.

The first argument for the biclausal analysis of Polish HC (Citko, 2013: 316–317) is based on the grammaticality contrast between (B3c) and (B4c).

(B3) a. Kto i komu i co dał? (Polish)
who.NOM and whom.DAT and what.ACC gave.3SG.M
'Who gave what to whom?'

b. Kto, komu i co dał? (Polish)
who.NOM whom.DAT and what.ACC gave.3SG.M
'Who gave what to whom?'

c. Kto i komu co dał? (Polish)
who.NOM and whom.DAT what.ACC gave.3SG.M
'Who gave what to whom?'

(B4) a. Jan i Piotr i Tomasz (Polish)
Jan.NOM and Piotr.NOM and Tomasz.NOM
'Jan and Piotr and Tomasz'

b. Jan, Piotr i Tomasz (Polish)
Jan.NOM Piotr.NOM and Tomasz.NOM
'Jan, Piotr and Tomasz'

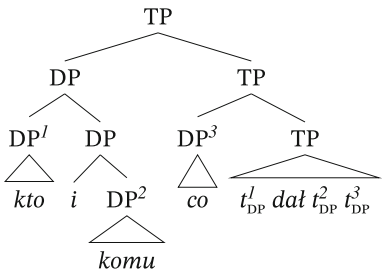
c. *Jan i Piotr Tomasz (Polish)
Jan.NOM and Piotr.NOM Tomasz.NOM

The argument is this: if apparently coordinated fronted *wh*-phrases, such as those in (B3), were really directly coordinated, then such a coordination should allow for the same conjunction placement possibilities as ordinary coordination, illustrated in (B4). But while ordinary coordination of three elements does not allow for the single conjunction to be placed between the first and the second conjuncts (see (B4c)), apparent coordination of *wh*-phrases allows that (see (B3c)). Hence, such an apparent coordination is not direct coordination. In particular, (B3c) must be analyzed

[19]Compare the related criticism of the bulk-sharing approach to HC in Gračanin-Yüksek (2007: 166–174), as well as other arguments against bulk-sharing and for the direct coordination in Croatian HC in Gračanin-Yüksek (2007: 195–206). Such arguments are not addressed either in Citko (2013) or in Citko and Gračanin-Yüksek (2013), or—to the best of my knowledge—in any of the subsequent literature relying on bulk-sharing.

as a biclausal coordination of the CPs *kto dał* 'who gave' and *komu co dał* 'whom what gave', with the latter CP involving multiple *wh*-fronting of *komu* 'whom' and *co* 'what' and with both CPs sharing the vP *dał* 'gave'. However, this argument does not go through, as there is a monoclausal structure readily available for (B3c), one that does not violate conjunction placement constraints:

(B5)



In (B5), the two *wh*-constituents adjoined to TP are the HC *kto i komu* 'who and whom' and the vanilla *wh*-phrase *co* 'what'. Hence, the acceptability of (B3c) does not provide an argument against the monoclausal analysis of HC.[20]

Another argument (Citko, 2013: 317) is based on the following contrast:

(B6) a. I Ewa i Ania przyszła na zebranie. (Polish)
and Ewa.NOM and Ania.NOM came.3SG.F to meeting
'Both Ewa and Ania came to the meeting.'

b. *I kto i komu dał jabłko? (Polish)
and who.NOM and whom.DAT gave.3SG.M apple.ACC
intended: 'Who gave apple to whom?'

This again is supposed to show that the apparent coordination of *wh*-phrases is not a direct coordination, as coordination allows for the repetition of the conjunction *i* 'and' on each DP conjunct (see (B6a)), unlike the only apparent coordination of *wh*-DPs (see (B6b)). However, this contrast is an immediate consequence of two well-known facts. First, as indicated by the translation of (B6a), the effect of such omnisyndetic coordination in Polish is—just as in some other languages (see, e.g., Progovac, 1999 on French, Italian, and—especially—Serbo-Croatian)—distributivity: that is, (B6a) is necessarily understood as referring to two coming events. This is made clear when such a coordination is the subject of a collective verb, such as SPOTKAĆ SIĘ 'meet'. So, while (B7a), involving the usual monosyndetic coordination, may be understood as referring to a single event of Ewa and Ania meeting at a cafe, the omnisyndetic (B7b) does not have such an interpretation and may only refer to the separate events of Ewa meeting someone and Ania meeting someone at a cafe.

[20]This reasoning assumes that (B3c) is indeed grammatical on the intended interrogative interpretation. Lipták (2011: 183) rejects Citko's (2013) argument discussed here on different grounds, by claiming that (B3c) and (B4c) have the same grammaticality status on the intended interpretation of (B3c), in which—according to her informants—*co* cannot be interpreted as the interrogative 'what', but must rather be understood as the indefinite 'whatever'. The judgements are not very clear here, so I do not attempt to resolve the issue of grammaticality of (B3c); whether it is grammatical or not, this argument does not go through.

(B7) a. Ewa i Ania spotkały się w kawiarni. (Polish)
Ewa.NOM and Ania.NOM met.3PL.F in cafe
'Ewa and Ania met at a cafe.'
b. #I Ewa i Ania spotkały się w kawiarni. (Polish)
and Ewa.NOM and Ania.NOM met.3PL.F in cafe
'Both Ewa and Ania met (with someone) at a cafe.'

This makes omnisyndentic coordination incompatible with HC, as—and this is the second well-known fact, discussed also in Citko (2013)—in HC all conjuncts are understood as referring to the same event (which, in turn, favors single-pair interpretations of questions involving HC). So the contrast in (B6) does not require an explanation in terms of different coordinations in the two sentences: direct coordination of DPs in (B6a) and biclausal coordination of CPs in (B6b).

In fact, the said contrast may be construed as providing an argument *against* the biclausal analysis HC. This is because omnisyndetic coordination is perfectly compatible with the coordination of CPs; compare (B6a) above with the synonymous (B8) below.

(B8) I Ewa przyszła na zebranie i Ania przyszła na zebranie. (Polish)
and Ewa.NOM came.3SG.F to meeting and Ania.NOM came.3SG.F to meeting
'Both Ewa came to the meeting and Ania came to the meeting.'

Hence, the ungrammaticality of (B6b), also involving coordination of CPs on the biclausal analysis, requires some explanation on that analysis (perhaps based on the fact that omnisyndetic coordination cannot combine questions).

The third argument (Citko, 2013: 317–318) is based on the purported grammaticality contrast between (B9b) and (B10b).

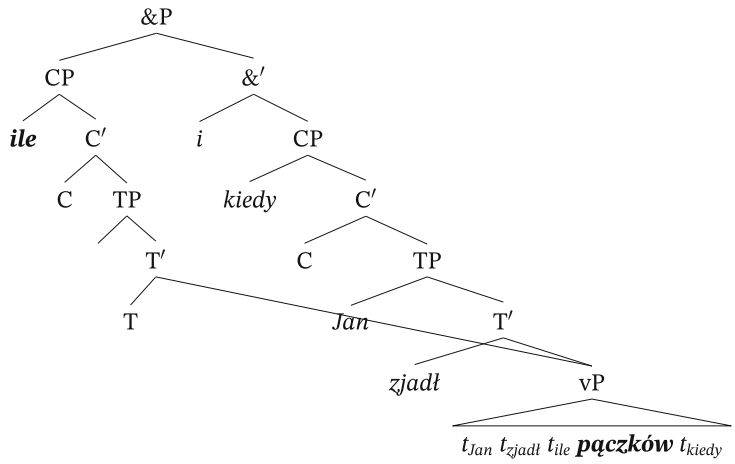
(B9) a. Kiedy ile Jan zjadł pączków? (Polish)
when how.many.ACC Jan.NOM ate.3SG.M doughnuts.GEN
'How many doughnuts did Jan eat when?'
b. Ile kiedy Jan zjadł pączków? (Polish)
how.many.ACC when Jan.NOM ate.3SG.M doughnuts.GEN
'How many doughnuts did Jan eat when?'

(B10) a. Kiedy i ile Jan zjadł pączków? (Polish)
when and how.many.ACC Jan.NOM ate.3SG.M doughnuts.GEN
'When and how many doughnuts did Jan eat?'
b. *Ile i kiedy Jan zjadł pączków? (Polish)
how.many.ACC and when Jan.NOM ate.3SG.M doughnuts.GEN
intended: 'When and how many doughnuts did Jan eat?'

As Polish does not exhibit superiority effects, the grammaticality of the two monoclausal (coordination-less) examples in (B9a,b) is expected, but what is unexpected on the monoclausal analysis of HC is that the apparent Left Branch Extraction (LBE) of *ile* 'how many' triggers superiority effects, as illustrated in (B10a,b). On the other hand, on the biclausal analysis, the structure of the apparently ungrammatical (B10b) would have to be as in (B11), where "the

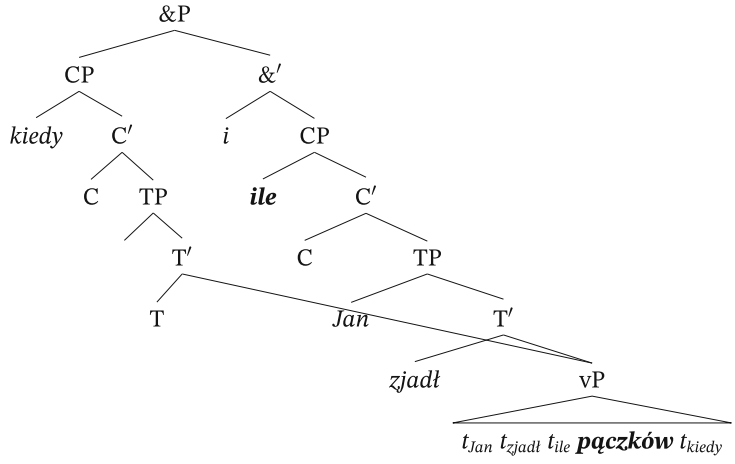
left-branch extracted quantifier and its restriction end up in two distinct conjuncts, which suggests the ungrammaticality can be attributed to an independent constraint that the quantifier and its restriction cannot be separated by an island boundary" (Citko, 2013: 322).

(B11)



This attempt at the explanation of the contrast in (B10) is directly contradicted by the fact that the fully acceptable (B10a) displays identical configurational relation between the quantifier and its restriction:

(B12)



So, whatever is meant by the statement that "the left-branch extracted quantifier and its restriction end up in two distinct conjuncts" (they are in fact in the same conjunct in both cases: the left CP in (B11) and the right CP in (B12)), it applies to both (B10a,b) and cannot account for the purported contrast.

Note that whatever the reason for that contrast, it cannot be explained in terms of LBE. In fact, the extraction of the numeral *ile* 'how many' is *not* a typical LBE, as the numeral is the head of the numeral phrase *ile pączków* 'how many doughnuts'—it bears the accusative case of the direct object position, while *pączków* 'doughnuts' is in the genitive assigned by the numeral. More

typical examples of LBE are (B13a,b), where the left-extracted element is the adjectival modifier *które* 'which'.

(B13) a. Kiedy i które Jan zjadł pączki? (Polish)
when and which.ACC Jan.NOM ate.3SG.M doughnuts.ACC
'When and which doughnuts did Jan eat?'
b. Które i kiedy Jan zjadł pączki? (Polish)
which.ACC and when Jan.NOM ate.3SG.M doughnuts.ACC
'When and which doughnuts did Jan eat?'

But here the contrast observed in (B10a,b) disappears—both are acceptable.

I believe that the contrast in (B10a,b) is only apparent, that is, that both are grammatical even if (B10a) is clearly preferred. The reason is that sentences of the same structure as in (B10b) occur naturally and are accepted by at least some native speakers, for example:[21]

(B14) Ale nie określiła, ile i kiedy zostanie wypłaconych odsetek. (Polish)
but not specified.3SG.F how.many.ACC and when will.be paid.GEN interests.GEN
'But she did not specify how much and when interest will be paid.'

One possible explanation of the acceptability contrast in (B10a,b) is that there is an interpretation of these sentences on which (B10a) is grammatical and (B10b) is not, namely the sluicing interpretation of the first conjunct. That is, (B10a) can be uttered after somebody said that John devoured lots of doughnuts, and it receives the meaning 'When (did it happen) and how many doughnuts (exactly) did he eat?'. On the other hand, (B10b) does not have such an interpretation: the initial *ile* 'how many' could be understood as a very brief way of asking 'How many doughnuts did he eat, then?', but then the second conjunct would have to be an acceptable CP, and it is not, as *pączków* 'doughnuts' occurs in the genitive instead of the expected accusative.[22] Such a difference in the availability of a sluicing reading is absent in (B9a,b) (neither can be interpreted via slucing) and in (B13a,b) (both can be), which explains why the acceptability contrast is only felt in (B10a,b). But whether or not this explanation is on the right track, the biclausal analysis does not offer any advantage in explaining the acceptability contrast in (B10a,b) over the standard monoclausal analysis of HC.

The final argument for the biclausal analysis (Citko, 2013: 318–319) is based on the following pair (again, acceptability marks are Citko's, but the translation of (B15b) is mine):

(B15) a. Który profesor$_i$ ilu ze swoich$_i$ studentów przeegzaminował? (Polish)
which professor how.many of his students examined.3SG.M
'Which professor examined how many of his students?'

[21] https://www.parkiet.com/Analizy/309229949-WykresDnia-Evergrande–reaktywacja.html.

[22] Verbs such as ZJEŚĆ 'eat' also combine with genitive themes, understood then as unspecified and partitive, but such an interpretation is not available in this dialogue, as doughnuts have already been mentioned and the question about their quantity was asked in the first—sluiced—conjunct.

b. *Który profesor$_i$ i ilu ze swoich$_i$ studentów przeegzaminował? (Polish)
which professor and how.many of his students examined.3SG.M
'Which professor examined his students and how many students did he examine?'

On the biclausal analysis, the purported ungrammaticality of (B15b) "can be linked to an independent fact that variable binding is generally impossible across clauses" (Citko, 2013: 322). Unfortunately, this one-sentence explanation is based on assumptions that are not made explicit (about the exact nature of variable binding in the multidominance framework), so it is difficult to verify it. Nevertheless, this explanation cannot be on the right track, as in fact there is no acceptability contrast of the kind reported in Citko (2013). To ascertain this, I conducted a small opportunistic experiment involving 14 native speakers of Polish—computational linguists mostly with no background or interest in syntactic theories or in issues discussed in this paper. The respondents evaluated (B15a,b) on the 5-point Likert scale from −2 (totally unacceptable) to 2 (totally acceptable). Ten of them (i.e., 71%) judged (B15b) as totally acceptable and 12 (i.e., 86%) judged (B15b) as equally or more acceptable than (B15a). Statistically, (B15b) scored on average 1.14 (vs. 0.55 for (B15a)),[23] with median 2.00 (vs. 1.00), and standard deviation 1.56 (vs. 1.44).[24] So if the biclausal analysis really predicts that (B15a) is grammatical and that (B15b) is ungrammatical, then these examples provide an argument against that analysis.

In summary, all of the arguments *for* the biclausal analysis adduced in Citko (2013) are immediately refutable, and some may in fact be reinterpreted as arguments *against* that analysis, so there is no reason to prefer that analysis over the standard monoclausal analysis of HC.[25]

[23]The difference in means is statistically marginally significant according to the one-tailed Wilcoxon signed rank test ($0.05 \leq p < 0.1$; $V = 11$). While, strictly speaking, it is not appropriate to report means and standard deviations for ordinal data (such as Likert scale), I follow the common linguistic practice in doing so anyway.

[24]See Lipták (2011: 184) for another report on nonreplicability of the judgements in (B15).

[25]Citko (2013) also mentions an argument from Tomaszewicz (2011), based on the possibility of the occurrence of "sentential adverbials" within Polish HC, but this argument may at best be construed as an argument for the availability English-type biclausal structures in Polish, apart from the standard monoclausal structures, similar to the situation argued at length for Croatian in Gračanin-Yüksek (2007); however, this is actually a non-argument, given that such adverbials may occur in uncontroversial cases of direct coordination (Condoravdi et al., 2019). Moreover, Citko (2013) mentions that biclausal structures do not violate the Law of the Coordination of Likes (LCL), but this is not a valid argument for biclausal structures, given that LCL cannot be maintained, as extensively argued in Patejuk and Przepiórkowski (2023) and in Przepiórkowski (2022b).