Chapter 16

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, and (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, and 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 into the general organization of the grammar.

1 Introduction

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. 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

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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 coordinands, 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 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 were also in-depth examinations of a number of complex empirical phenomena 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 is also often the case that a dependent can be omitted, fronted, or extraposed while the head cannot be (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 coordinands, not by one particular coordinand 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*, and *together* can be used to show that the entire bracketed string is interpreted as a complex unit denoting a plurality.

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

Generally, a coordinate structure has the same grammatical function and category as the coordinands: given a number of coordinands 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: 752) refer to 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 verb-initial, verb-final languages overwhelmingly employ coordinator-initial strategies. In particular, 119 of these languages have exclusively coordinator-initial, 12 exhibit both coordinator-initial

[1]The exceptions include coordinator expressions themselves, e.g. **You ordered a coffee and or or a tea?* This oddness may be due to the coordinands being of the wrong semantic type. See Section 5 for more on lexical coordination.

and coordinator-final strategies, and only 4 have exclusively coordinator-final structures.

Finally, coordination is also special in that the relationship between coordinands is unlike adjunction (Levine 2001: 156–160). Whereas adjuncts can in principle be displaced, coordinands 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 coordinand can usually be said to be a dependent. For example, reversing the order of the coordinands in (4) causes no major change in meaning. Neither daughter can be said to be the head because no subordination dependency is established between coordinands.

(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 like those in (5) which do not have such symmetric interpretations (Goldsmith 1985; Lakoff 1986; Levin & Prince 1986). Regardless, such constructions retain many of the properties that characterize coordinate structures, and therefore are likely to be 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: Section 4.2), and later adopted in many other frameworks such as Pesetsky (1982: Section 3.1), Gazdar (1980: 407), and Huddleston et al. (2002: 1275), among many others. See Borsley (1994; 2005) and Chaves (2007: Chapter 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,

[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.

> p. 613, rule 3i). These conclusions seem to me equally unacceptable. Thus to 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

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

(6) a. A, B, C (asyndeton)
b. A, B *coord* C (monosyndeton)
c. A *coord* B *coord* C (polysyndeton)
d. *coord* A *coord* B *coord* C (omnisyndeton)

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 clitic *to* is used for nominal coordination and *te* is used for other coordinations.

In what follows, we start by focusing on monosyndeton coordination. There are three possible structures one can assign to such coordinations, as Figure 1 illustrates. The binary branching approach (left) goes back to Yngve (1960: 456), and is used in HPSG work such as Pollard & Sag (1994: 200–205), Yatabe (2003),

Crysmann (2008), Beavers & Sag (2004), Drellishak & Bender (2005), Chaves (2007), and Chaves (2012b), among others. The flat branching approach (center) has also been assumed in HPSG (Abeillé 2005; Abeillé, Bonami, et al. 2006; Mouret 2005; 2006; Bîlbîie 2017), and the totally flat approach (right) much less frequently (Sag et al. 2003; Sag 2003).[3]

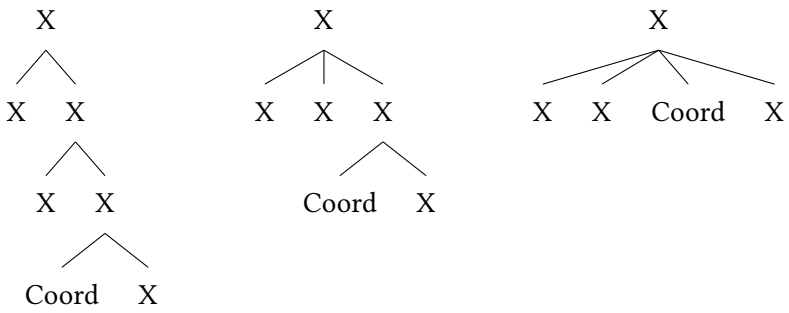

Figure 1: Three possible headless analyses of coordination

The binary branching analysis requires two different rules, informally depicted in (7), and a special feature to prevent the coordinator from recursively applying 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+}

Kayne (1994: Chapter 6) and Johannessen (1998: Chapter 3) argue that coordination follows X-bar theory and that the coordinator is the head of the construction; see Borsley & Müller (2021: Section 4.2.2), Chapter 28 of this volume. But in HPSG, even though one of the coordinands (or more) may combine with a coordinator, 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 branching 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 (2005) for criticism of ConjP and of the binary branching analysis of coordinate structures with three coordinands. ConjP is also discussed in Borsley & Müller (2021: Section 4.2.2), Chapter 28 of this volume.

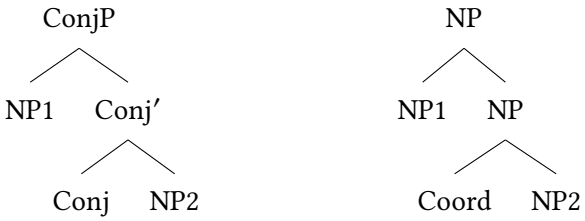

Figure 2: Binary-branching analyses of coordination, headed and non-headed

However, the flat analysis requires only one rule, and no special features at all, as (9) 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 (8a). 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 first one in a coordination of two items. 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 2005: 111). This last example is illustrated in (10), quoted from Drellishak & Bender (2005: 111).

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

Second, as Ross (1967: 165) 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 the former forms a unit with the latter.

Aspects of the phrase structure rule in (8b) can be formalized in HPSG as shown in (11), using parametric lists (Pollard & Sag 1994: 396, fn. 2) to enforce that all coordinands structure-share the morphosyntactic information. The type *ne-list* (*non-empty-list*) corresponds to a list that has at least one member, and

when used parametrically as in (11), it additionally requires that every member of the list bear the features $\left[\textsc{synsem|loc|cat}\ \boxed{1}\right]$.

(11) *coord-phrase* ⇒
$$\begin{bmatrix}\textsc{synsem|cat}\ \boxed{1} \\ \textsc{dtrs}\ \left\langle\left[\textsc{synsem|loc|cat}\ \boxed{1}\right]\right\rangle \oplus \textit{ne-list}\left(\left[\textsc{synsem|loc|cat}\ \boxed{1}\right]\right)\end{bmatrix}$$

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. Later in the chapter, we will see further proposals. For now, we are focusing on standard coordinations.

In order to account for the fact that different kinds of coordination strategies are possible, Mouret (2006: 260) and Bîlbîie (2017: 205) define three subtypes of *coord-phrase*, assuming a lexical feature COORD to distinguish between coordination types:[4]

(12) a. *simple-coord-phrase* ⇒
$$\left[\textsc{dtrs}\ \textit{ne-list}\left(\left\langle\left[\textsc{coord}\ \textit{none}\right]\right\rangle\right) \oplus \textit{ne-list}\left(\left[\textsc{coord}\ \boxed{1}\ \textit{crd}\right]\right)\right]$$

b. *omnisyndetic-coord-phrase* ⇒
$$\left[\textsc{dtrs}\ \textit{ne-list}\left(\left[\textsc{coord}\ \boxed{1}\ \textit{crd}\right]\right)\right]$$

c. *asyndetic-coord-phrase* ⇒
$$\left[\textsc{dtrs}\ \textit{ne-list}\left(\left[\textsc{coord}\ \textit{none}\right]\right)\right]$$

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. Thus, simple (monosyndeton and polysyndeton) coordinations are those where all but the first coordinand are allowed to combine with a coordinator, omnisyndeton coordinations are those where all coordinands have combined with a coordinator, and likewise, asyndeton coordinations are those where none of the coordinands have combined with a coordinator.

[4]Mouret's and Bîlbîie's formulations are 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* being 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.

Strictly speaking tags that appear only once in a structure are illegitimate, since tags are about sharing values. The purpose of the tags in (12a) and (12b) is to ensure that all members in the list have the same COORD value. A more precise way would add a constraint to (12a) and (12b) saying that $\boxed{1} = \top$, $\top$ (top) being the most general type in the type hierarchy. While this does not really add restrictive constraints on $\boxed{1}$, it makes sure that all list members of the second list get the same COORD value, since all elements of the lists are [COORD $\boxed{1}$] and since they are all shared with the $\boxed{1}$ mentioned in $\boxed{1} = \top$.

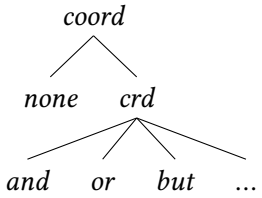

Figure 3: Coordinator sub-types

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?

3.1 The status of coordinator expressions

In HPSG, coordinators are sometimes analyzed as markers (Beavers & Sag 2004: Section 4.1; Drellishak & Bender 2005: Section 4.1). In such a view, the coordinator's lexical entry does not select any arguments, since it has none. In (13), we show the lexical entry for the conjunction, using current HPSG feature geometry. Note that the MRKG (marking) 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 in the analysis of Pollard & Sag 1994: Section 1.6), then the result will be an S that is also MRKG *that*, and so on, for any given value of MRKG.[5]

(13)
$$\left[\begin{array}{l} \textit{coord-lexeme} \\ \textsc{phon} \left\langle \textit{and} \right\rangle \\ \\ \textsc{synsem|loc|cat} \left[\begin{array}{l} \textsc{head} \left[\begin{array}{l} \textit{coord} \\ \textsc{sel} \left[\textsc{loc|cat} \left[\begin{array}{l} \textsc{coord} \ \textit{none} \\ \textsc{mrkg} \ \boxed{1} \end{array}\right]\right] \end{array}\right] \\ \textsc{coord} \ \textit{and} \\ \textsc{mrkg} \ \boxed{1} \end{array}\right] \end{array}\right]$$

This sign imposes constraints on the head sign it combines with via the feature SEL(ECTION), the same feature that allows other markers and adjuncts in general

[5]The semantics and pragmatics of coordination is a particularly complex topic which we cannot do justice to here, especially when it comes to interactions with other phenomena such as quantifier scope and collective, distributive, and reciprocal readings. See Koenig & Richter (2021), Chapter 22 of this volume for more discussion and in particular Copestake et al. (2005: Section 6.7), Fast (2005), Chaves (2007: Chapters 4–6; 2012b: Section 5.3; 2012a; 2009), and Park (2019: Chapters 4–5) for HPSG work that specifically focuses on the semantics of coordination.

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]

(14) *head-functor-phrase* ⇒

$$\begin{bmatrix} \textsc{synsem|loc|cat} \begin{bmatrix} \textsc{subj} & \boxed{1} \\ \textsc{comps} & \boxed{2} \\ \textsc{coord} & \boxed{3} \\ \textsc{mrkg} & \boxed{4} \end{bmatrix} \\ \textsc{hd-dtr}\ \boxed{5} \\ \textsc{dtrs} \left\langle \begin{bmatrix} \textsc{synsem|l|cat} \begin{bmatrix} \textsc{sel} & \boxed{6} \\ \textsc{coord} & \boxed{3} \\ \textsc{mrkg} & \boxed{4} \end{bmatrix} \end{bmatrix}, \boxed{5} \begin{bmatrix} \textsc{synsem}\ \boxed{6} \begin{bmatrix} \textsc{l|cat} \begin{bmatrix} \textsc{subj} & \boxed{1} \\ \textsc{comps} & \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix} \right\rangle \end{bmatrix}$$

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

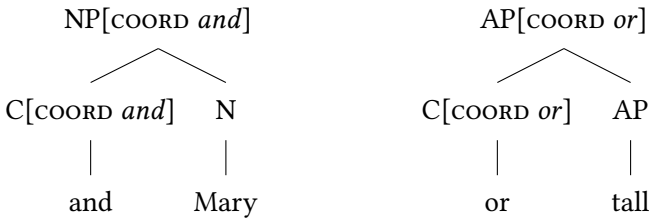

Figure 4: Coordinate marking constructions

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

[6]The Head Feature Principle (Pollard & Sag 1994: 34) states that the value of the mother's HEAD feature is identical to that of the head daughter's HEAD feature. See also Abeillé & Borsley (2021: 22), Chapter 1 of this volume.

(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, MRKG) from its complement, and adds its own COORD feature. The lexical entry for the coordinator *and* is shown in (16).

(16)
$$\left[\begin{array}{l}\textit{coord-lexeme}\\ \textsc{phon}\ \langle \textit{and} \rangle\\ \textsc{synsem|loc|cat}\ \left[\begin{array}{l}\textsc{head}\ \boxed{1}\\ \textsc{coord}\ \textit{and}\\ \textsc{subj}\ \boxed{2}\\ \textsc{comps}\ \left\langle \left[\textsc{loc|cat}\ \left[\begin{array}{l}\textsc{head}\ \boxed{1}\\ \textsc{subj}\ \boxed{2}\\ \textsc{comps}\ \boxed{3}\\ \textsc{mrkg}\ \boxed{4}\end{array}\right]\right] \right\rangle \oplus \boxed{3}\\ \textsc{mrkg}\ \boxed{4}\end{array}\right]\end{array}\right]$$

The weak head analysis is illustrated in Figure 5. Here, the category of the coordinator, the coordinand, and the mother node are the same, because the coordinator's head value is lexically required to be structure-shared with the head value of the coordinand it combines with (which is its first complement; see Section 5 on lexical coordination to see why the coordinator may inherit some complements expected by the coordinand).

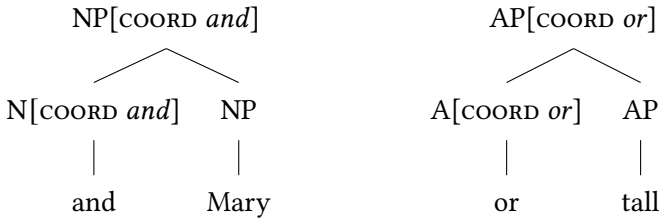

Figure 5: Coordinate weak-head constructions

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 coordinands as

in (17). If coordinands are arguments and hence listed in valence lists like COMPS and ARG-ST, then they are expected to be extractable (see Borsley & Crysmann 2021: Section 4, Chapter 13 of this volume and Chaves 2021: 668, Chapter 15 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: 17) 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: Section 3.2) for a weak head analysis of certain French prepositions.

3.2 Correlative coordination

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

(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 coordinator itself can be reduplicated, and it is obligatory for some coordinators (*soit* 'or' in French) (Mouret 2005; Bîlbîie 2017: 205–206):

(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

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: 33–36) for arguments that both types are attested in Romanian.

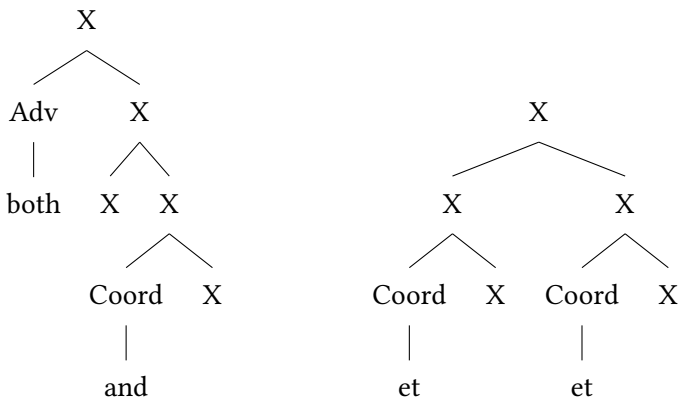

Figure 6: Two possible structures for correlative coordination

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

3.3 Comparative correlatives

When there is no overt coordinator, 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 coordinand *et* ('and'). In English, the first clause can also be used as a standard adjunct (22).

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

b. Plus je lis (et) plus je comprends. (French)
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 shows 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: 1152):

(24) a. Paul a peu de temps: aussi plus vite commencera-t-il, (French)
Paul has little of time so more fast start.FUT-he
plus vite aura-t-il fini.
more fast AUX.FUT-he finish.PTCP
'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, comparative correlatives come in two varieties as the following examples by Abeillé, Borsley & Espinal (2006: 7) show: one that can be analyzed as subordinate as in (25a), and one that can be analyzed as coordinate, as in (25b).

(25) a. Cuanto más leo, (tanto) más entiendo. (Spanish)
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.'

Be they coordinate or subordinate, comparative correlatives 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, as the oddness of (26b) shows, and may involve 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: 19) and Borsley (2011: 14) 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: 13) defines the *the*-clause as a subtype of *head-filler-phrase* with [CORREL *the*]; see also Sag (2010: 527).

Comparative correlatives belong to a more general class of (binary) correlative constructions, including *as … so …*, and *if … then …* constructions (Borsley 2004: Section 3.2; 2011: 17–18).[7] Correlative constructions can be defined as follows, where *correl-phrase* 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) *correl-phrase* ⇒

$$\left[\begin{array}{l}\textsc{synsem|loc|cat|correl}\ \textit{none} \\ \textsc{dtrs}\left\langle\left[\textsc{synsem|loc|cat|correl}\ \textit{corr-mrk}\right],\left[\textsc{synsem|loc|cat|correl}\ \textit{corr-mrk}\right]\right\rangle\end{array}\right]$$

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

[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.

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.

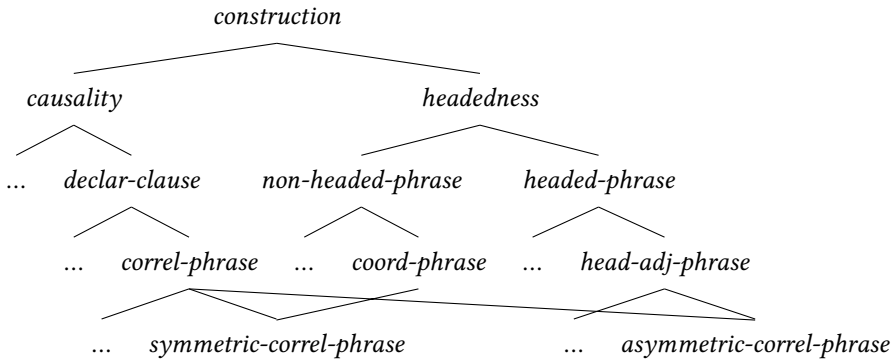

Figure 7: Type hierarchy for correlative constructions

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

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

Similarly, symmetric French comparative correlatives can be defined as in (29), where both clauses are coordinated (the second one may be introduced by *et* or without a conjunction) and introduced by a comparative correlative marker (*plus* 'more', *moins* 'less', *mieux* 'better').

(29) *symmetric-correl-phrase* ⇒
$$\left[\textsc{dtrs}\ \left\langle \left[\textsc{synsem|loc|cat|correl}\ \textit{compar}\right], \left[\textsc{synsem|loc|cat}\ \begin{bmatrix}\textsc{coord} & \textit{none} \vee \textit{et} \\ \textsc{correl} & \textit{compar}\end{bmatrix}\right]\right\rangle\right]$$

A more complete analysis would take into account the semantics as well (Sag 2010: Section 5.5). 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 comparative correlative 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 mis-predictions. 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.

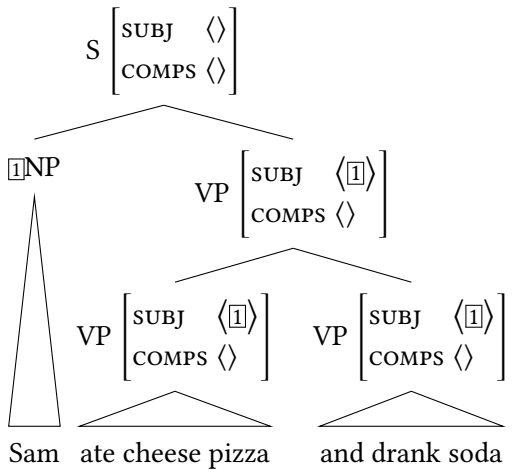

Figure 8: Valence identity in coordination

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]$_{\text{COMPS }\langle\rangle}$ and [opened]$_{\text{COMPS }\langle\text{ NP }\rangle}$.
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]$_{\text{VFORM } \textit{prp}}$.
b. * Sue [buy something]$_{\text{VFORM } \textit{inf}}$ and [came home]$_{\text{VFORM } \textit{fin}}$.

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

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. (2002: 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

[8] That said, some cases are more acceptable, such as (i):

(i) I expect [to be there]$_{\text{VFORM } \textit{inf}}$ and [that you will be there too]$_{\text{VFORM } \textit{fin}}$.

See Section 6 for more discussion about such cases.

verbs is resolved by the construction in which the verb is used. Since all the constructions in (36) are canonical VPs (i.e. non-inverted), then all the coordinands 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]$_{\text{PRD }-}$ and [happy]$_{\text{PRD }+}$.
b. * He is [happy]$_{\text{PRD }+}$ and [Fred]$_{\text{PRD }-}$.
c. * [Mere]$_{\text{PRD }-}$ and [happy]$_{\text{PRD }+}$, Fred rode on into the sunset.

Since case information is also part of CAT, the theory predicts that coordinands must be consistent, which is borne out by the facts, as the unacceptability of (40) shows.[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 the example in (35), concerning the feature INV, but there are others. For example, requiring that the SLASH

[9] There are nonetheless collocational cases where the distribution of pronouns defies this pattern, due to presumably prescriptive forces (Grano 2006). See also Lohmann (2014: 105, 107) for a broader multifactorial study of binomial expressions in which syllable length and frequency have a major effect in predicting nominal coordinand order, among other things.

value of the coordinands be the same readily predicts Coordinate Structure Constraint effects like (41), but it incorrectly rules out asymmetric coordination violation cases like (42). See Goldsmith (1985), Lakoff (1986), Levin & Prince (1986), and Kehler (2002) for more examples and discussion.

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

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

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

(42) 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$_i$ that I can [contribute $_{\text{SLASH}\langle\,\text{NP}_i\,\rangle}$ 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 SLASH identity across coordinands (GAP identity in his version of the theory). Rather, the Coordinate Structure Constraint and its asymmetric exceptions are best analyzed as pragmatic in nature, as Kehler (2002: Chapter 5) argues. See Borsley & Crysmann (2021: Section 3), Chapter 13 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.

Like in the case of locally specified valents, the category of the extracted phrase is also structure-shared in coordination. Hence, case mismatches like (43) are correctly ruled out.

(43) * [Him]$_{\text{NP}[acc]}$, [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 (Anderson 1983). This is illustrated in (44) using examples by Levine et al. (2001: 205) and Goodall (1987: 75), respectively.

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

b. We went to see a movie which$_i$ [the critics praised _$_i$ but that Fred said _$_i$ would probably be too violent for my taste].

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.

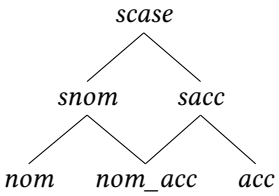

Figure 9: Type hierarchy of (structural) case assignments

Finite verbs assign structural nominative (*snom*) to their subjects and structural accusative (*sacc*) to their objects. Most nouns and some pronouns like *who* and *what* are underspecified for case, and thus typed as *scase*, which makes them consistent with both nominative and accusative positions. Hence, *a movie* can 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: Section 2.4.2), 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 & Zlatić (2003: Chapter 2) have also argued that there should be a distinct feature called CONCORD, which is morphosyntactic in nature (see Wechsler 2021: Section 4.2, Chapter 6 of this volume). The motivation for this move is that there are languages, like Serbo-Croatian, which display hybrid agreement:

(45) Ta dobra deca su doš-l-a.[10] (Serbo-Croatian)
that.SG.F good.SG.F children AUX.3PL come-PTCP-N.PL
'Those good children came.'

[10] Wechsler & Zlatić (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'. There are HPSG analyses that argue that what appears to be Closest Conjunct Agreement (see Section 4.3.1 below) is in fact agreement with the whole coordinate NP, which has additional features inherited from the first and last coordinands. Villavicencio et al. (2005: Section 5) propose two additional features: LAGR (for the left-most coordinand) and RAGR (for the right-most coordinand) for determiner and (attributive) adjective agreement in Romance, which involves the CONCORD feature. Semantic agreement 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:

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

The resolution of agreement information in coordination is not a trivial matter of matching the conjunct's agreement information. There are usually complex 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 strategies with coordinate phrases

In case of coordinands with conflicting agreement values, various resolution strategies are observed crosslinguistically. For example, a coordination with a first person is first person, and a coordination with second person (and no first person) is second person:

(47) 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: 186). This is illustrated in (48) for Portuguese taken from or based on examples by Villavicencio, Sadler & Arnold (2005).

(48) a. o homem e a mulher (Portuguese)
the.M.SG man.M.SG and the.F.SG woman.F.SG
modernos[11]
modern.M.PL
'the modern man and woman'

[11]Villavicencio et al. (2005: 433)

b. morbidez e morte prematuras[12]
morbidity.F.SG and death.F.SG premature.F.PL
'premature morbidity and death'

Sag (2003: 281) proposes that first person is a subtype of second person, which is itself a subtype of third person. This way, person resolution in coordination amounts to type unification. Addressing gender resolution, Aguila-Multner & Crysmann (2018) propose a list-based encoding of person and gender values, and list concatenation as a combining operation, as shown in (49). 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.

(49) *nom-coord-phrase* ⇒

$$\left[\begin{array}{l}\textsc{synsem|loc|cont|index}\left[\begin{array}{ll}\textsc{num} & \textit{pl}\\ \textsc{gend} & \left[\textsc{m}\ \boxed{1}\oplus\boxed{2}\right]\\ \textsc{per} & \left[\begin{array}{ll}\textsc{me} & \boxed{3}\oplus\boxed{5}\\ \textsc{you} & \boxed{4}\oplus\boxed{6}\end{array}\right]\end{array}\right]\\ \textsc{dtrs}\left\langle\left[\textsc{synsem|loc|cont|index}\left[\begin{array}{ll}\textsc{gend} & \left[\textsc{m}\ \boxed{1}\right]\\ \textsc{per} & \left[\begin{array}{ll}\textsc{me} & \boxed{3}\\ \textsc{you} & \boxed{4}\end{array}\right]\end{array}\right]\right],\left[\textsc{synsem|loc|cont|index}\left[\begin{array}{ll}\textsc{gend} & \left[\textsc{m}\ \boxed{2}\right]\\ \textsc{per} & \left[\begin{array}{ll}\textsc{me} & \boxed{5}\\ \textsc{you} & \boxed{6}\end{array}\right]\end{array}\right]\right]\right\rangle\end{array}\right]$$

For person agreement, they use two list valued features ME and YOU. A first person has a non-empty ME list, second person has an empty ME list and a non-empty YOU list, and third person has both empty lists. Thus, coordinating a first with a third person yields a ME feature with a non-empty list, and a YOU feature with a non-empty list, hence a first person phrase. Coordinating a third person with a second person yields a non-empty YOU list and an empty ME list, hence a second person phrase. This enables person and gender resolution by list concatenation over coordinands.

[12] See Villavicencio et al. (2005: 434) for similar examples.

4.3.1 Closest Conjunct Agreement

As observed by Corbett (1991: 186), many languages, including Romance, Celtic, Semitic, and Bantu languages, also have another strategy: partial agreement with only one coordinand, the one closest to the target, called *Closest Conjunct Agreement* (CCA). In the following examples, again from Portuguese and taken from Villavicencio et al. (2005), the determiner and prenominal adjective agree with the first noun (50a) and the postnominal adjective with the last noun (50b).

(50) a. suas próprias reações ou julgamentos[13] (Portuguese)
his.F.PL own.F.PL reactions.F.PL or judgements.M.PL
'his own reactions or judgements'

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.[14]
Brazilian.F.PL
'This song animates Brazilian hearts and minds.'

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 do so half of the time (in contemporary French). In (51a), the determiner can be singular (CCA) or plural (resolution), while in (51b), CCA (feminine Det) is obligatory. In (51c), the postnominal adjective can be masculine (resolution) or feminine (CCA), with the same meaning.

(51) a. votre / vos nom et prénom[15] (French)
your.SG you.PL name.M.SG and first.name.M.SG
'your name and first name'

b. certaines / * certains collectivités et organismes
certain.F.PL certain.M.PL collectivity.F.PL and organism.M.PL
publics[16]
public.M.PL
'certain public collectivities and organisms'

[13] Villavicencio et al. (2005: 435)
[14] Villavicencio et al. (2005: 437)
[15] An & Abeillé (2017: 34)
[16] Abeillé et al. (2018: 17)

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

As proposed by Wechsler & Zlatić (2003: Chapter 2), HPSG distinguishes two agreement features: CONCORD is used for morphosyntactic agreement and INDEX is used for semantic agreement (see Wechsler 2021: Section 4.2, Chapter 6 of this volume). Moosally (1999) proposes an account of single coordinand 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 coordinand (p. 389):

(52) *nom-coord-phrase* ⇒ $\begin{bmatrix} \text{SYNSEM|LOC|CONT|INDEX } \boxed{1} \\ \text{DTRS } \left\langle [], \ldots, \left[\text{SYNSEM|LOC|CONT|INDEX } \boxed{1}\right] \right\rangle \end{bmatrix}$

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 coordinand:

(53) Dw i a Gwenllian heb gael ein talu.[17] (Welsh)
be.1SG I and Gwenllian.3SG without get CL.1PL pay
'Gwenllian and I have not been paid.'

This is why Borsley (2009) proposes that CCA is superficial in Welsh and uses linearization domains[18] to handle partial agreement between the initial verb and the first coordinand, 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 coordinand to be just that. See also Wechsler (2021: Section 7.2), Chapter 6 of this volume. The alternative developed by Villavicencio et al. (2005) assumes that coordinate structures have features reflecting the agreement properties of their first and last coordinands, to which agreement constraints may refer. As mentioned above, Villavicencio et al. (2005) use three features: CONCORD, LAGR (for the left-most coordinand), and RAGR (for the right-most coordinand).

[17] Sadler (2003: 90)

[18] Order domains were introduced into HPSG by Reape (1994); for more on order domains see Müller (2021: Section 6), Chapter 10 of this volume.

(54) *nom-coord-phrase* ⇒

$$\begin{bmatrix} \textsc{synsem|loc|cat|head} & \begin{bmatrix} \textsc{lagr} & \boxed{1} \\ \textsc{ragr} & \boxed{2} \end{bmatrix} \\ \textsc{dtrs} & \left\langle \left[\textsc{synsem|l|cat|head|lagr}\ \boxed{1}\right], \ldots, \left[\textsc{synsem|l|cat|head|ragr}\ \boxed{2}\right] \right\rangle \end{bmatrix}$$

(55) *noun* ⇒ $\begin{bmatrix} \textsc{lagr} & \boxed{1} \\ \textsc{ragr} & \boxed{1} \\ \textsc{concord} & \boxed{1} \end{bmatrix}$

Nouns have the same value for CONCORD, 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:

(56) *prenominal-adj* ⇒

$$\begin{bmatrix} \textsc{concord} & \boxed{1} \\ \textsc{sel} & \left[\textsc{lagr}\ \boxed{1}\right] \end{bmatrix}$$

(57) *postnominal-adj* ⇒

$$\begin{bmatrix} \textsc{concord} & \boxed{1} \vee \boxed{2} \\ \textsc{sel} & \begin{bmatrix} \textsc{concord} & \boxed{1} \\ \textsc{ragr} & \boxed{2} \end{bmatrix} \end{bmatrix}$$

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

5 Lexical coordination

While coordinands have often been assumed to be phrasal (see for example Kayne 1994: Section 6.2 and Bruening 2018: Section 5.2, among others), 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, this is the case with prenominal adjectives and postverbal particles. See Abeillé (2006: Section 4) for similar examples with various categories in different languages. Most English attributive adjectives are prenominal unless they have a complement. Although adjectival phrases with complements are not licit in prenominal

position, it is possible to have complex adjectival expressions if they are coordinate.

(58) 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: 176–177), a particle may project a phrase after the nominal complement (59a), but not before (59b); but coordination is possible, at least for some speakers, as the example in (59c) from Abeillé (2006: 23) shows.

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

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

(60) 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 that share a preverbal clitic in French must share the same verbal root, and in Spanish, they must refer to the same event (Bosque 1987).

(61) a. Je te dis et redis que tu as tort. (French)
I you tell and retell that you have wrong
'I'm telling you again and again 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. (Spanish)
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). These cases differ semantically and prosodically from Right-Node Raising, however: with typical Right-Node Raising, the two coordinands must stand in contrast to one another, and do not have to refer to the same event. With Right-Node Raising, there is usually a prosodic boundary at the ellipsis site (Chaves 2014: 843–844 and Nykiel & Kim 2021: Section 6.2, Chapter 19 of this volume). In French, the first coordinand cannot end with a clitic article or with a weak preposition as in (62b,c), quoted from (Abeillé 2006: 14).

(62) a. * Paul cherche le, et Marie connaît la (French)
Paul searches the.M.SG and Marie knows the.F.SG
responsable.
responsible
'Paul looks for the and Marie knows the one in charge.'

b. * 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 coordinator in lexical coordination. Thus, in French, clitic articles or weak prepositions with a shared argument can be conjoined (Abeillé 2006: 14):

(63) a. Paul cherche le ou la responsable. (French)
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

The functor analysis of coordinands in (13) is compatible with lexical coordination, since the head-functor phrase in (14) has the same valence features as the head. The weak head analysis in (16) is also compatible, since the coordinator inherits the complements expected by the coordinand (this is done by concatenation of COMPS lists as it is for complex predicates; see Godard & Samvelian 2021: Section 3, Chapter 11 of this volume).

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: Section 5.1) analyses it as an instance of a "light" phrase, following the

WEIGHT account of Abeillé & Godard (2000; 2004). Light elements can be words or phrases, and can have restricted mobility (see Müller 2021, 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. Figure 10 illustrates this, assuming a functor analysis.

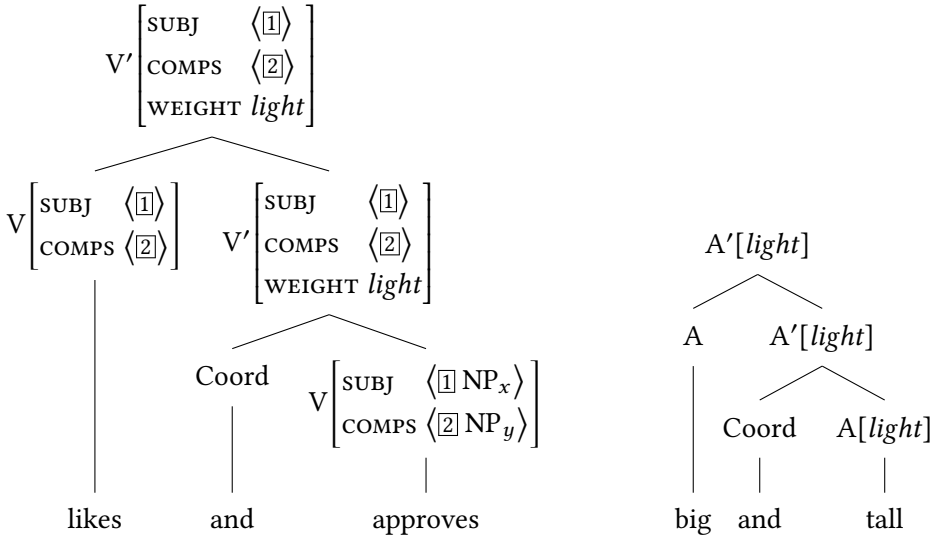

Figure 10: Examples of lexical coordination

6 Coordination of unlike categories

The categories of coordinands are required to be the same per the the coordination construction in (11). But this requirement is excessive, as illustrated by the coordinations in (64) from Bayer (1996: 580) and Huddleston et al. (2002: 1327), among others; see Chaves (2013: 169–170). Such data raise the problem of determining what the part of speech and the categorial status of the coordinate phrase should be.

(64) a. Kim is [alone]$_{\text{AP}}$ and [without money]$_{\text{PP}}$.
b. Pat is [a Republican]$_{\text{NP}}$ and [proud of it]$_{\text{AP}}$.
c. Jack is [a good cook]$_{\text{NP}}$ and [always improving]$_{\text{VP}}$.

d. What I would love is [a trip to Fiji]$_{NP}$ and [to win \$10,000]$_{VP}$.
e. That was [a rude remark]$_{NP}$ and [in very bad taste]$_{PP}$.
f. Chimpanzees hunt [frequently]$_{AdvP}$ and [with an unusual degree of success]$_{PP}$.
g. I'm planning [a four-month trip to Africa]$_{NP}$ and [to return to York afterwards]$_{VP}$.

Building on observations from Jacobson (1987: 417), Sag (2003) and others pointed out that the features of the mother are not simply the intersection of the features of the coordinands. For example, verbs like *remain* are compatible with both AP and NP complements, whereas *grew* is only compatible with APs. This is shown in (65). Crucially, however, the information associated with the phrase *wealthy and a Republican* somehow allows *grew* to detect the presence of the nominal, as (66a) illustrates, even when the verbs are coordinated, as in (66b–d).

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

(66) 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; Morrill 1994; Bayer 1996) use disjunction introduction, one of the rules of inference from propositional calculus, in order to deal with coordination of unlikes phenomena. Disjunction introduction allows one to infer $P \vee Q$ from P, and if one assumes 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 adapted to HPSG; see, for example, Daniels (2002) and Yatabe (2004). Related work, such as Sag (2003), aims to achieve the same result using type-underspecification. 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 (2001), Yatabe (2003), Beavers & Sag (2004), and Chaves (2006) argue that coordination of unlikes can be explained by a deletion operation that omits the left periphery of non-initial coordinands, illustrated in (67).

(67) a. Tom gave a book to Mary, and ~~gave~~ a magazine to Sue.[19]
b. He drinks coffee with milk at breakfast and ~~drinks coffee with~~ cream in the evening.[20]
c. There was one fatality yesterday, and ~~there were~~ two others on the day before.[21]
d. I see the music as both going backward and ~~going~~ forward.[22]

In such a view, the examples in (64) are verbal coordinations where the verb (or the verb and 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 (68). 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.

(68) a. Simultaneously shocked and in awe, Fred couldn't believe his eyes.[23]
b. Both tired and in a foul mood, Bob packed his gear and headed North.[24]
c. Both poor and a Republican, *no one* can possibly be.[25]
d. Dead drunk and yet in complete control of the situation, *no one* can be.[26]

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 (69).

(69) 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 (69a) 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

[19] Chaves (2013: 171)
[20] Hudson (1984: 214)
[21] Chaves (2007: 339)
[22] https://www.hdtracks.com/music/artist/view/?id=2418; accessed 2020-04-01.
[23] Chaves (2013: 172)
[24] Chaves (2006: 112)
[25] Chaves (2013: 172)
[26] Levine (2011: 142)

first coordinand, it is realized inside the first coordinand. 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 (69b,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. We refer the reader to Nykiel & Kim (2021), Chapter 19 of this volume for more discussion about ellipsis.

Consider, for example, the non-constituent coordinations in (70).

(70) 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 non-elliptical sequences (Mouret 2006). In the former approach, phonological material in the left periphery of the non-initial coordinand that is identical to phonological material in the left periphery of the initial coordinand is allowed to be absent in the mother node. This can be achieved by adding the constraints in (71) to the coordination construction, here shown in the binary-branching format for perspicuity. Here, *coord* is an abbreviation of the phonologies of coordinators, like *and*, *or*, etc.

(71) *coord-phrase* ⇒

$$\left[\begin{array}{l}\textsc{phon}\ \boxed{1}\oplus\boxed{2}\oplus\boxed{3}\oplus\boxed{4}\\ \textsc{dtrs}\ \left\langle \left[\begin{array}{l}\textsc{phon}\ \boxed{1}\oplus\boxed{2}\ \textit{ne-list}\\ \textsc{synsem|loc|cat|coord}\ \textit{none}\end{array}\right], \left[\begin{array}{l}\textsc{phon}\ \boxed{3}\left\langle\left(\textit{coord}\right)\right\rangle\oplus\boxed{1}\oplus\boxed{4}\ \textit{ne-list}\\ \textsc{synsem|loc|cat|coord}\ \textit{crd}\end{array}\right]\right\rangle\end{array}\right]$$

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 (2021: Section 6), Chapter 10 of this volume for more discussion about linearization theory.

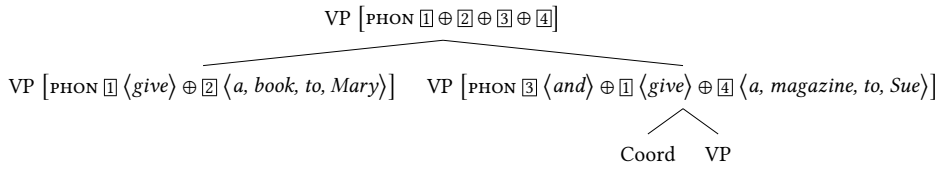

Figure 11: Analysis of *give a book to Mary and ~~give~~ a magazine to Sue*

This approach is motivated by the existence of ambiguity in sentences like (72); see Beavers & Sag (2004) and Chaves (2006) for more examples and discussion. Because (72a) involves a one-time predicate, the ellipsis must include the subject phrase, otherwise the interpretation is such that the same two trees were cut down twice. In contrast, (72b) does not involve a one-time predicate, and thus it is possible for the ellipsis to simply involve the verb.

(72) 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 coordinand. For example, Mouret (2006: 263) proposes a rule along the lines of (73). Here, a new head feature CLUSTER is introduced, which takes as its value the list of SYNSEM values of the daughters.

(73) *argument-cluster-phrase* ⇒

$$\begin{bmatrix} \text{HEAD|CLUSTER} \left\langle \boxed{1}, \ldots, \boxed{n} \right\rangle \\ \text{DTRS} \left\langle \left[\text{SYNSEM } \boxed{1}\right], \ldots, \left[\text{SYNSEM } \boxed{n}\right] \right\rangle \end{bmatrix}$$

Mouret defines argument clusters as instances of the underspecified non-headed construction *argument-cluster-phrase* with one daughter or more. The construction is valence saturated and clusters can be coordinated with one another. He

also postulates a lexical rule allowing (for example) a ditransitive verb to take a coordination of clusters as complement (this rule will also allow clusters for complements and adjuncts, assuming the latter are included in the COMPS list):

(74) $\left[\text{COMPS} \left\langle \left[\text{LOC|CAT } \boxed{1}\right], \ldots, \left[\text{LOC|CAT } \boxed{n}\right] \right\rangle\right] \mapsto$

$$\left[\text{COMPS} \left\langle \begin{bmatrix} \text{COORD} + \\ \text{HEAD|CLUSTER} \left\langle \left[\text{LOC|CAT } \boxed{1}\right], \ldots, \left[\text{LOC|CAT } \boxed{n}\right] \right\rangle \end{bmatrix} \right\rangle\right]$$

Figure 12 shows the analysis of the VP in (70a). The respective NPs and PPs form a cluster that is licensed by (73). The phrases *a book to Mary* and *a magazine to Sue* are coordinated and the respective CLUSTER values matched (see Mouret 2006: 263 for details on this matching). The lexical item for *give* is licensed by the lexical rule in (74). This version of *give* selects the cluster coordination rather than selecting the NP and PP directly.

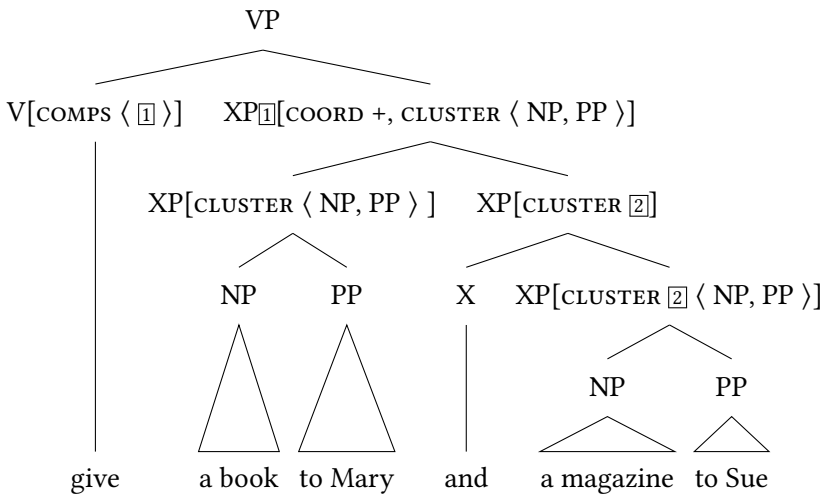

Figure 12: Mouret's (2006) analysis of Argument Cluster Coordination

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

(75) 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 (French)
Paul offer.FUT.3SG a record to Marie as.well.as a book
à Jean.[27]
to Jean
'Paul will offer a record to Mary as well as a book to Jean.'

d. * Paul offrira un disque à Marie ainsi qu' offrira un
Paul offer.FUT.3SG a record to Marie as.well.as offer.FUT.3SG a
livre à Jean.
book to Jean
'Paul will offer a record to Marie as well as will offer a book to Jean.'

Another argument is the placement of correlative coordinators: the first coordinator in (76a) must be postverbal; this shows that Argument Cluster Coordination does not include the first verb. The examples below are from Mouret (2006: 254).

(76) a. Jean a donné et un livre à Marie et un magazine (French)
Jean has given and a book to Marie and a magazine
à Sue.
to 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 plan.3SG offer and a record to Marie and a book to Jean
'Paul is planning to offer both a record to Marie and a book to Jean.'

c. * Paul compte et offrir un disque à Marie et un livre à
Jean is.planning and to.offer a record to Marie and a book to
Jean.
Jean

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

(77) a. Paul offrira un disque à Marie et (non) pas un (French)
Paul offer.FUT.3SG a record to Marie and not not a
livre à Jean.
book to Jean
'Paul will offer a record to Marie and not a book to Jean.'

[27] Mouret (2006: 253)

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 (78) shows. See Bresnan (1974), Wexler & Culicover (1980: 299), Grosu (1981: 45), McCawley (1982: 98–101), and Sabbagh (2007: 382, fn. 30) for more data and discussion.[28] In the examples that follow, small capital letters indicate prosodic focus and material shared between both coordinands is delineated by square brackets.

(78) 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 the examples in (79) by Huddleston et al. (2002: 1325, fn. 44) and Chaves (2008; 2014) illustrate:

(79) a. Please list all publications of which you were the SOLE or CO-[author].[29]

b. It is neither UN- nor OVERLY [patriotic] to tread that path.[30]

c. The EX- or CURRENT [smokers] had a higher blood pressure.[31]

d. The NEURO- and COGNITIVE [sciences] are presently in a state of rapid development [...][32]

e. Are you talking about A NEW or about AN EX-[boyfriend]?[33]

[28] Steedman (1985: 542; 1990: 256; 2000: 17) and Dowty (1988: 183–184) claim that Right-Node Raising is syntactically bounded. See Phillips (1996: 95) and Chaves (2014: 841) for rebuttals.

[29] Huddleston et al. (2002: 1325, fn. 44)

[30] Chaves (2008: 267)

[31] Chaves (2008: 267)

[32] https://opinionator.blogs.nytimes.com/2011/12/25/the-future-of-moral-machines/; 2021-01-19.

[33] Chaves (2014: 867)

Elliptical accounts of Right-Node Raising are proposed by Beavers & Sag (2004), Yatabe (2004), Chaves (2014), and others. The rule in (80) illustrates the account adopted by Chaves (2014: 874) and Shiraïshi, Abeillé, Hemforth & Miller (2019: 19) in simplified format.[34] 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).

(80) *right-peripheral-ellipsis-phrase* ⇒

$$\left[\begin{array}{ll} \textsc{mp} & \boxed{L_1} \oplus \boxed{R_1} \oplus \boxed{R_2} \oplus \boxed{R_3} \\ \textsc{synsem} & \boxed{1} \\ \textsc{dtrs} & \left\langle \left[\begin{array}{ll} \textsc{mp} & \boxed{L_1} \oplus \boxed{L_2} \left\langle \left[\begin{array}{ll} \textsc{phon} & \boxed{p_1} \\ \textsc{lid} & \boxed{1} \end{array}\right], \ldots, \left[\begin{array}{ll} \textsc{phon} & \boxed{p_n} \\ \textsc{lid} & \boxed{n} \end{array}\right] \right\rangle \oplus \\ & \boxed{R_1} \oplus \boxed{R_2} \left\langle \left[\begin{array}{ll} \textsc{phon} & \boxed{p_1} \\ \textsc{lid} & \boxed{1} \end{array}\right], \ldots, \left[\begin{array}{ll} \textsc{phon} & \boxed{p_n} \\ \textsc{lid} & \boxed{n} \end{array}\right] \right\rangle \oplus \boxed{R_3} \\ \textsc{synsem} & \boxed{1} \end{array}\right] \right\rangle \end{array}\right]$$

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 (81). 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 Right-Node Raised because they are independent prosodic units in their local domains. See Swingle (1995) for more discussion.

(81) 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].
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 (82). In such cases, oddness arises, because in general the same phrase cannot simultaneously have two meanings, except in puns (Zaenen & Karttunen 1984: 316).

[34] See Chaves (2014) for more details about how "cumulative" Right-Node Raising is modeled by this rule, i.e. cases like *Mia donated – and Fred spent – (a total of) $10,000* (between them).

(82) a. * John WILL and Sandy BUILT THE [drive].[35]
b. * Robin SWUNG and Leslie TAMED [an unusual bat].[36]
c. * We need new BLACK- and FLOOR[boards].[37]
d. * I caught BUTTER- and FIRE[flies].[38]
e. * There stood a ONE- and WELL-[armed man].[39]

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 Right-Node Raising:

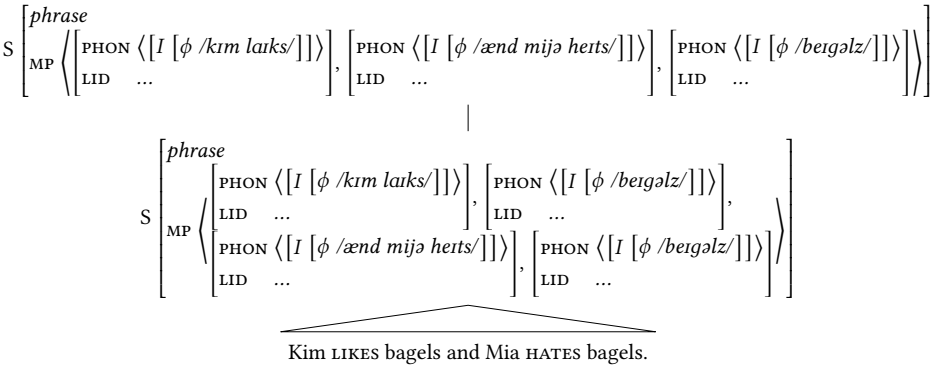

Figure 13: Analysis of *Kim likes, and Mia hates, bagels.*

(83) a. It's interesting to compare the people who LIKE with the people who DISLIKE [the power of the big unions].[40]
b. Anyone who MEETS really comes to LIKE [our sales people].[41]

[35] Milward (1994: 936)
[36] Levine & Hukari (2006: 156)
[37] adapted from Artstein (2005: 371)
[38] Chaves (2008: 274)
[39] Chaves (2014: 869)
[40] Hudson (1976: 550)
[41] adapted from Williams (1990: 267)

c. Spies who learn WHEN can be more valuable than those able to learn WHERE [major troop movements are going to occur].[42]
d. Politicians who have fought FOR may well snub those who have fought AGAINST [chimpanzee rights]. [43]
e. Those who voted AGAINST far outnumbered those who voted FOR [my father's motion].[44]
f. If there are people who OPPOSE then maybe there are also some people who actually SUPPORT [the hiring of unqualified workers].[45]

In the example in Figure 13, the sub-list $\boxed{R_3}$ in (80) is resolved as the empty list, but this need not be so. When the final sublist is not resolved as the empty list, we obtain discontinuous Right-Node Raising cases like (84), due to Whitman (2009: 238–240) and Chaves (2014: 868), where the Right-Node Raised expression is followed by extra material.

(84) a. The blast UPENDED and NEARLY SLICED [an armored Chevrolet Suburban] 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 (2021: Section 6.1), Chapter 19 of this volume. The latter is illustrated in Figure 14, 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 is shared across the clausal daughters as $\boxed{1}$. This allows the second coordinand to combine the two NPs with the verbal semantics, and recover the propositional meaning.

[42] Postal (1994: 101)
[43] Postal (1994: 104)
[44] Huddleston et al. (2002: 1344)
[45] Chaves (2014: 840)

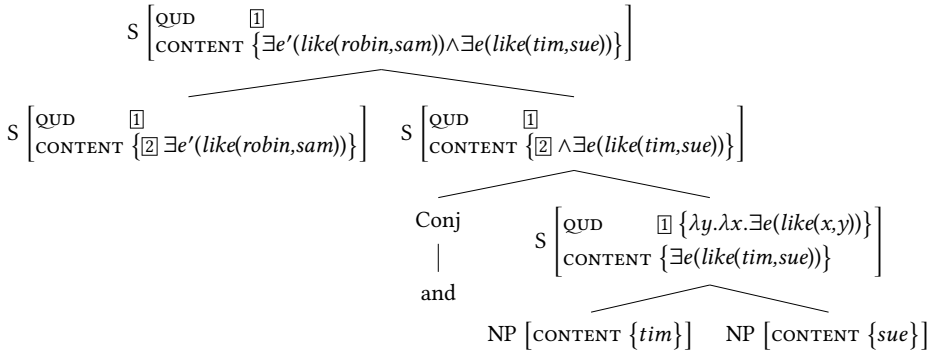

Figure 14: Analysis of *Robin likes Sam and Tim – Sue* (abbreviated)

Like Right-Node Raising, Gapping is not restricted to coordinate structures as Park's (2019: 30–31) attested examples in (85) illustrate, contrary to widespread assumption. Thus, the Gapping rule proposed by Park (2019: 125) that allows a gapped clause to follow a non-gapped clause is not specific to coordination.

(85) 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.

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 coordinands 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, and (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 approaches, 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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