

## In defense of lexical Coordination

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### Introduction<sup>1</sup>

The existence of lexical coordination has often been challenged, from different theoretical perspectives (e.g. recently Kayne 1994, Beavers & Sag 2004). Such reductionist approaches argue that putative cases of lexical coordination can be reduced to phrasal coordination with ellipsis. In this perspective, a sentence like (1a) is not analysed as a coordination of two Vs, but as a coordination of two VPs as in (1b) or (1c):

- (1) a      Le Président apprécie et approuve votre proposition  
              the president appreciates and approves your proposal  
      b      Le président [apprécie - et approuve -]VP [votre proposition]  
      c      Le président [apprécie - et approuve votre proposition]VP

We do not dispute that an elliptical analysis is possible for (1a), with a marked prosody, but we want to argue that another analysis, with a coordination of Vs is also available, and in fact more natural.

We first examine Kayne's arguments against lexical coordination, and then present some novel arguments in favor of lexical head coordination. We thus propose some empirical criteria for distinguishing lexical coordination from elliptical phrasal coordination or RNR (Right Node raising). We show that certain cases cannot be analysed as elliptical coordination and are thus unambiguous cases of lexical head coordination.

Assuming (as in Abeillé & Godard 2000, 2004) that certain non head positions can be occupied by X° elements, we also present some arguments in favor of lexical (non head) coordinations. We then show how both lexical coordination and Right Node raising can be formalized within Head-driven Phrase structure grammar (HPSG). The coordinate phrase resulting from the coordination of lexical elements is analysed as an instance of "light" phrase, following the WEIGHT theory of Abeillé and Godard 2004, 2006.

### 1. Arguments against X° coordination

The mere existence of lexical coordination has been challenged on different grounds. From a theoretical perspective, new approaches to coordinated Phrases as ConjP make it difficult to formalize. From an empirical perspective, some lexical items, such as French pronominal clitics, do not easily coordinate. We examine both issues, starting with the theoretical argument.

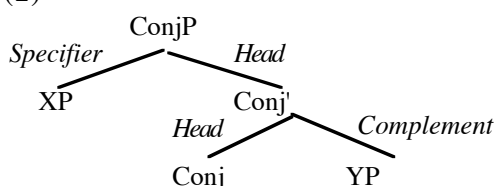
#### 1.1 Coordinate Phrases as ConjP

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Kayne 1994 argues in favor of an X-bar approach to coordination. He proposes that a coordinated phrase is a Conjunction Phrase (ConjP), with an asymmetric structure, and headed by a (possibly null) conjunction  $\square$

(2)



In this perspective, the conjunction cannot be followed by a lexical Head, since Antisymmetry forbids two sister heads. More generally, coordination of  $X^\circ$  elements is impossible, since both specifiers and complements are constrained to be maximal projections.

This approach has been challenged on different grounds (cf. Borsley 2005 for an overview). Assigning all coordinated Phrases a uniform ConjP category fails to capture the similarity between NPs and conjoined NPs, between APs and conjoined APs etc. The schema in (2) also cannot account for the ordering of conjuncts in head final languages such as Japanese and Korean, where the specifier normally precedes the Head:

- (3)
- |   |                      |          |
|---|----------------------|----------|
| a | John [and Mary]Conj' | English  |
| b | [Robin-to ]Conj' Kim | Japanese |
|   | 'Kim and Robin'      |          |

It also makes it difficult to account for 'omnisyndetic' coordinations, with a conjunction on each conjunct, as shown for French by Mouret 2005:

- (4)
- |   |                                       |
|---|---------------------------------------|
| a | soit Paul viendra soit il appellera   |
|   | either Paul will-come or he will-call |
| b | et Paul et Marie                      |
|   | both Paul and Marie                   |

If schema (2) has to be abandoned, then it cannot be taken as an argument against lexical coordination.

## 1.2. French clitics and coordination

The only empirical arguments given by Kayne against lexical coordination involve French pronominal clitics: coordination of clitics (which he analyses as syntactic heads) is difficult in French (cf. 5), as well as coordination of verbs when they share a clitic (cf. 6):<sup>2</sup>

- (5)
- |   |                                   |
|---|-----------------------------------|
| a | * Jean te et me voit souvent      |
|   | Jean you and me sees often        |
| b | * Je le et la vois souvent        |
|   | I him and her see often           |
| c | ? Je lui et vous ferai un plaisir |

<sup>2</sup> We reproduce Kayne's judgements.

- d I him/her and you will-give a pleasure  
 ? Pierre le ou les verra au concert  
 Pierre will-see him or them at the concert
- (6) a \* Jean vous parlera et pardonnera  
 Jean will speak to and forgive you  
 b Jean les lit et relit sans cesse  
 Jean them reads and rereads all the time

The judgments on these examples are in fact variable, and many speakers don't find (5c) any better than (5b). Kayne analyses (5c-d) as RNR, without justification, and notes that such RNR is severely constrained.

However, a different line of explanation is available for the badness of the above examples. If French complement clitics are analysed as verbal affixes (cf. Miller 1992, Miller & Sag 1997, Miller & Monachesi 2003), it is expected that they cannot coordinate nor have scope over a coordinate host. Coordination of prefixes is marginally available in French, but only for prefixes with some phonological autonomy (cf Arstein 2005 for English), such as 'pré' and 'post', or 'sur' and 'sous' but not 're' or 'dé' (=un):

- (7) a une révolution pré ou post-industrielle  
 a pre or post industrial revolution  
 b On risque toujours de sur ou sous-évaluer  
 One may always over or under estimate  
 c \* C'est un travail qu'il ne faut pas re ou défaire  
 This is a work that one should not re or undo

Since pronominal clitics are not phonologically autonomous, it is expected that they don't coordinate, except if they receive strong emphatic stress, and in general they don't. The status of example (5d) is unclear and could be analysed as a special case of reformulation (or metalinguistic coordination).

Analysing clitics as verbal prefixes also explains that they do not have wide scope over coordinated Verbs, since prefixes usually don't. If one looks at other prefixes, they cannot have scope over a coordination of hosts (cf 6a which mirrors 5a). (8a) cannot mean the same as (8b), and (8c) cannot mean the same as (8d):

- (8) a La période pré-industrielle et capitaliste  
 the preindustrial and capitalist period  
 b La période préindustrielle et précapitaliste  
 the preindustrial and precapitalist period  
 c Il ne faut pas surévaluer et surnoter  
 One should not overevaluate and overrate  
 d Il ne faut pas surévaluer et noter  
 One should not overevaluate and rate

(6b) is not productive and occurs only with coordination of the same lexical verbs in French (cf 9a), with speakers' variation (which we note %). In Spanish, such examples can be found but only with verbs denoting a complex event (cf Bosque 1986, cf 9b):

- (9) a % Jean les fait et défait sans cesse  
J makes and unmakes them all the time  
b Lo compro y vendio en una sola operacion  
I buy and sell it in one single operation  
c \* Lo compro hoy y vendio mañana  
I buy it today and sell it tomorrow

Notice that if such examples cannot involve RNR, since the shared element is to the left of the conjuncts.

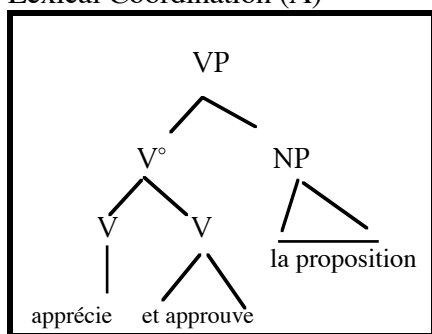
We conclude that Kayne's bad French examples are relevant for the interaction of coordination with morphology, but do not tell us anything about the syntax of coordination. Similarly better Spanish examples (cf. 9b) argue in fact in favor of lexical verb coordination (assuming that Spanish clitics are analysed as affixes) since VP coordinations with a shared clitic are ruled out (cf. 9c).

Now, we come back to example (1a), and compare an analysis in terms of lexical coordination with an analysis in terms of RNR.

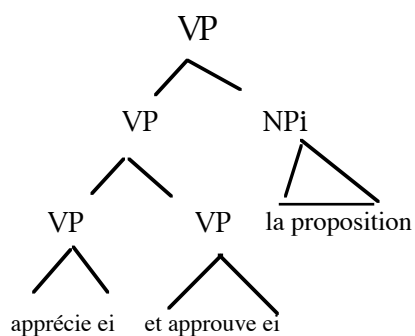
## 2. Coordination of lexical Heads

There are two possible analyses for (1a), the first one as a coordination of lexical V (A), the second as a coordination of VP with ellipsis (B). As for the second analysis, there are again two possibilities, one with a symmetrical coordination of two elliptical VP with a "raised" shared NP complement (B1, cf Ross 1967, Steedman 2000), the other with an asymmetrical coordination of an elliptical VP followed by a complete VP (B2, cf Selkirk 2002, Beavers & Sag 2004):

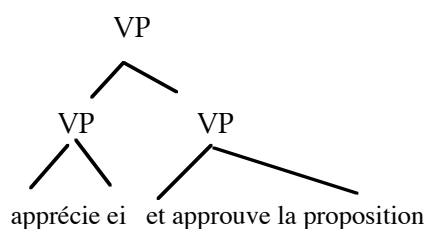
### Lexical Coordination (A)



Phrasal coordination (RNR):  
Symmetric VP coordination (B1)



Asymmetric VP coordination (B2)



We briefly examine the arguments for preferring B2 over B1.

### 2.1. Some syntactic properties of Right Node raising constructions

Elliptical analysis of (1a) involves so-called "right node raising". For this construction, there are a number of arguments for preferring an asymmetric analysis over a symmetric one, or in Hartmann 2002's terms a "deletion" analysis over a "movement" approach.

There are a number of arguments showing that the shared constituent is not extracted out of both conjuncts.<sup>3</sup> There are languages which have RNR and not leftward movement, such as Hausa (cf Beavers and Sag 2004). Extracted elements obligatorily occur at the sentence periphery, whereas shared elements can occur at the (right) periphery of any major phrases, such as NP (10a) or PP (10b):

- (10) a [Le père et la mère [de Jean]] viendront demain  
The father and the mother [of Jean] will come tomorrow  
b Il faut présenter [aux enseignants et aux étudiants [de notre département]]  
les nouveaux programmes  
One must present to the teachers and to the students [of our department]  
the new programs

Moreover, extracted elements must be major constituents (maximal projections) whereas shared elements can be subconstituents as in (11):<sup>4</sup>

- (11) a \* [How many] do you want [ - drinks ] ?  
b Paul wants two, and John wants three, [alcoholic drinks]

Furthermore, as noticed by Abbott 1976, more than one constituent can be shared, even in languages like English or French where at most one constituent can appear in (left) extracted position (cf 12):

- (12) a Smith loaned, and his widow later donated, a valuable collection of manuscripts to the library.  
b I borrowed, and my sisters stole, large sums of money from the Chase Manhattan Bank.

As shown by Levine 1985, extraction is possible out of the shared argument, whereas one cannot extract anything out of an extracted constituent (cf 13):

- (13) a Which picture does John like and Mary hate, a copy of ?  
b \* Which picture do you know [which copy of ] Mary likes ?

<sup>3</sup> There are also arguments showing that the shared element does not undergo extraposition out of both conjuncts (cf Büring and Hartmann 1997).

<sup>4</sup> This kind of example also provides an argument against a third type of analysis, namely one with a first conjunct interrupted by an incomplete (parenthetical) second conjunct :

Paul apprécie [et approuve -] la proposition

Such elliptical parentheticals do exist (i) but cannot interrupt a subconstituent (ii):

(i) Paul will go, he said -, to the beach.

(ii) \*Paul wants two, he said -, drinks

RNR can cross islands, such as relative clauses (cf Levine 1985), or PPs in French, which are barriers for extraction (cf 14, 15)

- (14) a John gave a briefcase, and Harry knows someone who had given a set of steak knives, to Bill  
 b \* To whom do you know someone who gave a set of steak knives ?
- (15) a Marie votera pour, et Jean votera contre, votre proposition  
 M will-vote for and J will-vote against, your proposal  
 b \* Quelle proposition Marie votera-t-elle pour ?  
 Which proposal will M vote for?

A further argument in favor of the asymmetric analysis B2 is that the two conjuncts can have different polarities and that, in this case, it is the polarity of the second conjunct that licenses the shared element, as in the French (attested) example (16a) (cf also for English Cann et al 2005):

- (16) a Il y a des langues qui ont - et des langues qui n'ont pas [de flexion casuelle]  
 there are languages which have and languages which don't have case inflection  
 b \* Il y a des langues qui ont de flexion casuelle.

In (16a), the shared 'de NP' object is a negative polarity item, and is not licensed by the first conjunct.

So we'll only consider the competition between A and B2 analyses in the following discussions. We show that there are a number of differences between lexical head coordination and RNR: prosodic differences, semantic and syntactic differences. Hence a double analysis is not always available: some examples can only be analysed as lexical coordinations, and some only as RNR coordinations. We start with the prosodic differences.

## 2.2. Some prosodic differences between RNR and lexical Coordination

There is a some prosodic marking for RNR that is not necessarily observed with head coordination. We first look at the first conjunct, and then at the shared element.

According to Hartmann 2002, in German, and in English, there is an obligatory rise at the end of the first conjunct (before the conjunction), and the shared element can be deaccented. The data have not been studied for French, but a completely "flat" prosody does not seem to be possible for RNR.<sup>5</sup> By contrast, lexical head coordinations are compatible with a larger variety of intonation contours, including a completely flat one, in particular in fast speech, or when answering an all focus question as in (17):<sup>6</sup>

- (17) a Qu'est-ce qui se passe ?

<sup>5</sup> For English and German, the prosody of RNR is often assimilated with that of contrastive FOCUS (cf Hartmann 2000, Selkirk 2002). It is clear that this is not the case in French. In RNR, the first conjunct has a pitch accent at the end of the group, whereas contrastive focus in French requires a pitch accent at the beginning of the group (cf what Marandin et al 2002 call c-accent):

Le président apprécie, et le vice-président approuve, votre proposition : pitch on 'cie'  
 C'est Gabriel qui est venu, pas Paul (it is Gabriel who came, not P) : pitch on 'Ga'

<sup>6</sup> As observed by Hartmann 2002, such a discourse context is not appropriate for RNR:

What's going on ?  
 # John hates, and Mary likes, red beans.

What(s) going on ?

- b - Jean lit et relit sans cesse le même livre  
 - Jean reads and rereads all the time the same book

There is no rise before the conjunction in (17b).

It is also clear that in RNR constructions, the first (elliptical) conjunct must be able to form (at least) one prosodic group. As originally proposed by Sag 1976 for English, there is an obligatory prosodic boundary before the conjunction, and an optional one before the shared element. We conclude that the first conjunct cannot end with a phonological weak element, such as a clitic, and that example (5d) above cannot be an instance of RNR. We observe that weak prepositions or weak determiners, which are prosodic "leaners" (in the sense of Zwicky 1982) in French, are also bad in RNR constructions:

- (18) a \* Paul cherche le, et Marie connaît la responsable  
 Paul looks for the-masc and Marie knows the-fem person responsible  
 b \* Paul parle de, et Marie parle avec Woody Allen  
 Paul speaks of and Marie talks with Woody Allen

Such a constraint does not hold for lexical coordination. We observe that weak determiners or weak prepositions can be conjoined, with a shared argument:

- (19) a Paul cherche le ou la responsable  
 Paul looks for the-masc or the-fem person responsible  
 b Un film de et avec Woody Allen  
 A film of and with Woody Allen

Given the constraint above on RNR, a phrasal analysis of (25) is not plausible:

- \* [de -] PP et [avec Woody Allen]PP  
 \* [le -] NP ou [la responsable]NP

We conclude that (19a,b) are unambiguous cases of lexical coordination.

Let us now look at the prosody of the shared element(s). As proposed by Bresnan 1974 for English, the shared constituent must be able to form a prosodic group. This is why personal pronouns are difficult, unless they are heavily stressed:

- (20) a ?? He tried to persuade, but he couldn't convince, him  
 b He tried to persuade, but he couldn't convince, HIM

As noticed by Borsley 2005, this constraint does not apply to the coordination of verbs which can share a weak personal pronoun:

- (21) He tried to persuade and convince him

In French, a similar contrast can be observed, with bare quantifiers *tout* (everything) and *rien* (nothing). They are difficult in final position in a RNR construction, unless they are heavily stressed (for some speakers) or modified (hence made prosodically heavier):<sup>7</sup>

- (22) a ?? Dans votre proposition, le président apprécie et le vice-président  
 approuve tout  
 In your proposal, the president appreciates and the vice-president approves, all  
 b % Dans votre proposition, le président apprécie et le vice-président approuve  
 TOUT  
 c Dans votre proposition, le président apprécie, et le vice-président approuve,  
 [presque tout]  
 In your proposal, the president appreciates and the vice-president approves, almost all

The crucial fact is that these bare quantifiers can be shared by two coordinated verbs:

- (23) Dans votre proposition, le président apprécie et approuve tout  
 In your proposal, the president appreciates and approves all

A similar situation is observed with French "light" manner adverbs (cf Abeillé & Godard 2004). These monomorphemic adverbs (without the suffix *-ment*) are not mobile and cannot be incidental, unless they are made heavier, by modification:

- (24) a Ce malade mange bien sa soupe  
 This sick person eats well his soup  
 b \* Ce malade mange sa soupe bien  
 This sick person eats his soup well  
 c Ce malade mange sa soupe [tout à fait bien]  
 This sick person eats his soup perfectly well

They cannot be shared in RNR constructions unless they are made heavier by modification (25a,b) but can perfectly well be shared in case of Verb coordination (25c):

- (25) a ?? [La femme mange et le mari boit ] mieux depuis quelques jours  
 The wife eats and the husband drinks better since a few days  
 b La femme mange, et le mari boit, [beaucoup mieux] depuis quelques jours  
 The wife eats and the husband drinks a lot better since a few days  
 c Ce malade [mange et boit] mieux depuis quelques jours  
 This sick person eats and drinks better since a few days

We conclude that (23) and (25c) are unambiguous cases of lexical coordination. In what follows, we use this criterion (no prosodic boundary nor rising contour before the conjunction) to exclude an RNR analysis.

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<sup>7</sup> These bare quantifiers are analysed as syntactically "light" by Abeillé & Godard 2004 on the basis of the following properties: they cannot be separated from the main verb by another complement, unless they are modified (hence made heavier):

Le président approuve tout dans votre proposition (the president approves all in your proposal)  
 ?? Le président approuve dans votre proposition tout (the president approves in your proposal all)  
 Le président approuve dans votre proposition [quasiment tout]  
 (the president approves in your proposal nearly all)



### 2.3. Some semantic differences between RNR and lexical coordination

Several semantic differences can be found between RNR and lexical coordination. A semantic constraint on lexical coordination is that two coordinated Verbs must have the same semantic type and assign the same semantic role to their shared arguments. If this is not the case, the sentences are difficult (cf 26a,c) with an integrated intonation pattern for the two verbs), and a VP coordination is preferred (cf 26b,d):

- (26) a ?? Paul [ressemble et téléphone] à son père  
Paul resembles and calls his father  
b Paul ressemble à son père et lui téléphone souvent  
Paul resembles his father and calls him often  
c ?? Les invités [étaient ou entraient] dans le jardin  
The guests were or entered in the garden  
d Les invités étaient dans le jardin ou y entraient  
the guests were in the garden or were entering there

In (26a), *ressembler* (resemble) is an individual-level predicate whereas *téléphoner* (call) is a stage-level predicate. Furthermore, *ressembler* assigns a Theme role to its NP object, whereas *téléphoner* assigns a Goal role. In (26c), 'être' (be), which is stative, assigns a location role to the PP complement, whether *entrer* (enter) assigns a goal role to it. Such a constraint does not hold with RNR, where verbs with different semantic types, and with different thematic role assignments, can head conjuncts sharing a complement:

- (27) a Paul ressemble beaucoup, et Marie téléphone souvent, à ce vieux professeur.  
P resembles a lot, and M often calls, this old professor  
b ? Les invités étaient déjà, ou se dépêchaient d'entrer, dans le jardin.  
The guests were already, or were hastening to enter, in the garden

Another constraint pointed out by Hartmann 2002 is that relational modifiers are difficult in the shared constituent with RNR (cf 28a). We observe that they are natural with V coordination (cf 28b):

- (28) a \* Paul vit, et Marie travaille, dans la même ville  
Paul lives and Marie works, in the same city  
b Paul vit et travaille dans la même ville  
Paul lives and works in the same city

A further difference is that two coordinate verbs necessarily share the same object, whereas with RNR the shared object can have a different interpretation in each conjunct:

- (29) a Paul [lit et annote] deux livres de linguistique  
Paul reads and annotated two linguistics books  
b Paul lit, et Marie annote, deux livres de linguistique  
Paul reads, and Marie annotates, two linguistics books.

In (29b) the books being read and the books being annotated are not necessarily the same and there can be four books altogether, whereas in (29a), with one phrasal group for the two verbs, there are only two books involved. This is unexpected if (29a) had the same elliptical analysis as (29b).

A final difference comes from the specific semantics of RNR. As observed by Hartmann 2002, in RNR, the two verbal (or sentential) conjuncts must stand in contrast with respect to one another:<sup>8</sup>

- (30) a Le président aime, mais le vice-président n'aime pas, votre proposition  
the president likes but the vice-president does not like, your proposal  
b Le président présentera aux actionnaires, et le vice-président présentera aux employés, votre proposition  
the president will-present to the share holders, and the vice president will present to the employes, your proposal  
c ?? Le président aime et il approuve, votre proposition  
the president likes, and he approves, your proposal  
d ?? Paul lit, et il relit, tous vos livres  
Paul reads and he rereads all your books

In (30a), there is a contrast between the two predicates (like and not-like) as two possible attitudes towards the proposal. In (30b), the shareholders are contrasted with the employees, as two possible beneficiaries of the proposal. If there is no such contrast between complements or predicates, as in (30c,d), the construction is not felicitous.

With bare V coordination, there is no such semantic constraint. On the contrary, with an additive conjunction, the two coordinated verbs must be understood as forming a natural activity, or a natural class of process, so that they denote one (possibly complex) event:<sup>9,10</sup>

- (31) a Le président [approuve et admire] votre proposition  
The president approves and admires your proposal  
b Paul [lit et relit] sans cesse tous vos livres  
Paul reads and rereads all the time your books  
c ?? Le président [apprendra et refusera] votre proposition  
The president will-learn and will-refuse your proposal  
d Le président apprendra votre proposition et la refusera.  
The president will-learn your proposal and will-refuse it.

<sup>8</sup> More precisely, each conjunct has a focus value interpreted as a set of alternatives, and contains an element belonging to the other conjunct's set. Hartmann has the additional constraint that in each conjunct the contrasted elements must be in final position (before the shared element).

<sup>9</sup> A specific case of additive V coordination involves repetition of the same V. This construction (studied by Richard 2004 for French) has a durative or iterative interpretation□

L'oiseau vole (et) vole dans le ciel (the bird flies and flies in the sky)

Les enfants sautaient (et) sautaient sur le gazon (the children were jumping and jumping on the grass)

It is not possible with VP coordination:

?? L'oiseau volait dans le ciel et volait dans le ciel

?? Les enfants sautaient sur le gazon et sautaient sur le gazon.

<sup>10</sup> This condition□ resembles that of “natural” coordination, independently proposed by Milner 1978, Lambrecht 1984, King & Dalrymple 2004, in the nominal domain. In order to share a common determiner, coordinate Ns, in French or in English, must form a “□atural□ group (or be explicitly grouped as one discourse entity in the context), hence the following contrast□

Cinq voitures et camions (Five cars and trucks)

?? Cinq voitures et maisons (Five cars and houses)

Les cinq voitures et maisons qui ont été saccagées la nuit dernière...

(the 5 cars and houses which were damaged last night)

However, this constraint is not specific to lexical N coordination and applies to N' as well:

?? Cinq voitures rouges et maisons jaunes (Five red cars and yellow houses)

In (31c), the two predicates learn and refuse do not make up one single complex event, and the sentence is difficult (with an integrated prosody). In such case, VP coordination, as in (31d), is much better. The same constraint was independently observed by Bosque 1986 for Spanish (cf 9b above).

These prosodic and semantic differences would be difficult to account for if RNR and lexical V coordination were one and the same process. Let us now look at some syntactic differences.

#### 2.4. Syntactic differences between RNR and lexical coordination

There are a number of syntactic differences between coordination of lexical heads and coordination of phrases:

- coordinated phrases can be of different categories, whereas coordinated lexical heads cannot,
- some syntactic markers can be shared by coordinated heads, and not by coordinated phrases,
- some conjunctions are appropriate for phrasal coordination only.

We examine them in turn.

Phrasal coordination can involve unlike conjuncts (with different categories, cf Sag et al 1985), lexical coordination cannot:

- (32) a      Jean est [directeur de cette école]NP et [fier de ses résultats]AP  
               Jean is director of this school and proud of its results  
       b      Jean a été [témoign de cette affaire] et [surpris de son retentissement]  
               Jean was a witness to the case and surprised by its consequences  
       c      \* Jean est [directeur et fier] de cette école  
               Jean is director and proud of this school  
       d      \* Jean a été [témoign et surpris] de cette affaire  
               Jean was witness and surprised of this case

Sentences (32a,b) show coordination between an NP and an AP. If we try to coordinate a lexical N and a lexical A with a shared complement, as in (32c,d), it is not possible without a strong prosodic marking before the conjunction 'et'. By contrast, the RNR counterparts, with a shared element between an NP and an AP, are much better:

- (33) a      ? Jean était témoin et sa mère très surprise [de cette affaire]  
               Jean was a witness and his mother very surprised, of this case  
       b      ? Jean est directeur, mais il n'est pas fier, de cette école  
               Jean is director, but he is not proud, of this school

Another difference involves the distribution of some syntactic markers. In French, VP markers (or complementizers) such as *à* and *de*, cannot be shared by a coordinate phrase and must be repeated on each conjunct:

- (34) a      \* Cet emballage permet de distribuer des produits et vendre des aliments  
               sans réfrigération  
               this packaging enables to distribute products and sell food without freezing  
       b      Cet emballage permet de distribuer des produits et de vendre des aliments  
               sans réfrigération  
               this packaging enables to distribute products and to sell food without freezing  
       c      Il continuait à lire attentivement le texte et \*(à) relire sans cesse l'introduction.  
               He continued to read carefully the text and reread all the time the introduction  
       d      Il continuait à lire attentivement le texte et \*(à) relire sans cesse l'introduction.

He continued to read carefully the text and to reread all the time the introduction

Interestingly, these markers can be shared in bare V coordinations (this includes V with a clitic which we analyse as a verbal affix, cf 34c):

- (35) a Il continuait à [lire et relire] sans cesse le même livre.  
He continued to read and reread all the time the same book  
b Cet emballage permet de [distribuer et vendre] les aliments sans réfrigération  
This package enables to distribute and sell food without freezing  
c Il continuait à [le lire et le relire] sans cesse.  
He continued to it read and it reread all the time

The explanation is that the examples in (35) do not involve (elliptical) VP coordination but V coordination. If *de* and *à* are VP markers, the V coordination is "hidden" inside VP and they do not "see" it:

- (34) = \* de [VP et VP]  
(35) = de vP[ [V et V] NP]

Another difference involves Coordinating Conjunctions. RNR is compatible with most coordinating conjunctions, and even some subordinating ones, while coordination of lexical heads is more restricted. In French, lexical coordination is difficult with *mais* (but). If we take previous examples of unambiguous cases of lexical coordination, it is difficult to have *mais* instead of *et*. V coordination with *mais* and a shared bare quantifier is difficult, but improves with a heavier shared complement (which can have an RNR analysis):

- (36) a ?? Dans votre proposition, le président apprécie mais désapprouve tout.  
In your proposal, the president appreciates but disapproves all  
b Dans votre proposition, le président apprécie, mais désapprouve, [presque tout]  
In your proposal, the president appreciates but disapproves, almost all

Similarly, the coordination of infinitival Vs with *mais* is difficult with a shared marker, and improves if the marker is repeated:

- (37) a \* Paul essaie de préserver mais distribuer tous vos produits  
Paul tries to preserve but distribute all your products  
b Paul essaie de préserver, mais de distribuer, tous vos produits  
Paul tries to preserve, but to distribute, all your products.

We thus analyse (36b) and (37b) as cases of RNR coordination. If *mais* has the same meaning as *et* plus an adversative contribution (cf Anscombe & Ducrot 1983), it is expected that it conflicts with the semantic constraint on V additive coordination (forming one possibly complex event).

Another difference is that the conjunction *et* can be modified by *puis*, *alors* (then) with RNR, but not when coordinating lexical heads. Again, we take V coordination with a shared quantifier, or a shared marker, as test examples:

- (38) a Paul lira et traduira tout

- b Paul will-read and will-translate all  
 ?? Paul lira et puis traduira tout  
 Paul will-read and then will-translate all
- c ?? Paul essaiera de lire et puis traduire ce texte pour demain  
 Paul will-try to read and then translate this text for tomorrow
- d Paul essaiera de lire, et puis de traduire, ce texte pour demain.  
 Paul will-try to read, and then to translate, this text for tomorrow

Again, the difficulty of having *et puis*, *et alors*, which forces an interpretation with two successive events, comes from the semantic constraint on V additive coordination.

We thus conclude that a lexical coordination analysis of (1a) is not superfluous and that a correct grammar of coordination must provide for both lexical and phrasal coordination.

### 3. Coordination in non Head X° positions<sup>11</sup>

Certain constructions involve a bare complement or a bare modifier, that are arguably X°. That means that the X-bar model of phrase structure is too strong and should be relaxed as to allow X° in non head positions (cf Sells 1994, Toivinen 2003, Abeillé & Godard 2004). We show that some of these X° can be coordinated, starting with incorporated NP objects in Danish, past participles (after tense auxiliary *haber*) in Spanish, English verb particles, prenominal adjectives in French, and preverbal quantifiers (also in French).

Unlike coordinations of lexical heads, which form a lexical phrase, we find that the coordinations of lexical non heads are syntactically ambiguous: they can form a lexical phrase, or a full phrase.

#### 3.1. Syntactic incorporation in Danish

In this construction known as syntactic N incorporation (SNI), a verb followed by a bare N complement loses its stress:<sup>12</sup>

- (39) a Min nabo [købte 'hus] sidste °ar  
 My neighbour buy-past house last year  
 = My neighbour purchased a/his house last year
- b \* Min nabo 'købte 'hus sidste °ar
- c Min nabo 'købte [et 'hus] sidste °ar  
 My neighbour has bought a house last year
- d \* Min nabo [købte et 'hus] sidste °ar

SNI contrasts with (39c), which exemplifies the non incorporated construction, in which the verb is stressed and the N object must have a determiner.

As shown by Asudeh and Mikkelsen (2000), in SNI the bare N cannot have a determiner (cf 39d) but can be (lightly) modified (by a prenominal adjective) or coordinated with another bare N:

- (40) a Min nabo købte ['hus og 'bill] sidste °ar

<sup>11</sup> This section relies on common work with Danièle Godard (cf Abeillé and Godard 2004, 2006).

<sup>12</sup> As shown by Asudeh and Mikkelsen (2000), this is syntactic and not morphological incorporation because some adverbs or an inverted subject can appear between the V and the N. Examples (38) and (39) are from them. We follow their notation, with [ ] for prosodic grouping and ' for word accent (at the beginning of a stressed word).

- My neighbour has bought house and car last year  
 b Min nabo kØbte ['nyt 'hus] sidste °ar  
 My neighbour has bought new house last year  
 c \*Min nabo kØbte ['hus som er nyt ] (sidste °ar )  
 My neighbour has bought house which is new last year

Phrasal modification by a relative clause is also impossible (cf 40c). This shows that the incorporated N is not a full NP (or DP), so that (40a) cannot be analysed as NP (or DP) coordination. An analysis of (40a) as VP coordination with V ellipsis is not possible either, since it would be a case of Left Node raising, and not of RNR. We conclude that it is a case of N coordination and that coordinated Ns can behave as bare Ns. Notice that a (lightly) modified N can also behave like a bare N (cf 40b).

### 3.2. Past participles in Spanish

As noticed by Abeillé & Godard 2002, 2003, Spanish tense auxiliary (*haber*) can be combined with a coordination of bare past participles, but not with a coordination of participle VPs:<sup>13</sup>

- (41) a Juan ha comprado y leído este libro  
 b \* Juan ha [comprado este libro] y [leído el primer capítulo]  
 b Juan ha comprado este libro y ha leído el primer capítulo  
 Juan has bought this book and has read the first chapter

Since, the auxiliary must be repeated on each conjoined VP (cf 41b), (41a) is not a case of VP coordination, and cannot receive an RNR analysis.

Our explanation of the agrammaticality of (41b) is that the tense auxiliary must combine with the lexical participle (with which it forms a complex V) and does not take a VP complement (contrary to English auxiliaries for instance):

[ ha [comprado]<sub>V°</sub> ]<sub>V°</sub> [este libro]<sub>NP</sub>

An argument in favor of a V° analysis is that no insertion is possible between the auxiliary and the participle (except a few adverbs: *ya, casi, apenas*, and for some speakers a few subject pronouns and a quantifier: *usted, ellos, todos*):

- (42) a \* Los niños no habían todavía aprendido a hablar  
 the children not have still learnt to speak  
 b El tren había apenas llegado a la estación  
 the train had barely arrived at the station

If this analysis is correct, it predicts that the auxiliary cannot combine with a VP (nor a coordination of VPs) but combines with a V° participle, hence the grammaticality of (41a). This is a case where a coordination of two V° forms itself a V° complement. Notice that a (lightly) modified V° can also form a V° complement (as with "apenas llegado" in 42b).

### 3.3. English particles

<sup>13</sup> Non repetition of the auxiliary is accepted only when the past participle has a bare N complement (cf Abeillé & Godard 2003):

Pablo ha comido galletas y (ha) bebido leche  
 (P has eaten cakes and drunk milk)

We analyse such V-N combination as verbal complexes (equivalent to V°).

A well known fact about mobile particles in English is that they are more constrained in prenominal position than in postnominal position:

- (43) a Paul turned (\*completely) off the radio  
 b Paul turned the radio (completely) off

Following Pollard and Sag 1987's analysis, we can say that the prenominal particle is a lexical complement (or P°) whereas it is a phrasal complement (or PP) in postnominal position, and appeal to a general ordering rule in English which orders lexical elements before phrasal ones.

Although there is some speaker's variation, we find that some coordination is possible for the prenominal particle, as in the following example (contra Toivinen 2003):

- (44) a Paul was turning [on and off] the radio all the time  
 b \* Paul was turning on the radio and off the TV

Notice that (44a) cannot be analysed as VP coordination with ellipsis since the shared V is on the left, and not on the right, of the coordination.<sup>14</sup> (44b) shows that an alternative RNR analysis involving the coordination of two putative part+NP phrases is also to be ruled out. We are thus left with an analysis of (44a) as involving lexical coordination of two particles, projecting a lexical phrase.

### 3.4. Prenominal adjectives in French

It is well-known that prenominal adjectives cannot be full APs in French. If we leave aside cases with focalising or incidental prosody, the adjective can have a "light" modifier (a degree adverb) but not a PP or VP complement (cf Abeillé & Godard 1999):

- (45) a une (très) longue table  
 a (very) long table  
 b \* une [longue de 2 mètres] table  
 a long of 2 meters table  
 c une table longue de 2 mètres  
 a table long of 2 meters
- (46) a une (trop) facile victoire  
 a too easy victory  
 b \* une [facile à remporter] victoire  
 an easy to obtain victory  
 c une victoire facile à remporter  
 a victory easy to obtain

One cannot just appeal to Williams 1982' Head-final filter, since not all preadjectival modifiers are allowed:

- (47) a une décision (politiquement) habile  
 a decision politically wise  
 b une (\*politiquement) habile décision

---

<sup>14</sup> Left node raising does exist (Yatabe 2001) but only in head final languages such as Japanese.

Interestingly, some prenominal adjectives can be coordinated (provided they are of the same semantic type):

- (48) a      une [belle et grande] piscine  
               a beautiful and big swimming pool  
           b      les [deux ou trois] premiers volumes  
               the two or three first volumes  
           c      \* les [deux et grands] volumes  
               the two and big volumes

Following Abeillé & Godard 1999, we analyse the prenominal adjectives as  $A^\circ$ , while postnominal adjectives project full APs. If this analysis is correct, then (48a) is a case of  $A^\circ$  coordination. Notice that it cannot be analysed as NP coordination with N ellipsis since it would be a case of left node raising, and not of RNR

Another argument against an elliptical analysis is that, when modifying a plural N, prenominal coordinate As cannot have a distributive interpretation, contrary to postnominal coordinate adjectives:

- (49) a      des enfants petits et grands  
               children small and big  
           b      \* des petits et grands enfants  
               small and big children  
           c      des beaux et grands enfants  
               beautiful and big children

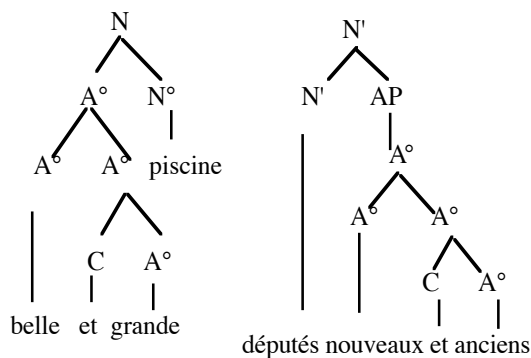
(49a) denotes a group of children where some are small and some are big. This is impossible for (49b) in which the same children should be simultaneously small and big. In (49c), each child has to be both big and beautiful. This is unexpected under an RNR analysis of (49c). On the contrary, it can be easily explained if (49c) is a case of lexical coordination of Adjectives: there is a semantic constraint on lexical additive coordination of As, similar to that on Vs, namely that lexically coordinate adjectives must denote one (possibly complex) property.

Interestingly, when prenominal adjectives are coordinated, they may also appear postnominally:

- (50) a      un ancien député  
               a former MP  
           b      \* un député ancien (with same meaning)  
           c      les députés [nouveaux et anciens]  
               the MPs new and former

This shows that coordination of  $A^\circ$  has a double behaviour: either as an  $A^\circ$  (prenominally) or as an AP (postnominally), as in (50c):  
 (51)





### 3.5. Preverbal quantifiers in French

Quantifiers *tout* (everything) and *rien* (nothing), corresponding to direct objects, can appear in preverbal position in French, with a non finite Verb (cf Kayne 1975):

- (52) a Paul essaie de tout comprendre  
Paul tries to all understand  
b Paul n' a rien oublié  
Paul has nothing forgotten

In these positions, the Quantifier cannot be modified by a PP (53) or a relative clause (54):

- (53) a \*Paul essaie de ne [rien d'important] oublier  
Paul tries to nothing important forget  
b Paul essaie de ne rien oublier [d'important]  
Paul tries to nothing forget important
- (54) a \* Paul a [tout ce qu'il voulait ] compris  
Paul has all that he wanted understood  
b Paul a compris [tout ce qu'il voulait]  
Paul has understood all that he wanted

The modifying PP must be extraposed as in (53b), and in (54b) the Q with the relative clause must appear postverbally.

A possible analysis is the following (see also Abeillé and Godard 2006): such bare quantifiers are lexical elements, and cannot project a full QP because they (left) adjoin to a lexical (non finite) V.

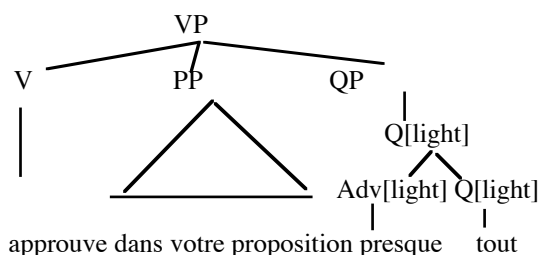
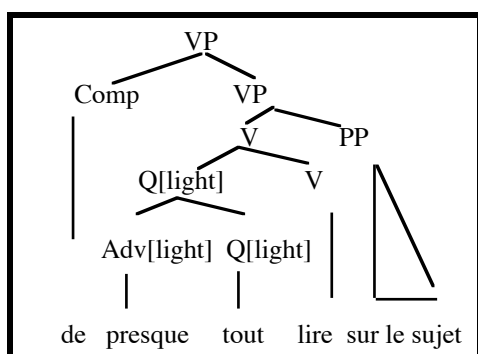
Interestingly, the bare quantifiers can be 'lightly' modified or coordinated in these positions:

- (55) a Paul a [presque tout] compris  
Paul has almost all understood  
b Paul a [tout ou presque tout] compris  
Paul has all or almost all understood  
c Paul essaie de ne [vraiment rien] oublier  
Paul tries to really nothing forget  
d Paul essaie de ne [rien ou quasi rien] oublier  
Paul tries to really nothing or almost nothing forget

Notice that (55d) cannot be a case of RNR, since the marker 'de' is not repeated. We thus conclude that (55b,d) are coordinations of bare Qs and that these coordinations can behave like bare Qs.

As was the case with prenominal Adjectives, these coordinations can also behave as ordinary phrases (=maximal projections), as shown by their mobility (54 contrast with bare Q in footnote 5):

- (56) a Paul approuve dans votre proposition [tout ou presque tout]  
 Paul approves in your proposal all or almost all  
 b Paul ne pardonne à ses collègues [rien ou quasi rien]  
 Paul forgives his colleagues nothing or almost nothing



We now show how lexical coordination and RNR can be analysed more precisely within HPSG, focusing on the syntactic aspects.

#### 4. Representation in HPSG

We present a formalisation of the syntactic aspects of lexical coordination and RNR within Head-driven Phrase structure grammar (HPSG, cf Sag et al 2003). In HPSG, coordinate phrases are analysed as a specific type of phrases which are both n-ary and unheaded (cf Pollard and Sag 1994). We rely on previous analyses of constituent coordination (cf Abeillé 2003, 2005) and of elliptical coordination (Yatabe 2001, Beavers and Sag 2004).

In order to distinguish phrasal from lexical coordination, we use the syntactic feature WEIGHT, as defined in Abeillé and Godard 2000, 2004.

##### 4.1. Lexical coordination as "light" coordination

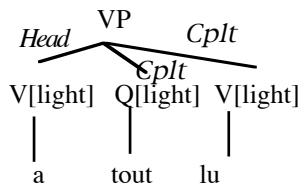
In order to represent our "lexical" phrases, i.e. phrases (built by adjunction or coordination) that behave like words, we use the syntactic feature WEIGHT (as in Abeillé et Godard 2000, 2004), with two values: light, and non-light.<sup>15</sup> Lexical heads are WEIGHT light (as in the head-complements phrases). Phrases are by default [WEIGHT non-light]. Words can be [WEIGHT light], [WEIGHT non-light] or underspecified for the feature WEIGHT, depending on whether they can project a phrase by themselves or not.

In this theory, the requirements of X-bar models are relaxed in the sense that non heads can be [WEIGHT light], as in the following examples, where (57a) is a head-complement phrase with two light complements, while (57b) illustrates two head-adjunct phrases with a light adjunct:<sup>16</sup>

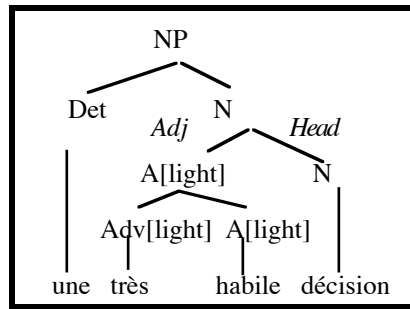
<sup>15</sup> Non-light has middle-weight and heavy as subvalues, but we ignore heaviness effects here.

<sup>16</sup> For other implementations of the same idea, allowing X° elements in non head positions, see Sadler & Arnold 1994, using a LEX ± feature in HPSG, and Sells 1994, Toivinen 2003 in LFG.

(57) a



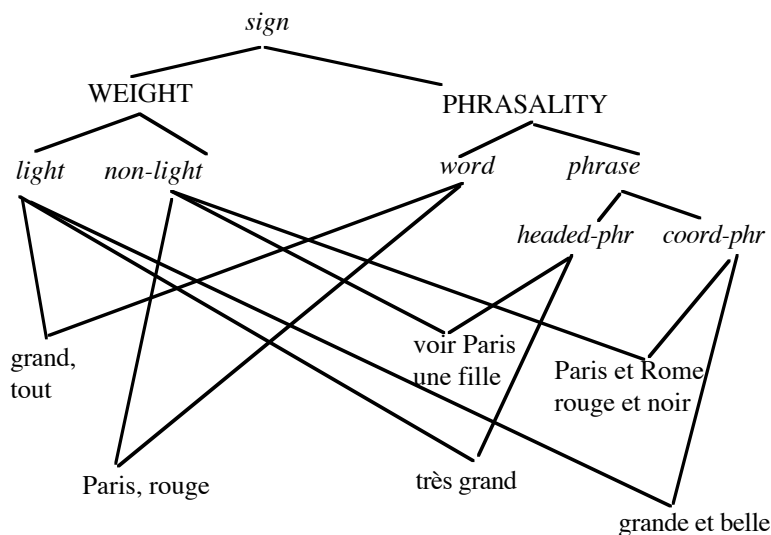
b



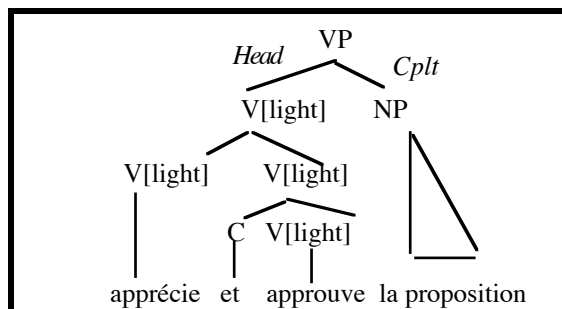
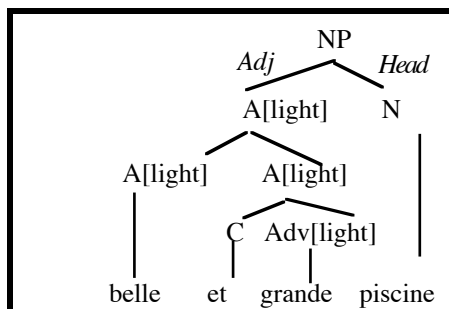
Lexical assignment of WEIGHT depends on different properties of words: their category, their semantics, their morphology. Proper names are [WEIGHT non-light], whereas common nouns (in French) are [WEIGHT light]. Strong pronouns are [WEIGHT non-light], whether the quantifiers *tout* and *rien* are [WEIGHT light].

Syntactic computation of phrasal WEIGHT depends on the type of phrase and on the WEIGHT of the immediate constituents. In French, head-adjunct phrases and coordinate phrases can be [WEIGHT light] when they only comprise [WEIGHT light] daughters.

Thus, WEIGHT is a syntactic feature appropriate for words and phrases:



When all daughters are [WEIGHT light], the phrase itself can be [WEIGHT light], and that is how we analyse lexical coordinations:

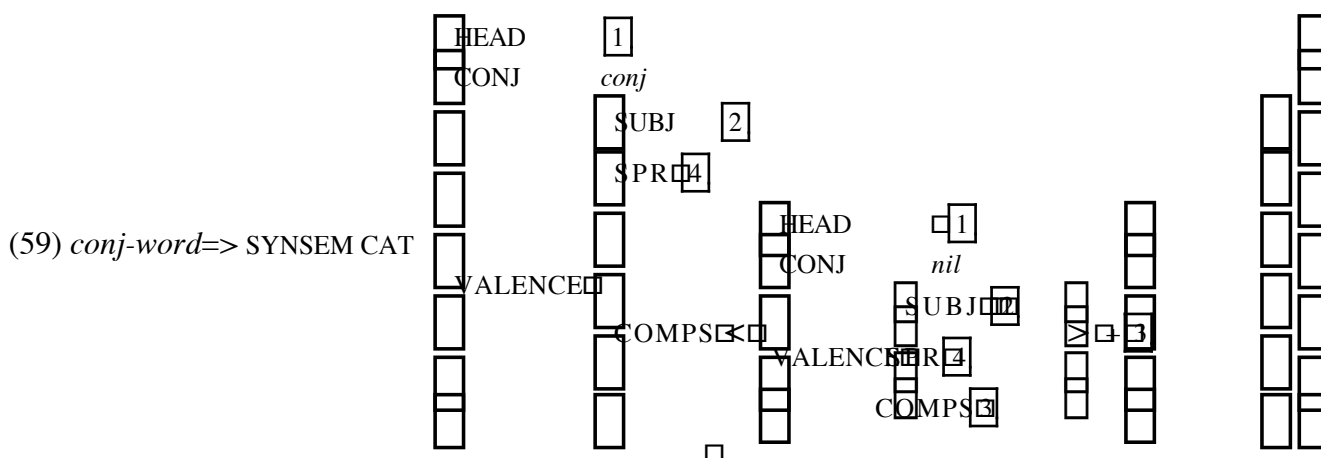


We thus have the following WEIGHT constraints on phrases (where the attribute MOTHER means the phrase itself, and DAUGHTERS its immediate constituents; '/' means default value):

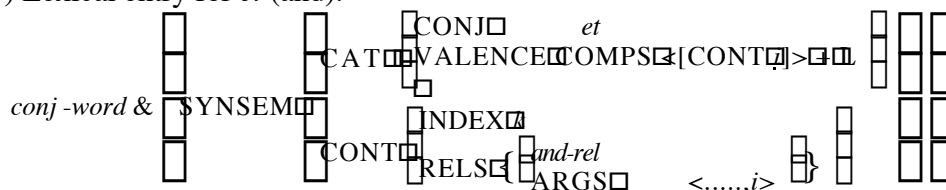
- (58) a phrase [WEIGHT light] => DAUGHTERS list([WEIGHT light])  
 b headed-phrase => MOTHER [WEIGHT / non-light]  
 c head-complement-phrase => HEAD-DTR <[WEIGHT light]>

#### 4.2. Coordinated conjunctions as weak heads

Following Ross 1967, we consider that coordinating conjunctions are syntactically combined with one of the conjuncts. We analyse coordinating conjunctions as 'weak' syntactic heads (cf Abeillé 2003, 2005), forming a subconstituent with the following element, and inheriting most of their syntactic features from this complement. The lexical type for coordinating conjunctions is shown in (58), with an example in (59):



(60) Lexical entry for *et* (and):



Coordinating conjunctions have a specific CONJ feature, as in Sag et al 1985. They are underspecified for their category (HEAD feature) and for their subcategorization (VALENCE features). They inherit the subject (variable [2] in (59)) the specifier (variable [4] in (59)) and the complements (variable [3] in (59) and L in (60)) of the item they combine with. They thus project phrases with the same category as the conjunct they combine with, and a specific CONJ feature. They are analysed as semantic heads, with an underspecified number of semantic arguments (attribute ARGS in their CONT feature), one of which is instantiated as the (content of their) complement, the others being instantiated at the level of the coordinate phrase.

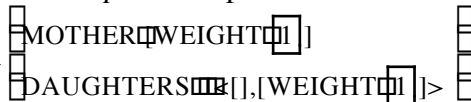
The constituent headed by the conjunction is a standard head-complement phrase, except for the following properties:

- it is necessarily binary,

- it can be unsaturated (have a non empty COMPS list),
- it can be [WEIGHT light].

We thus define a specific constraint on head-complements-phrases:


(61) Constraints on *Head-complements* phrases:

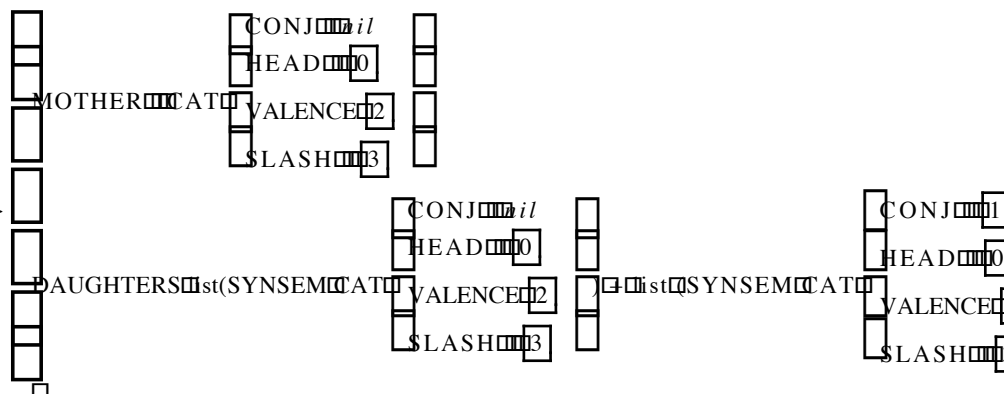
- a [CONJ ≠ nil] => 
- b [CONJ nil] => MOTHER [COMPS <>]

Constraint (61a) says that, if the Head is a Conjunction, the WEIGHT of the phrase is that of the complement (since the Head is necessarily light). Constraint (61b) says that if the Head is not a conjunction, the phrase must be saturated.<sup>17</sup>

#### 4.2. Non elliptical coordinated phrases

We analyse coordinated phrases as unheaded phrases with an underspecified number of daughters (cf Sag et al 2003, Abeillé 2003) □ they are n-ary phrases with some syntactic features shared between daughters and mother.

- (62)a *coordinate-phrase* => 

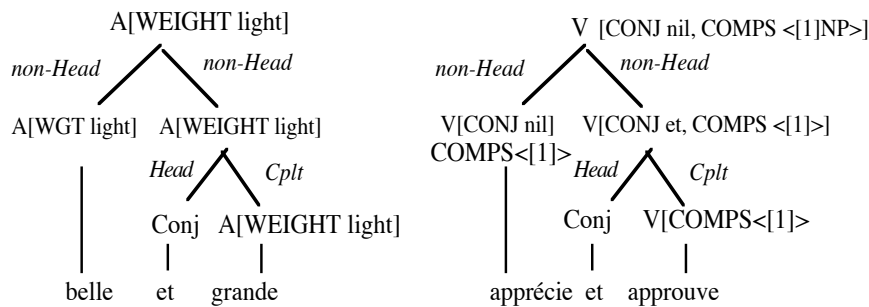
- b *coordinate-phrase* => 

We assume that HEAD features, Valence features and SLASH features are shared between conjuncts and the coordinate phrase (with the MOTHER attribute in (61)). Sharing can be redefined as allowing underspecification in the case of unlike conjuncts (cf Sag 2002).<sup>18</sup>

We thus have the following (simplified) representations for the lexical coordinations in (1a) and (48a):

<sup>17</sup> This is a simplification since Spanish allows unsaturated head-complement phrases made of a tense auxiliary and a past participle (cf above section 3.2).

<sup>18</sup> Sharing the SLASH features implements the Coordinate Structure Constraints disallowing extraction out of one conjunct only (cf Ross 1967). As shown by Kehler 1999, this constraint is too strong and only applies to a semantically defined subset of coordinate phrases.



The adjectival coordinate phrase being light in (48a), it can appear as prenominal adjunct. Since the verbal coordinate phrase is light in (1a), it can appear as a head in a head-complement phrase, and thus combine with the NP object.<sup>19</sup>

Now let us turn to RNR, which has been analysed in HPSG by Yatabe 2001 and Beavers and Sag 2004.

### 4.3. An elliptical analysis of RNR

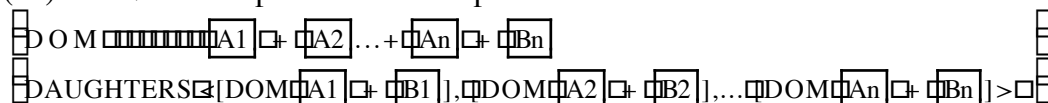
We follow Beavers and Sag 2004's analyses of RNR, which we reformulate in order to make it compatible with the previous section. As mentioned above, a movement analysis (in terms of SLASH feature) is to be rejected and a phonological reduction analysis is to be preferred. RNR is thus analysed as the coordination of two syntactically (and semantically) complete phrases, and ellipsis is implemented using the DOM feature, which at the phrase level, encodes the list of elements to be linearized, and which is not limited to the immediate constituents (cf Kathol 1995). Let us take the following example:

(63) John likes [~~red beans~~] and Paul dislikes [red beans]

The first conjunct is analysed as an elliptical S, that is as a syntactically (and semantically) complete S with a reduced Phonology. In HPSG terms, this means that its DOM feature inherits less than the concatenation of the DOM features of its daughters.

Considering Right-Node-Raising as a specific subtype of coordinate phrases, we reformulate Beavers and Sag 2004's coordination schema as follows:<sup>20</sup>

(64) RNR-coord-phrase => coord-phrase &

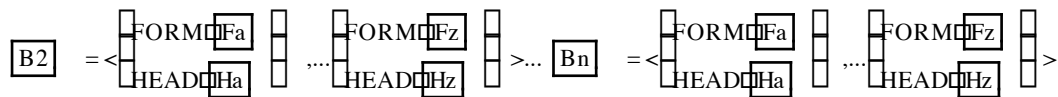


with  $B_1 = \langle \begin{matrix} \text{FORM} & F_a \\ \text{HEAD} & H_a \end{matrix} \rangle \dots \begin{matrix} \text{FORM} & F_z \\ \text{HEAD} & H_z \end{matrix} \rangle$ .

<sup>19</sup> Such coordinate phrases can also project [WEIGHT non-light] phrases, using a head-only phrase (cf Abeillé & Godard 2006).

<sup>20</sup> This is a simplification since RNR also applies to some non coordinate cases as well, such as comparatives and adjunct clauses with a contrastive meaning:

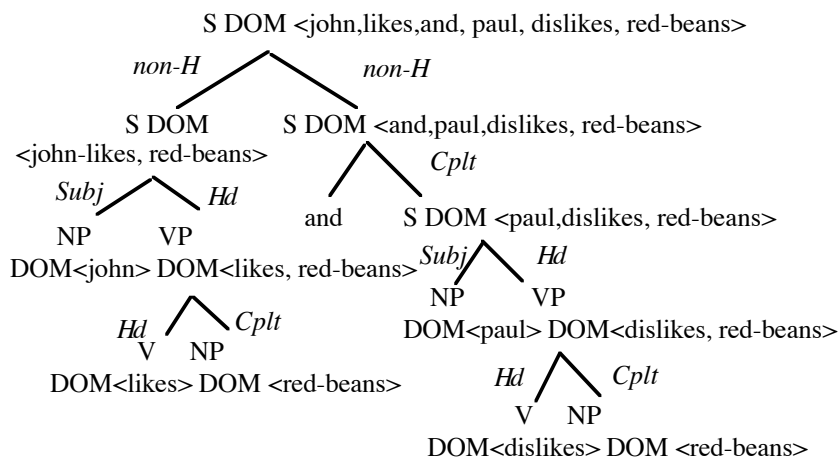
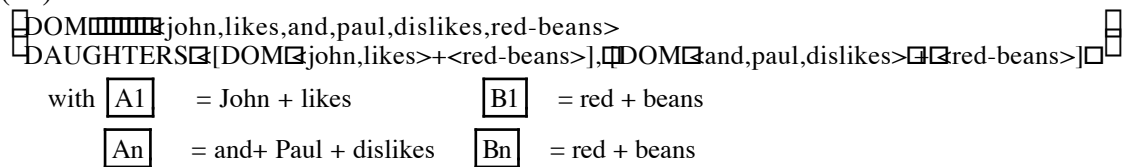
John likes, whereas Mary hates, red beans.



In (64),  $[A_1] \dots [A_n]$  can be any list of constituents, while  $[B_1] \dots [B_{n-1}]$  correspond to the ellided elements and  $[B_n]$  to the final remnants (which are shared). Deletion (ie non propagation at the mother's level) of the final elements in the non final conjuncts is done under morphological and categorial identity (checking identity of the respective FORM and HEAD features). Of course, the content of the ellided elements can be different from that of the realized ones, as in *Paul sells and Mary buys lots of books*, where the sold books are probably not the same as the ones bought.

The analysis of (63) is thus the following:

(65)



Note that in this approach, the Form of the Sentence is read off the DOM feature, and is not the terminal yield of a phrase structure representation.

### Conclusion

In this paper, we have shown that lexical head coordination (LHC) cannot be reduced to phrasal coordination with ellipsis or Right Node raising. There are prosodic, semantic and syntactic differences between lexical head coordination and RNR. In particular, if it is true that RNR implies a prosodic boundary and a rising tone before the conjunction, it is not the case for LHC. RNR implies a semantic contrast between the conjuncts which is not necessary with LHC. From the syntactic point of view, LHC can share some weak complements, and some syntactic markers, that phrasal conjuncts in RNR cannot. Finally some conjunctions are appropriate for RNR only and not for LHC.

We then show that coordination with lexical conjuncts is also relevant for certain non Heads, appearing in contexts where only  $X^\circ$  elements are allowed. We also show that these coordinate phrases can have a double behavior, as  $X^\circ$  or as XPs.

We finally show how lexical coordination can be represented in HPSG using the syntactic WEIGHT feature appropriate for both words and phrases. Lexical coordination thus falls into the class of "light" phrases, which also covers some head-adjunct phrases.

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