Chapter 17

Coordination

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Coordination is a central topic in theoretical linguistics. Following GPSG, which provided the first formal analysis of unlike coordination, HPSG has developed detailed analyses of different coordination constructions in a variety of unrelated languages. Central to the HPSG analyses are two main ideas: (i) coordination structures are non-headed phrases, (ii) coordinate daughters display some kind of parallelism, which is captured by feature sharing; from these ideas, specific properties can be derived, regarding extraction and agreement for instance. Many HPSG analyses also agree that coordination is a cover term for a wide variety of different constructions which can be viewed as different subtypes of coordinate phrases, which can be cross-classified with other subtypes of the grammar (nominal or not, with ellipsis or not etc.) We present the description of various coordination phenomena and show that HPSG can account for their subtle properties, while integrating them in the general organization of the grammar.

1 Introduction

A great deal of research has been dedicated to the topic of coordination structures in the last 70 years, spanning a multitude of different approaches in many different theoretical frameworks. With regard to the linguistic problems, research questions abound. In the realm of syntax there is much debate concerning the role of coordination lexemes, the existence of null coordinators, the syntactic relationship between conjuncts, the peculiar extraction phenomena that certain coordination structures exhibit, the necessary properties that allow two different structures to be coordinated, the relation between coordination structures

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and comparative and subordination structures, peculiar ellipsis phenomena that can optionally occur, the various patterns of agreement that obtain in nominal coordination structures, the distribution and syntactic realization of the lexemes *either* and *or*, etc. In the realm of semantics, the issues are no less complex, and the debate no less lively. There are many questions pertaining to how exactly the meaning of coordination structures is construed.

Among the first attempts to offer a precise formalization of the syntax and semantics of coordination was the seminal work of Gazdar (1980). Other seminal work soon followed, including the demonstration that phrase structure grammar offered a way to model filler-gap dependencies and certain island constraints (Gazdar 1981). In particular, Gazdar's account showed how long-distance dependencies involving multiple gaps linked to the same filler phrase could be modeled straightforwardly, something that mainstream movement-based models still struggle with to this day. Finally, there was also in-depth examinations of a number of complex empirical phenomena, i.e. in Gazdar et al. (1982), which proved highly influential in the genesis of Generalized Phrase-Structure Grammar, and later, of HPSG. Coordination thus has a special place in the history of HPSG, and still figures in many theoretical arguments within generative grammar given the extremely challenging phenomena it poses for linguistic theory. Nevertheless, there is no clear consensus, even within HPSG, about how to analyze coordination. For example, in some accounts the coordinator expression is a weak head, whereas in others it is a marker. Coordinate structures are binary branching in some accounts but not so in others. Finally, in some accounts non-constituent coordination involves some form of deletion, but in others no deletion operation is assumed. In this chapter we survey the empirical arguments and formal accounts of coordination, with special focus on its morphosyntax.

2 Headedness

The head of a construction is traditionally defined as the constituent which determines the syntactic distribution and the meaning of the whole, and it also often the case that a dependent can be omitted, fronted, or extraposed while the head cannot (Zwicky 1985). In coordination constructions something very different occurs. First, the syntactic category and the distribution of a coordinate phrase is collectively determined by the conjuncts, not by one particular conjunct nor by the coordination particle. Thus, an S coordination yields an S, a VP coordination

yields a VP and so on, for virtually all categories.[1] This is perhaps clearer in cases like (1), where expressions such as *simultaneously*, *both*, *together* can be used to show that the entire bracketed string is interpreted as a complex unit denoting a plurality.

(1) a. [$_S$ [$_S$ Tom sang] and [$_S$ Mia danced]] simultaneously.
b. Often [$_{VP}$ [$_{VP}$Kim goes to the beach] and [$_{VP}$Sue goes to the city]].
c. Sue [$_{VP}$ [$_{VP}$ read the instructions] and [$_{VP}$ dried her hair]], in twenty seconds.
d. You can't simultaneously [$_{VP}$ [$_{VP}$ drive a car] and [$_{VP}$ talk on the phone]].
e. Simultaneously [$_{VP}$ [$_{VP}$ shocked] and [$_{VP}$ saddened]], Robin decided to go home.
f. Robin is both [$_A$ [$_A$ tall] and [$_A$ thin]].
g. [$_{NP}$ [$_{NP}$ Tom] and [$_{NP}$ Mia]] agreed to jump into the water together.

Generally, a coordinate structure has the same grammatical function and category as the conjuncts: given a number of conjuncts of category X, the distribution of the coordinate constituent that is obtained is again the same as of an X constituent, what Pullum & Zwicky (1986) refer as Wasow's Generalization. In particular, this is what allows coordination to apply recursively:

(2) a. [[Tom and Mary]$_{NP}$ or [Mia and Sue]$_{NP}$]$_{NP}$ got married.
b. I can either [[sing and dance]$_{VP}$ or [sing and play the guitar]$_{VP}$]$_{VP}$.
c. Either [[John went to Paris and Kim went to Brussels]$_S$ or [none of them ever left home]$_S$]$_S$.

Another piece of evidence in favor of a non-headed analysis comes from the fact that there is no typological correlation between the position of the coordinator and the head directionality (Zwart 2005). For example, in Zwart's survey of 136 languages where half are verb-final and half are verb-initial languages, verb-final languages overwhelmingly employ initial conjunction strategies. In particular, 119 of these languages have exclusively initial conjunctions, 12 languages exhibit both initial and final conjunctions, and only 4 have exclusively final conjunctions.

[1] The exceptions include coordinator expressions themselves, e.g. **You ordered a coffee and or or a tea?* The oddness of the former is presumably due to the fact that expletives are devoid of any meaning (Müller 2016), and the oddness of the latter may be due to the conjuncts being of the wrong semantic type. See Section 5 for more on lexical coordination.

Finally, Coordination is also special in that the relationship between conjuncts is unlike adjunction (Levine 2001). Whereas adjuncts can in principle be displaced, conjuncts do not have any mobility, as (3) illustrates.

(3) a. Because/Since Jane likes music, Tom learned to play the piano.
b. * And Jane likes music, Tom learned to play the piano.

Thus, no conjunct can usually be said to be a dependent. For example, reversing the order of the conjuncts in (4) causes no major change in meaning. Neither daughter can be said to be the head because no subordination dependency is established between conjuncts.

(4) a. Sam ordered a burger and Robin ordered a pizza.
b. Robin ordered a pizza and Sam ordered a burger.

To be sure, there are certain coordination structures which do not have such symmetric interpretations, as noted by Ross (1967); see also Goldsmith (1985), Lakoff (1986), and Levin & Prince (1986). Regardless, such constructions retain many of the properties that characterize coordinate structures, and therefore are likely coordinate just the same (Kehler 2002: Chapter 5).

(5) a. Robin jumped on a horse and rode into the sunset.
b. Robin rode into the sunset and jumped on a horse.

For these reasons, HPSG adopts a rather traditional non-headed analysis of coordination, an approach going back to Bloomfield (1933: 195) and Ross (1967), and later adopted in many other frameworks such as Pesetsky (1982), Gazdar (1980), Huddleston et al. (2002a: 1275), among many others. See Borsley (1994), Borsley & Jones (2005) and Chaves (2007: Chaves 2) for more discussion about previous claims in the literature that coordination structures are headed. Finally, we note that the HPSG account is in agreement with Chomsky (1965: 196), who argued against postulating complex syntactic representations without direct empirical evidence:[2]

> It has sometimes been claimed that the traditional coordinate structures are necessarily right-recursive (Yngve, 1960) or left-recursive (Harman, 1963, p. 613, rule 3i). These conclusions seem to me equally unacceptable. Thus to

[2] In more recent times Chomskyan theorizing has assumed that all structures should be binary branching purely on conceptual economy grounds; see Johnson & Lappin (1999) for criticism.

> assume (with Harman) that the phrase "a tall, young, handsome, intelligent man" has the structure [[[[tall young] handsome] intelligent] man] seems to me no more justifiable than to assume that it has the structure [tall [young [handsome [intelligent man]]]]. In fact, there is no grammatical motivation for any internal structure, [...] The burden of proof rests on one who claims additional structure beyond this (Chomsky 1965: 196–197)

As we shall see, the empirical evidence suggests that the simplest and most parsimonious structure for coordination is neither left- nor right-recursive.

3 On the Syntax of Coordinate Structures

In this chapter we refer to expressions like *and*, *either*, *or*, *but*, *let alone*, etc. as *coordinators* and the phrases that a coordinator can combine with as *coordinands*. Thus, in "A or B" both A and B are coordinands and *or* is the coordinator.

There are a wide range of coordination strategies in the languages of the world Haspelmath (2007). In some languages no coordinand is accompanied by any coordinator (syndenton coordination; as in *We came, we saw, we conquered*), or one of the conjuncts is accompanied by a coordinator (monosyndenton coordination, as in *We came, we saw, and we conquered*. Other strategies involve marking multiple coordinands with a coordinator (polysindenton coordination; *We came, and we saw, and we conquered*, or all coordinands (omnysyndenton coordination; *Either you come or you go*. All of these are schematically depicted in (6); see Drellishak & Bender (2005a) for more discussion about how to accommodate such typological patterns in a computational HPSG platform.

(6)
a. A, B, C (asyndenton)
b. A, B, *coord* C (monosyndenton)
c. A *coord* B *coord* C (polysyndenton)
d. *coord* A *coord* B *coord* C (omnisyndenton)

Finally, a single coordination strategy often serves to coordinate all types of constituent phrases, but in many languages different coordination strategies only cover a subset of the types of phrases in the language. For example, in Japanese the suffix *to* is used for nominal coordination and *te* is used for other coordinations.

In what follows we start by focusing on monosyndenton coordination. There are three possible structures one can assign to such coordinations, as Figure 1

illustrates. The binary branching approach goes back to Yngve (1960), and is used in HPSG work such as Pollard & Sag (1994), Yatabe (2002), Crysmann (2003), Beavers & Sag (2004), Drellishak & Bender (2005a), Abeillé (2005), and Chaves (2007), Chaves (2012b), among others. The flat branching approach has also been assumed in HPSG, albeit less frequently. See for example Sag et al. (2003) and Sag (2003a).[3]

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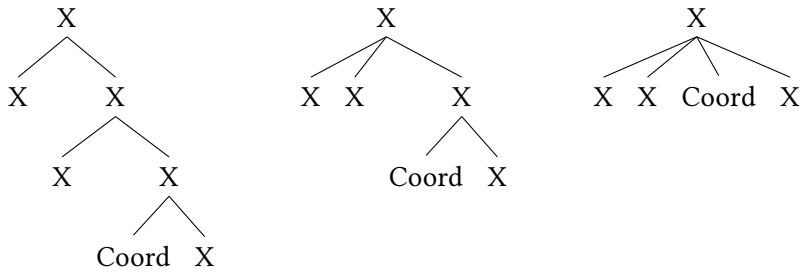

Figure 1: Three possible headless analyses of coordination

The binary branching analysis requires two different rules, informally depicted in (7), and a special feature to prevent the coordinator to recursively apply to the last coordinand, e.g. **Robin and and and Kim.* Otherwise, the two rules are unremarkable and are handled by the grammar like any other immediate dominance schema. See for example Beavers & Sag (2004) for a formalization.

(7) a. $X_{crd+} \rightarrow$ *Coord* X_{crd-}
b. $X \rightarrow X_{crd-}$ X_{crd+}

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Kayne (1994) and Johannessen (1998) argue that coordination follows X-bar theory and that the conjunction is the head of the construction; see Borsley & Müller (2020), Chapter 30 of this volume. But in HPSG, even though one of the conjuncts (or more) may combine with a conjunction, this subconstituent is not the head of the construction, which is considered as unheaded. The two analyses are contrasted in Figure 2.

Similarly, the flat analysis where the coordinator and the coordinand attach to each other requires two rules as well (where $n \geq 1$):

(8) a. $X_{crd+} \rightarrow$ *Coord* X_{crd-}
b. $X \rightarrow X^1_{crd-} \ \ldots \ X^n_{crd-}$ X_{crd+}

[3] See Borsley & Jones (2005) for criticism of ConjP and of binary branching analysis of coordinate structures with three conjuncts.

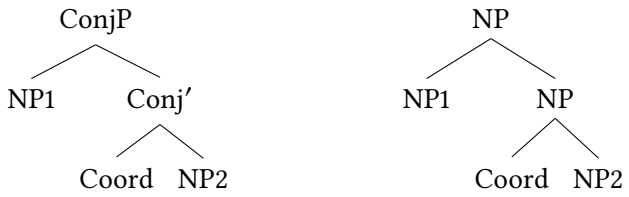

Figure 2: Binary-branching analyses of coordination, headed and non-headed

However, the flat analysis requires only one rule, and no special features at all, as (3) illustrates.

(9) $X \rightarrow X^1 \ldots X^n$ *Coord* X_{n+1}

That said, there are some reasons for assuming that the coordinator does in fact combine with the coordinand, as in (3). First, in some languages of the world the coordinator is a bound morpheme instead of a free morpheme. For example, verbs are coordinated by adding one of a set of suffixes to one of the coordinands in Abelam (Papua New Guinea), usually the prior one. Similarly, in Kanuri (Nilo-Saharan), verb phrases are coordinated by marking the first verb with a conjunctive form affix, and in languages like Telugu (Dravidian), the coordination of proper names is marked by the lengthening of their final vowels (Drellishak & Bender 2005b). The latter is illustrated in (10).

(10) kamalaa wimalaa poDugu
Kamala Vimala tall
'Kamala and Vimala are tall'

Second, as Ross (1967) originally noted, the natural intonation break occurs before the coordination lexeme rather than between the coordinator and the coordinand, so that a prosodic constituent is formed. Although prosodic phrasing is not generally believed to always align with syntactic phrasing, the fact that the coordinator prosodifies with the coordinand suggests that it forms a unit with it. add pages

The analysis in Figure 3 can be formalized in HPSG as shown in (11), using parametric lists (Pollard & Sag 1994) to enforce that all conjuncts structure-share the morphosyntactic information. The type *n(on)e(mpty)-list* corresponds to a list that has at least one member, and when used parametrically as in (11) it in addition requires that every member of the list must bear the features [SYNSEM|LOC|CAT 1]. add pages

(11) Coordination Construction (preliminary)

$$\textit{coord-phr} \Rightarrow \left[\begin{array}{l}\textsc{synsem} \mid \textsc{cat}\ \boxed{1} \\ \textsc{dtrs}\left\langle\left[\textsc{synsem} \mid \textsc{loc} \mid \textsc{cat}\ \boxed{1}\right]\right\rangle \oplus \textit{ne-list}\left(\left[\textsc{synsem} \mid \textsc{loc} \mid \textsc{cat}\ \boxed{1}\right]\right)\end{array}\right]$$

The constraint forcing all daughters to be of the same category is excessive, as we shall see below, and this will have to undergo a revision. For now, we are focusing on standard coordinations.

In order to account for the fact that different kinds of coordination strategies are possible, Mouret (2005) defines three subtypes of *coord-phr*, assuming a lexical feature coord to distinguish between coordination types:[4]

(12) $\textit{simple-coord-phr} \Rightarrow \left[\textsc{dtrs}\ \textit{ne-list}\left(\left\langle\left[\textsc{coord}\ \textit{nil}\right]\right\rangle\right) \oplus \textit{ne-list}\left(\left[\textsc{coord}\ \textit{crd}\right]\right)\right]$

$\textit{omnisyndetic-coord} \Rightarrow \left[\textsc{dtrs}\ \textit{ne-list}\left(\left[\textsc{coord}\ \textit{crd}\right]\right)\right]$

$\textit{asyndetic-coord} \Rightarrow \left[\textsc{dtrs}\ \textit{ne-list}\left(\left[\textsc{coord}\ \textit{nil}\right]\right)\right]$

Here, we assume that the value of coord must be typed as *coord*, and that the latter has various sub-types as shown in Figure 3.

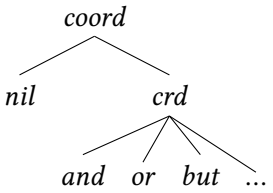

Figure 3: Coordinator sub-types

Thus, simple (monosyndenton and polysyndenton) coordinations are those where all but the first coordinand are allowed to combine with a coordinator, omnisyndenton coordinations are those where all coordinands have combined with a coordinator, and likewise, asyndenton coordinations are those where none of the coordinands have combined with a coordinator.

We turn to the analysis of coordinators. In other words, what exactly are words like *and*, *or*, and others, and how do they combine with coordinands?

[4] Mouret's formulation is slightly different in that the relevant feature is instead called conj, and a slightly different type hierarchy is assumed, with negative constraints like conj ≠ *nil* are employed instead of coord *crd*. The current formulation avoids negative constraints, though nothing much hinges on this. Similar liberty is taken in subsequent constraints, for exposition purposes.

3.1 The status of coordinator expressions

In HPSG, coordinators are sometimes analyzed as markers (Beavers & Sag 2004; Drellishak & Bender 2005a). In such a view, the coordinator's lexical entry does not select any arguments, since it has no arguments. In (13) we show the lexical entry for the conjunction, using current HPSG feature geometry. Note that the MRKG value of the coordinator is the same as the coordinand's, which makes this marker a bit unusual in that it is transparent. Thus, if *and* coordinates S nodes that are MRKG *that* (i.e. CPs) then the result will be an S that is also MRKG *that*, and so on, for any given value of MRKG.[5]

(13)
$$\begin{bmatrix} \textit{coord-lexeme} \\ \text{PHON} \quad \langle \textit{and} \rangle \\ \text{SYNSEM} \begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{coord} \\ \text{SEL} \begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{COORD} & \textit{none} \\ \text{MRKG} & \boxed{1} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \\ \text{COORD} \quad \textit{and} \\ \text{MRKG} \quad \boxed{1} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

This sign imposes constraints on the head sign it combines with via the feature SEL, the same feature that allows other markers and adjuncts in general to combine with their hosts. The syntactic construction that allows such elements with their selected heads is the Head-Functor Construction in (14). Since the second daughter is the head, the value of the mother's HEAD feature will have to be the same as the head daughter's, as per the Head Feature Principle.[6]

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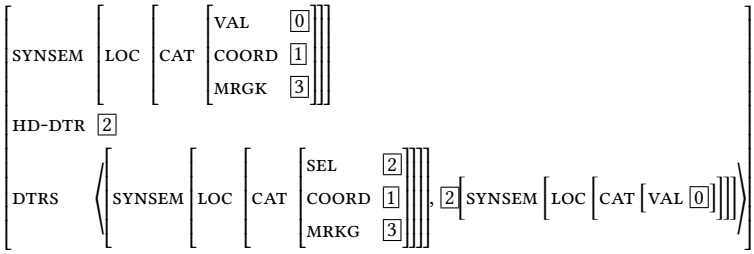
[5] The semantics and pragmatics of coordination is a particularly complex topic which we cannot do justice to here, specially when it comes to interactions with other phenomena such as quantifier scope and collective, distributive, and reciprocal readings. See Koenig & Richter (2020), Chapter 23 of this volume for more discussion and in particular Copestake et al. (2005), Fast (2005), Chaves (2007: Chapters 4–6), Chaves (2012b), Chaves (2012a), Chaves (2009), and Park (2019) for HPSG work that specifically focuses on the semantics of coordination.

[6] The Head Feature Principle (Pollard & Sag 1994) states that the value of the mother's HEAD feature is identical to that of the head daughter's HEAD feature. See also **chapters/basic-properties** Chapter ?? of this volume.

(14) *head-func-cxt* ⇒



This is wrong. Structure sharing goes from SEL to SYNSEM, there is no VAL but SUBJ and COMPS.

Thus, the conjunction projects an NP when combined with an NP, an AP when combined with an AP, etc., as Figure 4 illustrates.

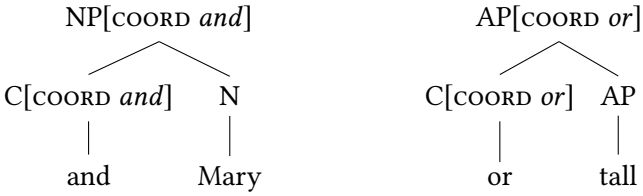


Figure 4: Coordinate marking constructions

An alternative HPSG account that yields almost the same representation through different means is adopted by Abeillé (2003), Abeillé (2005), Mouret (2007) and Bîlbîie (2017) and others. This approach instead takes coordinators to be *weak heads*, i.e. heads which inherit most of their syntactic properties from their complement, like argument-marking prepositions. Thus, the coordinator combines with coordinands via the same headed constructions that license non-coordinate structures. It preserves the MARKING feature when conjuncts are themselves marked. The conjunction takes the adjacent conjunct as a complement. This captures its being first in head initial languages like English, and its final position in head final languages like Japanese.

(15) a. Lee [and Kim]] (English)
b. Lee-to Kim (Japanese)
Lee-and Kim
'Lee and Kim'

Since it is a weak head, it inherits most of its syntactic features (HEAD, MARKING, XARG) from its complement, and adds its own COORD feature. The relevant constraint over all such coordinator lexemes is shown in (16).

(16)
$$\textit{coord-lexeme} \Rightarrow \left[\begin{array}{ll} \textsc{phon} & \langle \textit{and} \rangle \\ \textsc{synsem} & \left[\textsc{loc} \left[\textsc{cat} \left[\begin{array}{ll} \textsc{head} & \boxed{0} \\ \textsc{coord} & \textit{and} \\ \textsc{mrkg} & \textit{none} \end{array}\right]\right]\right] \\ \textsc{arg-st} & \boxed{1} \oplus \left\langle \left[\textsc{synsem} \left[\textsc{loc} \left[\textsc{cat} \left[\begin{array}{ll} \textsc{head} & \boxed{0} \\ \textsc{xarg} & \boxed{1} \\ \textsc{mrkg} & \boxed{2} \end{array}\right]\right]\right]\right] \right\rangle \end{array}\right]$$

The weak head analysis is illustrated in Figure 5. Here, the category of the coordinator, the conjunct and of the mother node are the same, because the coordinator's head value is lexically required to be structure-shared with the head value of its valents.

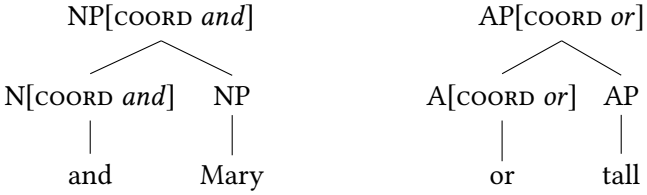


Figure 5: Coordinate weak-head constructions

Before moving on, we note that the weak head analysis of coordinators makes certain problematic predictions that the marker analysis in (13) does not make. Since coordinands are selected as arguments in the former approach, additional assumptions need to be made in order to prevent the extraction of conjuncts as in (17). If coordinands are in ARG-ST then they are expected to be extractable (see Borsley & Crysmann (2020), Chapter 14 of this volume and Chaves (2020), Chapter 16 of this volume).

(17) * Which boy did you compare Robin and _?
(cf. with *which boy did you compare Robin with _?*)

For this reason, the members of ARG-ST of the coordinator are typed as *canonical* by Abeillé (2003), to prevent their extraction, analogously to how prepositions in most languages must prevent their complements from being extracted, unlike English and a few other languages. See Abeillé, Bonami, et al. (2006) for a weak head analysis of certain French prepositions.

3.2 Correlative coordination

Having discussed standard coordination structures, we now move on to cases where multiple inter-dependent coordinators are present, such as *either … or …*, *neither … nor …*, and *both … and …*. See Hofmeister (2010) for an account in HPSG. Given the linearization flexibility of the first coordinator, they can be analyzed in English as adverbials rather than as true coordinators:

(18) a. Either Fred bought a cooking book or he bought a gardening magazine.
b. Fred either bought a cooking book or he bought a gardening magazine.
c. Fred can either buy a cooking book or he can buy a gardening magazine.

(19) a. John will read both the introduction and the conclusion.
b. John will both read the introduction and the conclusion.

In French, as in other Romance languages, the conjunction itself can be reduplicated, and it is obligatory for some conjunctions (*soit* 'or' in French) (Mouret 2007; Bîlbîie 2017):

(20) a. Jean lira et l'introduction et la conclusion.
Jean read.FUT and the.introduction and the conclusion
'Jean read both the introduction and the conclusion.'
b. * Jean et lira l'introduction et la conclusion.
Jean and read.FUT the.introduction and the conclusion
c. Jean lira soit l'introduction soit la conclusion.
Jean read.FUT or the.introduction or the conclusion
d. * Jean lira l'introduction soit la conclusion.
Jean read.FUT the.introduction or the conclusion

check (20c,d). I took them appart. Check translation

Thus, there are different structures for different types of correlative, as Figure 6 illustrates. The one on the left is for correlatives that exhibit adverbial properties and the one on the right is for correlatives that do not. See Bîlbîie (2008) for arguments that both types are attested in Romanian.

The correlative coordinate structure on the right is covered by (12), since it requires the COORD feature to be the same for all conjuncts.

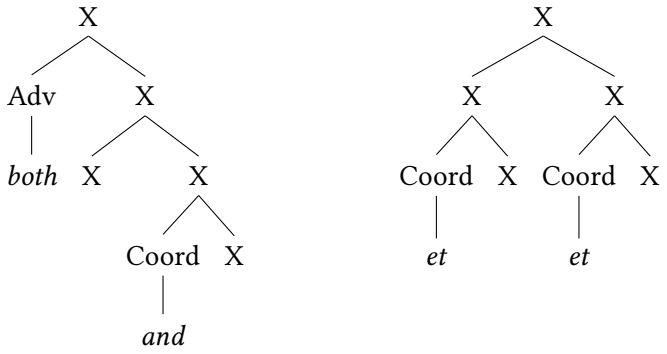


Figure 6: Two possible structures for correlative coordination

3.3 Comparative correlatives

When there is no overt conjunction, it is not always clear whether a binary clause construction is coordinate or not. Comparative correlatives such as (21) have been analyzed as coordinate by Culicover & Jackendoff (1999) for English (in syntax, though not in semantics) and as universally subordinate by den Dikken (2006).

(21) The more I read, the more I understand.

On the semantic side, the interpretation is something like: 'if I read more, I understand more'. Abeillé (2006) and Abeillé & Borsley (2008) propose that they are coordinate in some languages, and subordinate in others. In English, one can add the adverb *then*, whereas in French, one can add the conjunction *et* ('and'). In English, the first clause can also be used as a standard adjunct (22).

I reinserted the *then*. We had a long discussion about this. I think it is correct with *then*.

(22) a. The more I read, then the more I understand.

b. Plus je lis (et) plus je comprends.
more I read and more I understand
'If I read more, I understand more.'

c. I understand more, the more I read.

As shown by Culicover & Jackendoff (1999: 549-550), the second clause show matrix clause properties, not the first one:

(23) a. The more we eat, the angrier you get, don't you?
b. * The more we eat, the angrier you get, don't we?

Syntactic parallelism seems to be stricter in French, for example clitic inversion or extraction must take place out of both clauses at the same time (Abeillé & Borsley 2008):

I changed the glosses according to the Leipzig Glossing Rules, please check.

(24) a. Paul a peu de temps: aussi plus vite commencera-t-il, plus vite
Paul has little of time so more fast start-FUT-he more fast
aura-t-il fini.
AUX-FUT-he finish.PPART
'Paul has little time left: so the faster he starts, the faster he will finish'

b. C' est un livre que plus tu lis, plus tu apprécies.
this is a book COMP more you read.2SG more you appreciate.2SG
'This is a book that the more you read the more you like.'

In Spanish, comparartive correlatives come in two varieties: one that can be analyzed as subordinate as in (25a), and one that can be analyzed as coordinate, like (25b).

(25) a. Cuanto más leo, (tanto) más entiendo.
how.much more read.1SG that.much more understand.1SG
'The more I read, the more I understand.'

b. Más leo (y) más entiendo.
more read.1SG and more understand.1SG
'The more I read, the more I understand.'
(Abeillé, Borsley & Espinal 2006)

Be they coordinate or subordinate, they are special kinds of construction: they are binary, with a fixed order: the meaning changes if the order is reversed as in (26a). The internal structure of each clause is also special. In English, it must start with *the* and a comparative phrase like in (26b), which may belong to a long distance dependency (26c). Each clause must be finite and allow for copula omission, as shown in (26d).

(26) a. The more I understand, the more I read.

b. * I understand (the) more, I read (the) more.

c. The more I manage to read, the more I start to understand.

d. The more intelligent the students, the better the marks.

These *the*-clauses are a special subtype of finite clause, starting with a comparative phrase. Abeillé, Borsley & Espinal (2006), Borsley (2011) define a CORREL feature which is a LEFT EDGE feature (see the EDGE feature in Bonami et al. (2004) for French liaison). Assuming a degree word *the*, which can only appear as a specifier of a comparative word, Borsley (2011) defines *the*-clause as a subtype of head-filler-phrase with [CORREL *the*]; see also Sag (2010).

Comparative correlatives belong to a more general class of (binary) correlative constructions, including *as … so …*, and *if … then …* constructions in Borsley (2004; 2011).[7] Correlative constructions can be defined as follows, where *correl-construction* is a sub-type of *declarative-clause* and the feature CORREL introduces a *correl* type hierarchy analogous to that of *coord* in Figure 3 above. The construction in (27) thus states that all correlative constructions have in common the fact that both daughters are marked by a special expression.

(27)
$$\textit{correl-construction} \Rightarrow \left[\begin{array}{ll} \textsc{synsem} & \left[\textsc{loc}\left[\textsc{cat}\begin{bmatrix}\textsc{head} & \textit{finite}\\ \textsc{correl} & \textit{none}\end{bmatrix}\right]\right] \\ \textsc{dtrs} & \left\langle \left[\textsc{synsem}\left[\textsc{loc}\left[\textsc{cat}\left[\textsc{correl}\ \textit{corr-mrk}\right]\right]\right]\right], \left[\textsc{synsem}\left[\textsc{loc}\left[\textsc{cat}\left[\textsc{correl}\ \textit{corr-mrk}\right]\right]\right]\right] \right\rangle \end{array}\right]$$

Naturally, *correl-construction* has various sub-types, each imposing particular patterns of correlative marking, including coordinate correlatives. More specifically, this family of constructions comes in two varieties: asymmetric (for the subordinate ones, like English comparative correlatives), and symmetric for coordinate ones, like French comparative correlatives). The symmetric subtype inherits from *clausal-coordination-phrase*, while the asymmetric one inherits from the *head-adjunct-phrase* as seen in Figure 7.

Thus, asymmetric English comparative correlatives can be defined as in (28), where *the* is a sub-type of *corr-mrk* (i.e. is a coordinate marker).

[7] This does not handle Hindi type correlatives, which differ in that only the first clause is introduced by a correlative word, and the first clause is mobile and optional; see Pollard & Sag (1994: 228) for an analysis.

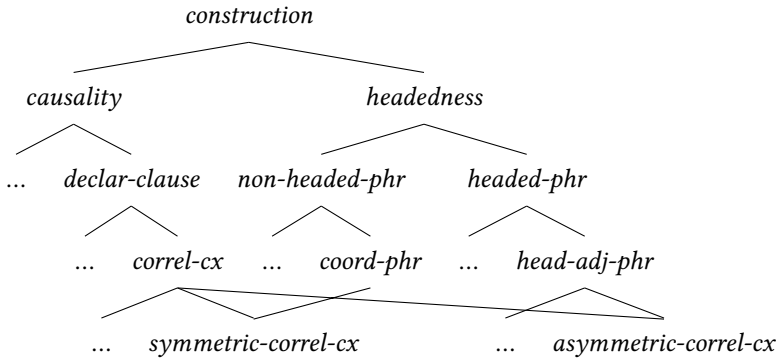


Figure 7: Type hierarchy for correlative constructions

(28)
$$\textit{asymmetric-cc-cx} \Rightarrow \begin{bmatrix} \textsc{hd-dtr}\ \boxed{1} \\ \textsc{dtrs}\left\langle \begin{bmatrix} \textsc{synsem}\left[\textsc{loc}\left[\textsc{cat}\left[\textsc{correl}\ \ \textit{the}\right]\right]\right] \end{bmatrix}, \boxed{1}\left[\textsc{synsem}\left[\textsc{loc}\left[\textsc{cat}\left[\textsc{correl}\ \ \textit{the}\right]\right]\right]\right] \right\rangle \end{bmatrix}$$

Similarly, symmetric French comparative correlatives can be defined as in (29), where *et* and *compar* are subtypes of *corr-mrk* and *none* is the sub-type of *correl* indicating the absence of correlative marking.

(29)
$$\textit{symmetric-cc-cx} \Rightarrow \begin{bmatrix} \textsc{dtrs}\left\langle \begin{bmatrix} \textsc{synsem}\left[\textsc{loc}\left[\textsc{cat}\left[\textsc{correl}\ \ \textit{compar}\right]\right]\right] \end{bmatrix}, \begin{bmatrix} \textsc{synsem}\left[\textsc{loc}\left[\textsc{cat}\begin{bmatrix} \textsc{coord}\ \ \textit{none} \vee \textit{et} \\ \textsc{correl}\ \ \textit{compar} \end{bmatrix}\right]\right] \end{bmatrix} \right\rangle \end{bmatrix}$$

A more complete analysis would take into account the semantics as well (Sag 2010). From a syntactic point of view, HPSG seems to be in a good position to handle both the general properties and the idiosyncrasy of the CC construction, as well as its crosslinguistic variation. For an analysis of a number of Arabic correlative constructions see Alqurashi & Borsley (2014). See also Borsley (2011) for a comparison with a tentative Minimalist analysis.

4 Phrasal coordination and feature resolution

4.1 Feature sharing between coordinands

The coordination construction in (11) requires the value of CAT to be structure-shared across the coordinands and the mother node. Given the large number

of features within CAT, such a constraint makes a series of predictions and mispredictions. For example, this entails that all valence constraints are identical. Thus, in VP coordination all nodes have an empty COMPS list and share exactly the same singleton SUBJ list, as illustrated in Figure 8. Thus, nothing needs to be said from the semantic composition side: the verbs will have to share exactly the same referent for their subject. The same goes for any other combination of categories, of whatever part-of-speech.

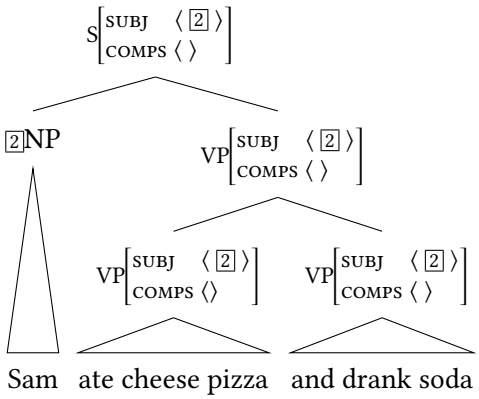


Figure 8: Valence identity in coordination

All the unsaturated valence arguments become one and the same for all coordinands, and it becomes impossible to have daughters with different subcategorization information. For example, if one daughter requires a complement while the other does not, CAT identity is impossible. This correctly rules out a coordination of VP and V categories like the one in (30a), or S and VP as in (30b):

(30) a. * Fred [read a book]$_{\text{COMP}\langle\,\rangle}$ and [opened]$_{\text{COMP}\langle\text{NP}\rangle}$.
b. * Fred [she has a hat]$_{\text{SUBJ}\langle\,\rangle}$ and [smiled]$_{\text{SUBJ}\langle\text{NP}\rangle}$.

But there is other information in CAT besides valence. For example, the head feature VFORM encodes the verb form, and the coordination of inconsistent VFORM values is ruled out as ungrammatical as seen in (31), while consistent values of VFORM are accepted as illustrated by (32).[8]

(31) a. * Tom [whistled]$_{\text{VFORM } \textit{fin}}$ and [singing]$_{\text{VFORM } \textit{prp}}$.

[8] That said, some cases are more acceptable such as *I expect* [*to be there*]$_{\text{VFORM } \textit{inf}}$ *and* [*that you will be there too*]$_{\text{VFORM } \textit{fin}}$. See §6 for more discussion about such cases.

b. * Sue [buy something]$_{\text{VFORM } prs}$ and [came home]$_{\text{FORM } fin}$.

(32) a. Tom [is married]$_{\text{VFORM } fin}$ and [just bought a house]$_{\text{VFORM } fin}$.
b. Sue [buys groceries here]$_{\text{VFORM } fin}$ and [could be interested in working with us]$_{\text{VFORM } fin}$.
c. Dan [protested for two years]$_{\text{VFORM } fin}$ and [will keep protesting]$_{\text{VFORM } fin}$.

Yet another feature that resides in the CAT value of verbal expressions is the head feature INV, which indicates whether a given verbal expression is invertable or not. Hence, inverted structures cannot be coordinated with non-inverted ones:

(33) a. [Sue has sung in public]$_{\text{INV}-}$ and [Kim has tap-danced]$_{\text{INV}-}$.
b. * [Sue has sung in public]$_{\text{INV}-}$ and [has Kim tap-danced$_{\text{INV}+}$.

(34) a. [Elvis is alive]$_{\text{INV}-}$ and [there was a CIA conspiracy]$_{\text{INV}-}$.
b. * [Elvis is alive]$_{\text{INV}-}$ and [was there a CIA conspiracy]$_{\text{INV}+}$.

But if the inverted clause precedes the non-inverted one, then such coordinations become somewhat more acceptable. In fact, Huddleston et al. (2002b: 1332–1333) note attested cases like (35).

(35) Did you make your own contributions to a complying superannuation fund and your assessable income is less than $31,000?

A similar problem arises for the feature AUX, which distinguishes auxiliary verbal expressions from those that are not auxiliary:

(36) a. [I stayed home]$_{\text{AUX}-}$ but [Fred could have gone fishing]$_{\text{AUX}+}$.
b. [Tom went to NY yesterday]$_{\text{AUX}-}$ and [he will return next Tuesday]$_{\text{AUX}+}$.
c. Fred [sang well]$_{\text{AUX}-}$ and [will keep on singing]$_{\text{AUX}+}$.

However, this problem vanishes in the account of the English Auxiliary System detailed in Sag et al. (2020), since in that analysis the feature AUX does not indicate whether the verb is auxiliary or not. Rather, the value of AUX for auxiliary verbs is resolved by the construction in which the verb is used. Since all the constructions in (36) are canonical VPs (e.g. non-inverted), then all the conjuncts in (36) are specified as AUX–, in the Sag et al. (2020) analysis.

Similarly, argument-marking PPs cannot be coordinated with modifying-PPs simply because the former are specified with different PFORM and SELECT values. This explains the contrast in (37). The first PP is the complement that *rely* selects

but the second is a modifier. Thus, they have different CAT values and cannot be coordinated.

(37) a. Kim relied on Mia on Sunday.
b. * Kim relied on Mia and on Sunday.

Consequently, it is in general not possible to coordinate argument marking PPs headed by different prepositions, simply because they bear different PFORM values as shown in (38).

(38) a. *Kim depends [[on Sandy]$_{\text{PFORM } on}$ or [to Fred]$_{\text{PFORM } to}$].
b. *Kim is afraid [[of Sandy]$_{\text{PFORM } of}$ and [to Fred]$_{\text{PFORM } to}$].

Similarly, adjectives that are specified as PRED+ cannot be coordinated with PRED– adjectives, without stipulation:

(39) a. * I became [former]$_{\text{PRED}-}$ and [happy]$_{\text{PRED}+}$.
b. * He is [happy]$_{\text{PRED}+}$ and [Fred]$_{\text{PRED}-}$.
c. * [Mere]$_{\text{PRED}-}$ and [happy]$_{\text{PRED}+}$, Fred rode on into the sunset.

Since case information is also part of CAT, it follows that conjuncts must be consistent as in (10).[9] Many other examples of CAT mismatches exist, but the list above suffices to illustrate the breadth of predictions that follow from the feature geometry of CAT and the constraints imposed by the coordination construction.

(40) a. * I saw [her$_{acc}$ and he$_{nom}$].
b. * He likes [she$_{nom}$ and me$_{acc}$].

Mispredictions also exist. We already discussed one, concerning the feature INV, but there are others. For example, requiring that the GAP value of the coordinands be the same readily predicts Coordinate Structure Constraint effects like (41) and (42), but it incorrectly rules out asymmetric coordination violation cases like (43). See Goldsmith (1985), Lakoff (1986), and Levin & Prince (1986) for more examples and discussion.

(41) a. [To him]$_{\boxed{1}\text{NP}}$ [Fred gave a football _]$_{\text{SLASH}\langle\boxed{1}\rangle}$ and [Kim gave a book _]$_{\text{SLASH}\langle\boxed{1}\rangle}$

[9] There are nonetheless collocational cases where the distribution of pronouns defies this pattern, due to presumably prescriptive forces; see Grano (2006) and Lohmann (2014).

b. * [To him]$_{\boxed{1}\text{NP}}$ [Fred gave a football _]$_{\text{SLASH}\langle\boxed{1}\rangle}$ and [Kim gave me a book]$_{\text{SLASH}\langle\,\rangle}$

c. * [To him]$_{\boxed{1}\text{NP}}$ [Fred gave a football to me]$_{\text{SLASH}\langle\,\rangle}$ and [Kim gave a book _]$_{\text{SLASH}\langle\boxed{1}\rangle}$

The gap is bound off within the relative clause. In PS94 and in Sag (1997: 456). Please fix this. (42b) is not ruled out because of non-matching SLASH values but because the relative clause is internally not well-formed: a head-filler phrase needs a gap and *that every kid wants it* does not have a gap and hence the relative pronoun cannot be integrated. I guess you should just remove the example in (42).

(42) a. It offers something$_i$ [that every kid wants _]$_{\text{SLASH}\langle \text{NP}_i\rangle}$ and [that every parent tries to help their child to achieve _]$_{\text{SLASH}\langle \text{NP}_i\rangle}$.

b. * It offers something$_i$ [that every kid wants _]$_{\text{SLASH}\langle \text{NP}_i\rangle}$ and [that every parent tries to help their child to achieve it]$_{\text{SLASH}\langle\,\rangle}$

c. * It offers something$_i$ [that every kid wants it]$_{\text{SLASH}\langle\,\rangle}$ and [that every parent tries to help their child to achieve _]$_{\text{SLASH}\langle \text{NP}_i\rangle}$

(43) a. [Who]$_{\boxed{1}\text{NP}}$ did Sam [[pick up the phone]$_{\text{SLASH}\langle\,\rangle}$ and [call _]$_{\text{SLASH}\langle\boxed{1}\rangle}$?

b. What was the maximum amount$_{\boxed{1}}$ that I can [contribute _]$_{\text{SLASH}\langle\boxed{1}\rangle}$ and [still get a tax deduction]$_{\text{SLASH}\langle\,\rangle}$?

Chaves (2012b) argues that there are no independent grounds to assume that asymmetric coordination is anything other than coordination, and therefore the coordination construction must not impose GAP identity across conjuncts. Rather, the Coordinate Structure Constraint, and its asymmetric exceptions are best analyzed as pragmatic in nature, as Kehler (2002) argues. See Borsley & Crysmann (2020), Chapter 14 of this volume for more discussion. In practice, this means that the coordination construction should impose identity of some of the features in CAT, though not all, despite the fact that one of the prime motivations for CAT was coordination phenomena.

Please tell me which area you refer to and I add the section/pages.

Like in the case of locally specified valents, the category of the extracted phrase is also structure-shared in coordination. Hence, case mismatches like (44) are correctly ruled out.

(44) a. * [Him]$_{acc}$, [all the critics like to praise _]$_{\text{SLASH}\langle \text{NP}acc\rangle}$ but [I think _would probably not be present at the awards]$_{\text{SLASH}\langle \text{NP}nom\rangle}$

There are, however, cases where the case of the ATB-extracted phrase can be syncretic as in (45), due to Levine et al. (2001).

add pages

(45) a. Robin is someone who$_i$ even [good friends of _$_i$] believe _$_i$ should be closely watched.

b. We went to see [a movie]$_{\boxed{1}nom\_acc}$ [which the critics praised _]$_{\text{SLASH}\langle\boxed{1}\rangle}$ but [that Fred said _would probably be too violent for my taste]$_{\text{SLASH}\langle\boxed{1}\rangle}$

The feature CASE is responsible for identifying the case of nominal expressions. Pronouns like *him* are specified as *acc*(*usative*), and pronouns like *I* are *nom*(*inative*), and expressions like *who* or *Robin* are left underspecified for case. According to Levine et al. (2001: 207), the case system of English involves the hierarchy in Figure 9.

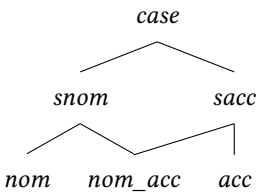


Figure 9: Type hierarchy of (structural) case assignments

Verbs subcategorize for structurally nominative (*snom*) NP subjects and structurally accusative (*sacc*) NP complements. Most nouns and some pronouns like *who* and *what* are underspecified for case, and thus typed as *case*, which makes them consistent with both nominative and accusative positions. Hence, *a movie* can be simultaneously be required to be consistent with *snom* and *sacc*, by resolving into the syncretic type *nom_acc*, which is a subtype of both *snom* and *sacc*. Pronouns like *him* and *her* are specified as *acc* and therefore are not compatible with the *nom_acc* type. The same goes for *nom* pronouns like *he* and *she*, etc. Hence, the problem of case syncretism is easily solved. See Section 6 for more discussion about the related phenomenon of coordination of unlike categories.

4.2 Coordination and agreement

Another thorny issue for syntactic theory and coordination structures concerns agreement. According to Pollard & Sag (1994), agreement information is introduced by the INDEX feature in semantics, not morphosyntax. Hence, different expressions with inconsistent person, gender and number specifications are free to combine. But Wechsler & Zlatic (2003) have also argued that there should be a distinct feature called CONCORD, which is morphosyntactic in nature (See Wech-

sler (2020), Chapter 6 of this volume). The motivation for this move, is that there are languages, like Serbo-Croatian, which display hybrid agreement:

(46) Ta dobra deca su doš-l-a
that.SG.F good.SG.F children AUX.3PL come-PPRT-PN
'Those good children came.'
(Wechsler & Zlatic 2003: 51)

The collective noun *deca* 'children' triggers feminine singular (morphosyntactic) agreement on NP-internal items, in this case the determiner *ta* 'that' and the adjective *dobra* 'good'. This is a problem for a locality theory of agreement. On the other hand, there are other HPSG analyses that argue that what appears to be closest conjunct agreement is in fact agreement with the whole coordinate NP, which has additional features inherited from the first and last conjuncts. Villavicencio et al. (2005) propose two additional features: LAGR (for the left most conjunct) and RAGR (for the right most conjunct) for determiner and (attributive) adjective agreement in Romance, which involves the CONCORD feature. Semantic agreement (i.e. Concord), on the other hand, is seen in the verb *su*, which is inflected for third person plural, in agreement with the semantic properties of the subject *deca*. The two kinds of agreement are also visible in English:

(47) a. This/*These committee made a decision.
b. The committee have/has made a decision.

Since (morphosyntacic) agreement is not recorded in CAT, it follows that the resolution of agreement information in coordination must be processed elsewhere in the grammar. There are usually strict and non-trivial constraints involved in determining what the agreement of the mother node is given that of the coordinands. We turn to this problem below.

4.3 Agreement

In case of conjuncts with conflicting agreement values, resolution strategies are observed crosslinguistically. For example, a coordination with a 1st person is 1st, and a coordination with 2nd person (and no 1st person) is 2nd person:

(48) a. Paul and I like ourselves / *themselves.
b. Paul and you like yourselves / *themselves.

In gender marking languages, coordination with conflicting gender values is often resolved to masculine, at least for animates (Corbett 1991). This is illustrated in (49), for Portuguese.

(49) a. o homem e a mulher modernos
the.M.SG man.M.SG and the.F.SG woman.F.SG modern.M.PL
'the modern man and woman'

b. morbidez e morte prematuras
morbidity.F.SG and death.F.SG premature.F.PL
'premature morbidity and death'
(Villavicencio et al. 2005: 433)

Sag (2003a) proposes that 1st person is a supertype of 2nd person which is itself a supertype of 3rd person. This way, person resolution in coordination amounts to type unification. Addressing gender resolution, Gabriel & Crysmann (2018) propose a list-based encoding of person and gender values, and list concatenation as a combining operation, as shown in (50). For gender, they propose a M(ASCULINE) feature that has an empty list value for feminine words, and a non empty list value for masculine words. The coordination of a masculine noun (*chevaux* 'horses') with a feminine noun (*ânesses* 'female donkey') yields a masculine NP with a non-empty list value for M. Only the coordination of two feminine nouns yields a feminine NP with an empty list value M.

(50)

$$\textit{nom-coord-phrase} \Rightarrow \left[\begin{array}{l} \textsc{synsem}\ \left[\textsc{cont}\ \left[\textsc{index}\ \left[\begin{array}{l}\textsc{num}\ \textit{pl}\\ \textsc{gen}\ \left[\textsc{m}\ \boxed{1}\oplus\boxed{2}\right]\\ \textsc{pers}\ \left[\textsc{me}\ \boxed{4}\oplus\boxed{6}\right]\end{array}\right]\right]\right] \\ \textsc{dtrs}\ \left\langle \left[\textsc{synsem}\ \left[\textsc{cont}\ \left[\textsc{index}\ \left[\begin{array}{l}\textsc{gen}\ \left[\textsc{m}\ \boxed{1}\right]\\ \textsc{pers}\ \left[\begin{array}{l}\textsc{me}\ \boxed{3}\\ \textsc{you}\ \boxed{4}\end{array}\right]\end{array}\right]\right]\right], \left[\textsc{synsem}\ \left[\textsc{cont}\ \left[\textsc{index}\ \left[\begin{array}{l}\textsc{gen}\ \left[\textsc{m}\ \boxed{2}\right]\\ \textsc{pers}\ \left[\begin{array}{l}\textsc{me}\ \boxed{5}\\ \textsc{you}\ \boxed{6}\end{array}\right]\end{array}\right]\right]\right]\right\rangle \end{array}\right]$$

For person agreement , they use two list valued features ME and YOU. A 1st person has a non empty ME list, 2d person has an empty ME list and a non empty YOU list, and 3rd person has both empty lists. Thus, coordinating a 1st with a 3rd person yields a ME feature with a non-empty list, and a YOU feature with a non-empty list, hence a 1st person phrase. Coordinating a 3rd person with a 2d person yields a non-empty YOU list and an empty ME list, hence a 2d person phrase. This enables person and gender resolution by list concatenation over conjuncts.

4.3.1 Closest Conjunct agreement

As observed by Corbett (1991), many languages including Romance, Celtic, Semitic and Bantu languages, also have another strategy, namely partial agreement with only one conjunct, the one closest to the target, called closest conjunct agreement (CCA). In the following example, again from Portuguese, the determiner and prenominal adjective agree with the first Noun (51a) and the postnominal adjective with the last Noun (51b).

(51) a. suas próprias reações ou julgamentos
his.F.PL own.F.PL reactions.F.PL or judgements.M.PL
'his own reactions or judgements'
(Villavicencio et al. 2005: 435)

b. Esta cancão anima os corações e mentes
this.F.SG song.F.SG animates the.M.PL hearts.M.PL and minds.F.PL
brasileiras.
Brazilian.F.PL
'This song animates Brazilian hearts and minds.'
(Villavicencio et al. 2005: 437)

For French determiners and attributive adjectives, An & Abeillé (2017) and Abeillé et al. (2018) show on the basis of corpus data and experiments that number agreement may also obey CCA. As far as gender is concerned, prenominal adjectives always obey CCA while postnominal ones half of the time (in contemporary French). In (52a), the determiner can be singular (CCA) or plural (resolution), while in (52b), CCA (feminine Det) is obligatory. In (52c), the postnominal adjective can be masculine (resolution) or feminine (CCA), with the same meaning.

(52) a. votre / vos nom et prénom
your.SG you.PL name.M.SG and first.name.M.SG
'your name and first name'
(An & Abeillé 2017)

b. certaines / * certains régions et départements
certain.F.PL certain.M.PL region.F.PL and department.M.PL
'certain regions and departments'
(Abeillé et al. 2018)

c. des départements et régions importants/importantes
some department.M.PL and region.F.PL important.M.PL/F.PL
'some important departments and regions'

As proposed by Wechsler & Zlatic (2003), HPSG distinguishes two agreement features: CONCORD is used for morphosyntactic agreement and INDEX is used for semantic agreement (see Wechsler (2020), Chapter 6 of this volume). Moosally (1999) proposes an account of single conjunct predicate-argument agreement in Ndebele, which she analyses as INDEX agreement. She has a version of the following constraint that shares the INDEX value of the (nominal) coordinate mother with that of the last conjunct:

(53) $$\textit{nom-coord-phrase} \Rightarrow \begin{bmatrix} \textsc{synsem} & [\textsc{loc}|\textsc{cont}|\textsc{index}\ \boxed{1}] \\ \textsc{dtrs} & \langle [\ ], \ldots, [\textsc{synsem}|\textsc{loc}|\textsc{cont}|\textsc{index}\ \boxed{1}] \rangle \end{bmatrix}$$

But in other languages, such as Welsh, there is evidence that the INDEX of the coordinate structure is resolved, even though predicate-argument agreement is controlled by the closest conjunct:

(54) Dw i a Gwenllian heb gael ein talu.
be.1SG I and Gwenllian.3SG without get CL.1SG pay
'Gwenllian and I have not been paid.'
(Sadler2003a)

This is why Borsley (2009) proposes that CCA is superficial in Welsh and uses linearization domains to handle partial agreement between the initial verb and the first conjunct, which are not sisters. The hypothesis was that verb-subject agreement involves order domains and coordinate structures are not represented in order domains. This allows what looks like agreement with a closest conjunct to be just that. The alternative developed by Villavicencio et al. (2005) assumes that coordinate structures have features reflecting the agreement properties of their first and last conjuncts, to which agreement constraints may refer. Villavicencio et al. (2005) use three features: CONCORD, LAGR (for the left most conjunct) and RAGR (for the right most conjunct).

(55) *nom-coord-ph* ⇒
$$\begin{bmatrix} \textsc{synsem}|\textsc{loc}|\textsc{cat}|\textsc{head} \begin{bmatrix} \textsc{lagr}\ \boxed{1} \\ \textsc{ragr}\ \boxed{2} \end{bmatrix} \\ \textsc{dtrs} \left\langle [\textsc{synsem}|\textsc{loc}|\textsc{cat}|\textsc{head}|\textsc{lagr}\ \boxed{1}], \ldots, [\textsc{synsem}|\textsc{loc}|\textsc{cat}|\textsc{head}|\textsc{ragr}\ \boxed{2}] \right\rangle \end{bmatrix}$$

(56) $$noun \Rightarrow \begin{bmatrix} \textsc{lagr} & \boxed{1} \\ \textsc{ragr} & \boxed{1} \\ \textsc{concord} & \boxed{1} \end{bmatrix}$$

Nouns have the same value for CONCOORD, LAGR and RAGR, and determiner and (attributive) adjective agreement in Romance involves the CONCORD feature. Attributive adjectives constrain the agreement features of the noun they modify (via the MOD or SEL feature). One may distinguish two types for prenominal and postnominal adjectives, by the binary LEX ± feature (Sadler & Arnold 1994) or by the WEIGHT light/non-light feature (Abeillé & Godard 1999). In this perspective, each has its agreement pattern, which we simplify as follows, using '∨' to express a disjunction of feature values:

(57) $$prenominal\text{-}adj \Rightarrow \begin{bmatrix} \textsc{concord} & \boxed{1} \\ \textsc{sel} & \begin{bmatrix} \textsc{lagr} & \boxed{1} \end{bmatrix} \end{bmatrix}$$

(58) $$postnominal\text{-}adj \Rightarrow \begin{bmatrix} \textsc{concord} & \boxed{1} \vee \boxed{2} \\ \textsc{sel} & \begin{bmatrix} \textsc{concord} & \boxed{1} \\ \textsc{ragr} & \boxed{2} \end{bmatrix} \end{bmatrix}$$

In the absence of coordination, these constraints apply vacuously, since CONCORD, LAGR and RAGR all share the same values.

5 Lexical coordination

While conjuncts have often been assumed to be phrasal (see for example Kayne (1994) and Bruening (2018) a.o.), Abeillé (2006) gives several arguments in favor of lexical coordination. In some contexts, words (or phrases with a premodifier) are allowed but not full phrases. In English, it is the case with prenominal adjectives and postverbal particles. See Abeillé (2006) for similar examples with various categories in different languages. Most English attributive adjectives are prenominal unless they have a complement. Although complex adjectival expressions with complements are not licit in prenominal position, it is possible to have complex adjectival expressions if they are coordinate.

(59) a. a tall / proud man
b. * a [taller than you] man
c. * a [proud of his work] man
d. a [big and tall] man

As observed by Pollard & Sag (1987), a particle may project a PP after the nominal complement, but not before; but coordination is possible, at least for some speakers.

(60) a. Paul turned (*completely) off the radio.
b. Paul turned the radio (completely) off.
c. Paul was turning [on and off] the radio all the time.

While phrasal coordination can conjoin unlike categories (see below), it is not the case with lexical coordination:

(61) a. Paul is [head of the school] [and proud of it].
b. # Paul is [head and proud] of the school.

Semantically, lexical coordination is more constrained than phrasal coordination. With *and*, two lexical verbs, sharing a preverbal clitic in French, must share the same verbal root, and in Spanish, they must refer to the same event (Bosque 1986).

(62) a. Je te dis et redis que tu as tort.
I you tell and retell that you have wrong
'I'm telling you that you are wrong.'
b. # Je te dis et promets que tu as tort.
I you tell and promise that you have wrong
'I'm telling and promising you that you are wrong.'
c. Lo compro y vendio en una sola operacion.
it buy.1SG and sell.1SG in a single operation
'I buy and sell it in one single operation.'
d. * Lo compro hoy y vendio mañana.
it buy.1SG today and sell.1SG tomorrow
'I buy it today and sell it tomorrow.'

Some apparent cases of lexical coordination may be analyzed as Right-Node Raising (Beavers & Sag 2004). They differ semantically and prosodically, however: with typical Right-Node Raising, the two conjuncts must stand in contrast to one another, and do not have to refer to the same event. With Right-Node Raising there must be a prosodic boundary at the ellipsis site (see Chaves (2014) and Nykiel & Kim (2020), Chapter 20 of this volume). In French, the first conjunct cannot end with a clitic article or with a weak preposition as in (63b,c),

(63) a. Tout le monde dit et je te promets que tu as tort.
all the world says and I you promise that you are wrong
'Everyone says and I promise you that you are wrong.'

b. * Paul cherche le, et Marie connaît la responsable.
Paul searches the and Marie knows the responsible
'Paul looks for the.M.SG and Marie knows the.F.SG responsible.'

c. * Paul parle de, et Marie discute avec Woody Allen.
Paul speaks of and Marie talks with Woody Allen
'Paul speaks of and Marie talks with Woody Allen.'

No such boundary occurs before the conjunction in lexical coordination. Thus, in French, clitic articles or weak prepositions can be conjoined, with a shared argument (Abeillé 2006):

(64) a. Paul cherche le ou la responsable
Paul looks for the.M.SG or the.M.SG responsible
'Paul is looking for the man or woman in charge'

b. Un film de et avec Woody Allen
a film by and with Woody Allen

c. ?? un film de mais sans Woody Allen
a film by but without Woody Allen

Not all conjunctions are felicitous with lexical coordination; *but*, for example is less felicitous than *and* or *or*. Analyzing the conjunction as a weak head (see above), the sub-type for lexical coordination has to allow for the coordination of items waiting for complements: the conjunction (this is done by concatenation of ARG-ST lists as it is for complex predicates, see Godard & Samvelian (2020), Chapter 12 of this volume). It thus inherits all the dependents of the word it combines with.

(65)
$$\textit{lex-coord} \Rightarrow \left[\begin{array}{l} \textsc{synsem|loc|cat}\left[\begin{array}{ll}\textsc{head} & \boxed{0} \\ \textsc{weight} & \boxed{3}\textit{light}\end{array}\right] \\ \textsc{arg-st}\ \boxed{1} \oplus \left\langle \left[\begin{array}{l}\textsc{synsem|loc|cat}\left[\begin{array}{ll}\textsc{head} & \boxed{0} \\ \textsc{weight} & \boxed{3}\end{array}\right] \\ \textsc{arg-st}\ \boxed{1} \oplus \boxed{2}\end{array}\right] \right\rangle \oplus \boxed{2} \end{array}\right]$$

please give an example

The construct resulting from the coordination of lexical elements has hybrid properties: as a syntactic construct, it must be a phrase, but it also behaves as a word: coordinate verbs behave as lexical heads, coordinate adjectives may occur in positions ruled out for phrases. To overcome this apparent paradox, Abeillé (2006) analyses it as an instance of "light" phrase, following the WEIGHT account of Abeillé & Goodard (2000) and Abeillé & Goodard (2004). Light elements can be words or phrases, and can have a restricted mobility (see Müller (2020), Chapter 10 of this volume). For example prenominal modifiers can be constrained to be [WEIGHT *light*]. In this theory, light phrases can be coordinate phrases or head-adjunct phrases, provided all their daughters are light as Figure 10 illustrates.

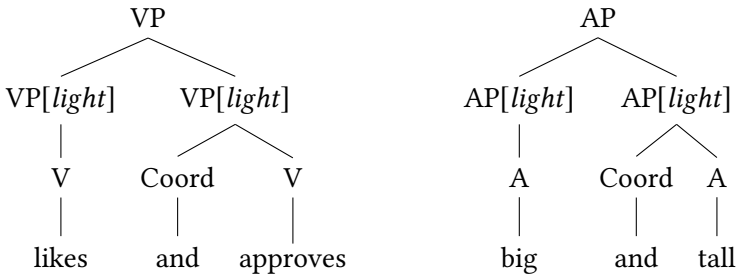


Figure 10: Examples of lexical coordination

6 Coordination of unlike categories

The coordination construction in (11) requires that the categories being coordinated are the same. However, there is some evidence that this requirement is excessive. Consider the coordinations in (66), from Gazdar et al. (1985), Bayer (1996), Huddleston et al. (2002b), among others. Such data pose a classic syntactic problem: what is the part of speech and categorial status of the bracketed constituents?

(66) a. Kim is [alone and without money].
[AP & PP]

b. Pat is [a Republican and proud of it].
[NP & AP]

c. Jack is [a good cook and always improving].
[NP & VP]

d. What I would love is [a trip to Fiji and to win $10,000].
[NP & VP]

e. That was [a rude remark and in very bad taste].
[NP & PP]

f. Chimpanzees hunt [frequently and with an unusual degree of success].
[AdvP & PP]

g. I'm planning [a four-month trip to Africa and to return to York afterwards].
[NP & VP]

As Jacobson (1987) pointed out, it is clear that the features of the mother are not simply the intersection of the features of the conjuncts. Verbs like *remain* are compatible with both AdjP and NP complements whereas *grew* is only compatible with AdjPs. This is shown in (67). Crucially, however, the information associated with the phrase *wealthy and a Republican* somehow allows *grew* to detect the presence of the nominal, as (68a) illustrates, even when the verbs are coordinated, as in (68b–d).

(67) a. Kim remained/grew wealthy.
b. Kim remained/*grew a Republican.

(68) a. Kim remained/*grew [wealthy and a Republican].
b. Kim grew and remained wealthy.
c. * Kim grew and remained a Republican.
d. * Kim grew and remained [wealthy and a Republican].

A number of influential accounts in Type-logical grammar (Morrill 1990; 1994; Bayer 1996) have used one of the rules of inference from propositional calculus in order to deal with coordination of unlikes phenomena, namely, disjunction introduction (or addition): from P one can infer $P \vee Q$. Thus, by assuming that categories like NP, PP and so on can also be disjunctive, the grammar allows an expression of type 'NP' to lead a double life as an 'NP $\vee$ PP' expression, or the type 'AP' to be taken as an 'AP $\vee$ PP $\vee$ NP' and so on. This kind of approach has been adopted in various forms into HPSG, see for example Daniels (2002) and Yatabe (2004). Related work aims to achieve the same result using type-underspecification, such as Sag (2003b). Other, more exploratory work, views coordination of unlike categories as the result of parts-of-speech being gradient and epiphenomenal rather than hard-coded into the type signature (Chaves 2013).

Finally, Crysmann (2000), Yatabe (2003), Beavers & Sag (2004), Chaves (2006) argue that coordination of unlikes can be explained by a deletion operation that omits the left periphery of non-initial conjuncts, illustrated in (69).

(69) a. Tom gave a book to Mary, and ~~gave~~ a magazine to Sue.
b. He drinks coffee with milk at breakfast and ~~drinks coffee with~~ cream in the evening.
(Hudson 1984)
c. There was one fatality yesterday, and ~~there were~~ two others on the day before.
(Chaves 2007: 339).
d. I see the music as both going backward and ~~going~~ forward.
[http://pdxjazz.com/dave-holland; 20 December 2010]

In such a view, (66) are verbal coordinations where the verb (or the verb and the subject) has been deleted (e.g. *Kim is alone and ~~is~~ without money*). The problem is that left-periphery ellipsis cannot fully explain coordination of unlikes phenomena. For example, there is no elliptical analysis of data like (70). Levine (2011) offers arguments against the coercion account of Chaves (2006), and against the existence of left-periphery ellipsis. See Yatabe (2012) for a reply.

(70) a. Simultaneously shocked and in awe, Fred couldn't believe his eyes.
b. Both tired and in a foul mood, Bob packed his gear and headed North.
(Chaves 2006)
c. Both poor and a Republican, *no one* can possibly be.
d. Dead drunk and yet in complete control of the situation, *no one* can be.
(Levine 2011)

Further problems for an ellipsis account of coordination of unlikes phenomena are posed by the position of the correlative coordinators *both*, *either* and *neither* in (71).

(71) a. Isn't this both illegal and a safety hazard?
b. It's both odd and in very poor taste to have a fake wedding.
c. Who's neither tired nor in a hurry?
d. Isn't she either drunk or on medication?

If (71a) is an elliptical coordination like *isn't this both illegal and ~~isn't this~~ a safety hazard*, then the location of *both* is unexpected. Instead of occurring before the first conjunct, it is realized inside the first conjunct. Crucially, the non-elided counterparts are not grammatical, e.g. **isn't this both illegal and isn't this a safety hazard?* The same issue is raised by (71b,c). In an elliptical account one would have to stipulate that *both* can only float in the presence of ellipsis, which is unmotivated. Finally, see Mouret (2007) for an extensive discussion in favor of a non elliptical analysis of unlike coordination, based on correlative coordination. In sum, left-periphery ellipsis does not offer a complete account of coordination of unlikes, and underspecification accounts are more promising.

7 Non-constituent Coordination

The fact that not all coordination of unlike categories can be reduced to deletion does not entail that deletion is impossible, or that no phenomena involve deletion. Consider for example the constructions in (72), all of which involve non-canonical (i.e. non-constituent) coordination, some of which were already discussed above. We refer the reader to Nykiel & Kim (2020), Chapter 20 of this volume for more discussion about other types of ellipsis.

(72) a. Tom gave a book to Mary, and a magazine to Sue.
(Argument Cluster Coordination)

b. Tom loves – and Mary absolutely hates – spinach dip.
(Right-Node Raising)

c. Tom knows how to cook pizza, and Fred – spaghetti.
(Gapping)

Some authors regard Argument Cluster Coordination as elliptical (Yatabe 2001; Crysmann 2004; Beavers & Sag 2004) others regard such phenomena as base-generated (Mouret 2006). In the former, phonological material in the left periphery of the non-initial conjunct that is identical to phonological material in the left periphery of the initial conjunct is allowed to be not present in the mother node. This can be achieved by adding the constraints in (73) to the coordination construction, here shown in the binary-branching format, for perspicuity.

(73)
$$\textit{coord-phr} \Rightarrow \begin{bmatrix} \textsc{phon} \boxed{1}\oplus\boxed{2}\oplus\boxed{3} \\ \textsc{dtrs} \left\langle \left[\textsc{phon} \boxed{1}\oplus\boxed{2}_{ne-list}\right], \begin{bmatrix} \textsc{phon} \boxed{1}\oplus\boxed{3}_{ne-list} \\ \textsc{synsem|loc|cat|coord} \quad \textit{crd} \end{bmatrix} \right\rangle \end{bmatrix}$$

If 1 is resolved as the empty list then no ellipsis occurs, but if 1 is non-empty then ellipsis occurs, as illustrated in Figure 11. Some accounts, like Yatabe (2001), Crysmann (2004), Beavers & Sag (2004), and Chaves (2008) operate on linearization domain elements instead of directly on PHON. See Müller (2020), Chapter 10 of this volume for more discussion about linearization theory.

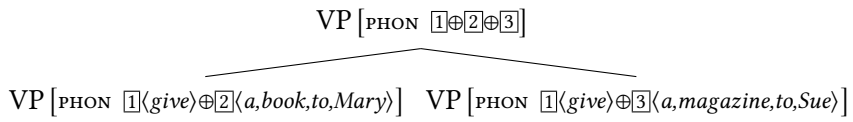


Figure 11: Analysis of *give a book to Mary and ~~give~~ a magazine to Sue*

The conjunction is missing in the figure and in the constraint.

This approach is motivated by the existence of ambiguity in sentences like (74), from Beavers & Sag (2004) and Chaves (2006). Because (74a) involves a one-time predicate, the ellipsis must include the subject phrase, otherwise the intepretation is such that the same two trees are cut down twice. In contrast, (74b) does not involve a one-time predicate, and thus is it possible for the ellipsis to simply involve the verb.

(74) a. Two trees were cut down by Robin in July and by Alex in September.
(Two trees were cut down by Robin in July and ~~two trees were cut down~~ by Alex in September.

b. Two trees were photographed by Robin in July and by Alex in September.
(Two trees were photographed by Robin in July and ~~photographed~~ by Alex in September)

In the non-elliptical analysis of such data, the missing material is recovered from the preceding conjunct. For example, Mouret proposes a rule along the lines of (75). Here, a new head feature CLUSTER is introduced, which takes as its value the list of SYNSEM values of the daughters.

(75) $$\textit{ac-cx} \Rightarrow \begin{bmatrix} \textsc{head} & \left[\textsc{cluster} \left\langle \boxed{1}, \ldots, \boxed{n} \right\rangle\right] \\ \textsc{dtrs} & \left\langle \left[\textsc{synsem}\ \boxed{1}\right], \ldots, \left[\textsc{synsem}\ \boxed{n}\right] \right\rangle \end{bmatrix}$$

Mouret defines argument-clusters as instances of some underspecified non-headed construction *ac-cx* with one daughter or more. The construction is valence saturated. He also postulates a lexical rule allowing (for example) a ditransitive verb

to take a CLUSTER as complement (this rule will also allow clusters for complements and adjuncts, assuming the latter are included in the COMPS list):

(76) $\left[\text{COMPS}\left\langle[\text{LOC|CAT } \boxed{1}], \ldots, [\text{LOC|CAT } \boxed{n}]\right\rangle\right] \mapsto \left[\text{COMPS}\left\langle\left[\begin{array}{ll}\text{COORD} & +\\ \text{CLUSTER} & \left\langle[\text{LOC|CAT } \boxed{1}], \ldots, [\text{LOC|CAT } \boxed{n}]\right\rangle\end{array}\right]\right\rangle\right]$

Something is missing here. Are these clusters coordintated? And then the verb takes the coordination as argument? Maybe a figure would be good.

This approach is motivated by non clausal conjunctions (*as well as, ainsi que*), which are possible in Argument Cluster Coordination, but cannot conjoin tensed VPs:

(77) a. John gave a book to Mary as well as a magazine to Sue.
b. * John gave a book to Mary as well as gave a magazine to Sue.
c. Paul offrira un disque à Marie ainsi qu'un livre à Jean.
'Paul will.offer a record to Mary as well as a book to Jean'
(Abeillé & Goodard 1996)

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Another argument is the placement of correlative conjunctions: the first conjunction in (a) must be postverbal; this shows that Argument Cluster Coordination does not include the first verb. The examples below are from Mouret (2006: 254).

add glosses and translations to all (!) examples

(78) a. Jean a donné et un livre à Marie et un magazine à Sue.
'Jean has given both a book to Marie and a magazine to Sue'
b. Paul compte offrir et un disque à Marie et un livre à Jean.
Paul is.planning.to offer and a record to Marie and a book to Jean
c. * Paul compte et offrir un disque à Marie et un livre à Jean.
Jean is.planning and to.offer a record to Marie and a book to Jean

Another argument is negation placement, which is a case of constituent negation (Mouret 2006: 253):

add glosses and translations to all (!) examples

(79) a. Paul offrira un disque à Marie et (non) pas un livre à Jean.
'Paul will offer a record to Marie and not a book to Jean'
b. Paul gave a record to Mary and not a book to Bill.
c. * Paul gave a record to Mary and not gave a book to Bill.

A syntactic and non-elliptical account of Right-Node Raising is harder to maintain given that this phenomenon does not seem to be sensitive to syntactic structure as (80) shows. See Bresnan (1974), Wexler & Culicover (1980: 299), Grosu (1981: 45), McCawley (1982), and Sabbagh (2007: 382, footnote 30) for more data and discussion.[10]

(80) a. I know a man who SELLS and you know a person who BUYS [pictures of Elvis Presley].
b. John wonders when Bob Dylan WROTE and Mary wants to know when he RECORDED [his great song about the death of Emmet Till].
c. Politicians WIN WHEN THEY DEFEND and LOSE WHEN THEY ATTACK [the right of a woman to an abortion].
d. Lucy CLAIMED that – but COULDN'T SAY exactly when – [the strike would take place].
e. I found a box IN which and Andrea found a blanket UNDER which [a cat could sleep peacefully for hours without being noticed].

Another source of evidence against syntactic and non-elliptical accounts of Right-Node Raising is that this phenomenon can involve lexical structure, as (81) illustrates:

(81) a. Please list all publications of which you were the SOLE or CO-[author]. (Huddleston et al. 2002b: 1325, footnote 44).
b. It is neither UN- nor OVERLY [patriotic] to tread that path.

[10] Steedman (1985; 1990; 2001) and Dowty (1988: 183) claim that Right-Node Raising is bounded, nonetheless. For example, Dowty (1988) argues that **an idea that, and a robot which* [*can solve this problem*] is evidence for islands in RNR. But as Phillips (1996: 95) points out, this oddness is explained by semantic factors: it is impossible to semantically contrast *that* (which is semantically vacuous) with *which*. Steedman (2001: 17) argues that RNR exhibits islands effects by claiming that *I hope that I will meet the woman* WHO WROTE *and you expect to interview the consortium* THAT PUBLISHED [*that novel about the secret life of legumes*] is ungrammatical. In our experience, informants do not systematically share this judgment.

c. The EX- or CURRENT [smokers] had a higher blood pressure. (Chaves 2008)

d. The NEURO- and COGNITIVE [sciences] are presently in a state of rapid development (...)[11]

e. Are you talking about A NEW or about AN EX-[boyfriend]?

Elliptical accounts of Right-Node Raising are proposed by Beavers & Sag (2004), Yatabe (2004), Chaves (2014) and others. The rule in (82) illustrates the account adopted by Chaves (2014) and Shiraïshi et al. (2019) in simplified format.[12] In a nutshell, the M(ORPHO-)P(HONOLOGY) feature introduces two list-valued features, namely PHON(OLOGY) and L(EXICAL-)ID(ENTIFIER). The former encodes phonological content, including phonological phrasing information, whereas the latter is used to individuate lexical items semantically (i.e. the value of LID is a list of semantic frames that canonically specify the meaning of a lexeme).

(82)
$$rpe\text{-}cx \Rightarrow \left[\begin{array}{ll} \textsc{mp} & L_1 \oplus R_1 \oplus R_2 \oplus R_3 \\ \textsc{synsem} & \boxed{0} \\ \textsc{dtrs} & \left\langle \left[\begin{array}{ll} \textsc{mp} & L_1 \oplus L_2 \left\langle \left[\begin{array}{ll} \textsc{phon} & \boxed{p_1} \\ \textsc{lid} & \boxed{1} \end{array}\right], \ldots, \left[\begin{array}{ll} \textsc{phon} & \boxed{p_n} \\ \textsc{lid} & \boxed{\text{n}} \end{array}\right] \right\rangle \oplus \\ & R_1 \oplus R_2 \left\langle \left[\begin{array}{ll} \textsc{phon} & \boxed{p_1} \\ \textsc{lid} & \boxed{1} \end{array}\right], \ldots, \left[\begin{array}{ll} \textsc{phon} & \boxed{p_n} \\ \textsc{lid} & \boxed{\text{n}} \end{array}\right] \right\rangle \oplus R_3 \\ \textsc{synsem} & \boxed{0} \end{array}\right] \right\rangle \end{array}\right]$$

By requiring PHON identity, this rule ensures that Right-Node Raising only targets strings that are phonologically independent, and have the same surface form, ruling out the ungrammatical examples in (83). The assumption here is that the value of PHON is not simply a list of phonemes, but rather a structured list containing intonational phrases, phonological phrases, prosodic words, syllables, and segments.

Stressed pronouns, affixes that correspond to independent prosodic words, and compound parts can be RNRaised because they are independent prosodic units in their local domains. See Swingle (1995) for more discussion.

(83) a. He tried TO PERSUADE but he couldn't CONVINCE [THEM] / *[them].

b. * I think that I'D and I know that PAT'LL [buy those portraits of Elvis].

[11] http://opinionator.blogs.nytimes.com/2011/12/25/the-future-of-moral-machines/?hp, accessed 2020-03-09.

[12] See Chaves (2014) for more details about how 'cumulative' Right-Node Raising is modeled by this rule, i.e. cases like *Mia lost – and Fred spent – (a total of) $10.000.*

c. * They've always WANTED a – and so I've GIVEN THEM a – [coffee grinder].

d. * I bought EVERY RED and Jo liked SOME BLUE [t-shirt].

By requiring LID identity, the rule prevents homophonous strings that have fundamentally different semantics from being Right-Node Raised, as in (84). In such cases, oddness arises because in general the same phrase cannot simultaneously have two meanings, except in puns (Zaenen & Karttunen 1984: 316).

(84) a. * Randy SAW and Rene has BEEN [flying planes].

b. * Jo WILL and Sandy BUILT THE [drive].
(Milward 1994)

add pages

c. * Mary FED and Tom ENJOYED [the lamb].
(adapted from Buitelaar (1998: 64))

d. * Robin SWUNG and Leslie TAMED [an unusual bat].
(Levine & Hukari 2006: 156)

e. * We need new BLACK- and FLOOR[boards].
(Artstein 2005)

f. * We caught BUTTER- and FIRE[flies].
(Chaves 2008)

g. * There stood a ONE- and WELL-[armed man].
(Chaves 2014)

At the same time, LID identity does not go as far as requiring co-referentiality of the shared material. This is as intended given ambiguous examples like *Chris LIKES and Bill LOVES* [*his bike*]. The account of Right-Node Raising is illustrated below. Here, I corresponds to an intonational phrase, and ϕ to a phonological phrase. Note that this is a unary-branching rule, which means that it can in principle apply to any phrasal node, including non-coordinate cases of RNR:

I and phi are strange. There is no feature but a bracket for embedding. This needs explanation. It is formally incoherent.

(85) a. It's interesting to compare the people who LIKE with the people who DISLIKE [the power of the big unions].
(Hudson 1976: 550)

b. Anyone who MEETS really comes to LIKE [our sales people].
(adapted from Williams (1990))

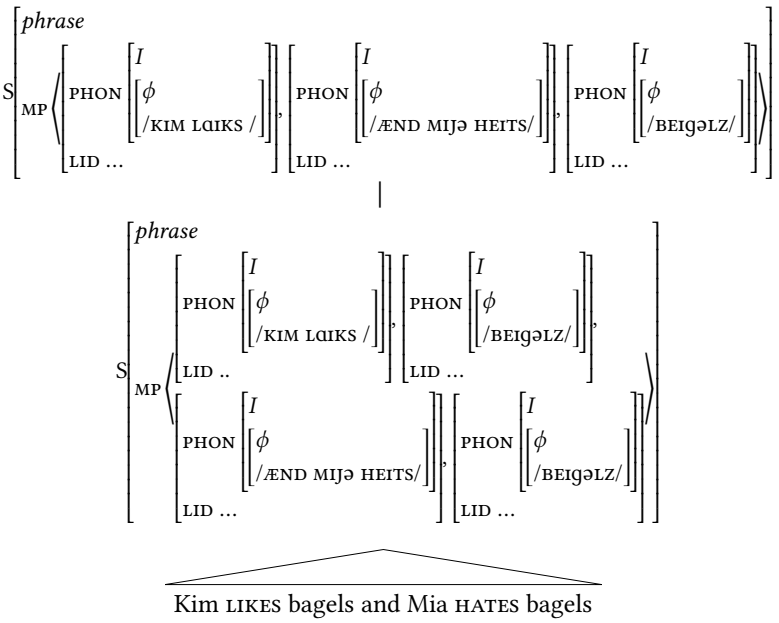

Figure 12: Analysis of *Kim likes, and Mia hates, bagels*

c. Spies who learn WHEN can be more valuable than those able to learn WHERE [major troop movements are going to occur].

d. Politicians who fought FOR may well snub those who have fought AGAINST [chimpanzee rights].
(Postal 1994)

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e. Those who voted AGAINST far outnumbered those who voted FOR [my father's motion].
(Huddleston et al. 2002b: 1344)

f. If there are people who OPPOSE then maybe there are also some people who actually SUPPORT [the hiring of unqualified workers].
(Chaves 2014)

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In the example in Figure 12 the sub-list $\boxed{R_3}$ is resolved as the empty list, but this need not be so. When the latter sublist is not resolved as the empty list, we obtain discontinuous Right-Node Raising cases like (86), where the RNRaised expression is followed by extra material.

(86) a. The blast UPENDED and NEARLY SLICED [an armored Chevrolet Subur-

ban] in half.

b. During the War of 1982, American troops OCCUPIED and BURNED [the town] to the ground.

c. Please move from the exit rows if you are UNWILLING or UNABLE [to perform the necessary actions] without injury.

d. The troops that OCCUPIED ended up BURNING [the town] to the ground.

Finally, let us now turn our attention to Gapping, as in *Robin likes Sam and Tim – Sue*. There are elliptical accounts of Gapping (Chaves 2006) as well as direct-interpretation accounts where the missing material is recovered from the preceding linguistic context (Mouret 2006; Abeillé et al. 2014; Park 2019); see Nykiel & Kim (2020), Chapter 20 of this volume. The latter is illustrated in Figure 13, in simplified format. Basically, the Question Under Discussion (QUD, Roberts 1996) of the first clause is $\lambda y.\lambda x.\exists e(like(x,y))$ which is information that shared across the clausal daughters as $\boxed{1}$. This allows the second conjunct to combine the two NPs with the verbal semantics, and recover the propositional meaning.

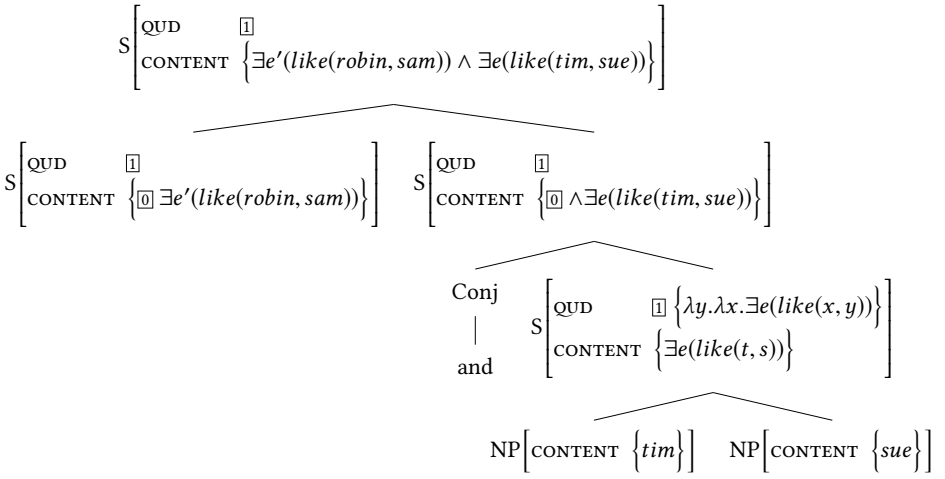

Figure 13: Analysis of *Robin likes Sam and Tim – Sue* (abbreviated)

Like RNR, Gapping is not restricted to coordinate structures as (87) illustrates, contrary to widespread assumption. Thus, the Gapping rule proposed by Park (2019) that allows a gapped clause to follow a non-gapped clause, is not specific to coordination.

(87) a. Robin speaks French better than Leslie – German.

b. My purpose here is not to resolve the crucial disagreement between two prominent theoreticians in a way that one would be declared true while the other one – false.
c. The keynote of their relationship was set when Victoria, already a reigning queen, had to propose to Albert, rather than he – to her.
d. The public remembers all that and usually recognizes us before we – them.
(Park 2019)

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8 Conclusion

Coordination is a pervasive phenomenon in all natural languages. Despite intensive research in the last 70 years, its empirical properties continue to challenge most linguistic theories: the coordination lexemes play a crucial role but do not behave like usual syntactic heads, the conjuncts do not need to be identical but display some parallelism relations and can be unlimited in number, some non constituent sequences can be coordinated, peculiar ellipsis phenomena can optionally occur, etc. We have shown how HPSG offers precise detailed analyses of various coordinate constructions for a wide variety of languages, factoring out the common properties shared by other constructions and the properties specific to coordination.

Central to the HPSG analyses are two main ideas: (i) coordination structures are non-headed phrases and come with different subtypes; (ii) the parallelism between coordinate daughters is captured by feature sharing; from these ideas, specific properties can be derived, regarding extraction and agreement for instance. Nevertheless, there is no clear consensus about some remaining issues. In some accounts, the coordinator is a weak head, whereas in others it is a marker. Coordinate structures are binary branching in some accounts but not so in others. Agreement is always local (with the whole coordinate phrase) in some account, whereas locality is abandoned by others to account for Closest Conjunct agreement. Finally, in some accounts non-constituent coordination involves some form of deletion, but in others no deletion operation is assumed.

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