A Head-Driven Treatment of Asymmetric Coordination and Apposition

Frank Van Eynde
University of Leuven

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Abstract

In Pollard and Sag (1994) and Ginzburg and Sag (2000) phrases are either headed or non-headed, and if they are headed, there is a relation of selection between the daughters: either the head daughter selects its non-head sister(s), as in the phrases of type *head-complements*, or the non-head daughter selects its head sister, as in the phrases of type *head-adjunct*. In the non-headed phrases, by contrast, there is no selection; in a coordinate structure, for instance, there is no relation of selection, neither between the conjuncts nor between the conjunction and the conjuncts. The central claim of this paper is that there are also phrases which are headed but in which neither daughter selects the other. To model such phrases I propose a new type, called *head-independent*. Its properties are spelled out and its range of application is illustrated with various examples, including asymmetric coordination and apposition.

1 Introduction

The main claim of this paper is that there are certain types of phrases which are headed but which cannot properly be modeled in terms of the usual inventory of phrase (structure) types. To demonstrate this I will provide examples and analyses of prenominal APs, subject NPs and prenominal NPs. The examples are all taken from Dutch, but their analysis is defined in terms which are sufficiently general to be applicable to other languages as well.

2 Prenominal APs

In Dutch, the prenominal adjectives show morpho-syntactic agreement with the nouns they modify. More specifically, they take the base form if the noun is singular neuter, and the declined form otherwise. Compare, for instance, the singular neuter *een zwart paard* 'a black horse' with the singular nonneuter *een zwarte ezel* 'a black-DCL donkey' and the plural *zwarte paarden* 'black-DCL horses'.[1] If the prenominal is a phrase, rather than a single word, then it is the adjectival head of the prenominal which hosts the declension affix, as in the plural *zeer snelle paarden* 'very fast-DCL horses' and the singular nonneuter *een van Rusland afhankelijke staat* 'a from Russia dependent-DCL state'.

[†] I would like to thank the anonymous reviewers of the abstract and the non-anonymous attendants of the conference whose comments and questions have provided me with so much food for thought and (re)consideration that this text only remotely resembles the original submission.

[1] In NPs with a definite determiner the adjectives are also declined if the noun is singular neuter, as in *het zwarte paard* 'the black-DCL horse'. To neutralize this factor I will use nominals without determiner or with an indefinite determiner for exemplification.

2.1 Two types of coordination

If a prenominal AP takes the form of a coordinate structure, the declension affix materializes on all of the conjuncts, as in the direct object NP of (1).

(1) Hij heeft witte en zwarte truien gekocht.
he has white-DCL and black-DCL sweaters bought
'He bought white and black sweaters.'

This, however, is not the only possibility. There is also a (less common) type of coordination, in which the declension affix only appears on the last conjunct, as in (2).[2]

(2) Hij heeft wit en zwarte truien gekocht.
he has white and black-DCL sweaters bought
'He bought white and black sweaters.'

This syntactic difference correlates with a semantic one. While the NP in (1) denotes a set of sweaters which includes both white exemplars and black ones, its counterpart in (2) denotes a set of bi-coloured sweaters. In other words, while the conjuncts in the symmetric coordination denote mutually distinct properties, i.c. the property of being white and the property of being black, the conjuncts in the asymmetric coordination jointly denote one property, i.c. the property of being black and white. There is, hence, a close semantic link between the conjuncts in the asymmetric coordination. This is mirrored by the syntactic peculiarity that they cannot be separated. Extraposition of the final conjunct, for instance, is possible in the symmetric type of coordination, but not in the asymmetric one.

(3) Hij heeft witte truien gekocht en zwarte (ook).
he has white-DCL sweaters bought and black-DCL (too)
'He bought white sweaters and black ones (too).'

(4) * Hij heeft wit truien gekocht en zwarte (ook).
he has white sweaters bought and black-DCL (too)

Similarly, it is possible to insert a prenominal between both adjectives in a symmetric coordination, but not in an asymmetric one.

(5) Hij heeft drie witte en twee zwarte truien gekocht.
he has three white-DCL and two black-DCL sweaters bought
'He bought three white sweaters and two black ones.'

(6) * Hij heeft drie wit en twee zwarte truien gekocht.
he has three white and two black-DCL sweaters bought

[2] If the affix is only realized on a non-final conjunct, as in * *witte en zwart truien* 'white-DCL and black sweaters', the resulting phrase is ungrammatical.

In sum, there is a close link between the conjuncts in the asymmetric type, both semantically and syntactically. This link, though, is not so close that it justifies the treatment as a single syntactic atom. Notice, for instance, that the conjuncts can be permuted without changing the meaning or the well-formedness: *zwart en witte truien* is synonymous with and equally well-formed as *wit en zwarte truien*. They can also be replaced by other adjectives, as in *rood en gele truien* 'red and yellow-DCL sweaters', and they can take their own modifiers, especially incorporated ones, as in *donkerblauw en lichtgroene truien* 'dark-blue and light-green-DCL sweaters'. This demonstrates that the asymmetric coordinate structures are phrases, rather than single words. For the declension marker, this implies that it cannot be treated as an affix which is added to a morphologically complex word, as in *(wit-en-zwart)+e truien*; instead, it is what it seems to be, i.e. an affix which is only realized on the last conjunct, as in *wit en zwart+e truien*.

2.2 Symmetric coordination in prenominal APs

To model the combination of a noun with a prenominal AP I adopt the analysis of Allegranza (1998) and Van Eynde (2003), in which the noun is the head and the prenominals its functors. The defining characteristic of functors is that they are non-head daughters which select their head sister. In terms of the Pollard and Sag (1994) inventory of phrase types, they include the adjuncts, the specifiers and the markers.[3] The selection is modeled in terms of a *synsem* valued feature SELECT, which is part of the functor's HEAD value.[4]

(7)
$$\left[\begin{array}{l} \textit{head-functor-phr} \\ \text{DTRS} \left\langle \left[\text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{SELECT} \ \boxed{1}\right], \boxed{2} \right\rangle \\ \text{HEAD-DTR} \ \boxed{2}\left[\text{SYNSEM} \ \boxed{1}\,\textit{synsem}\right] \end{array}\right]$$

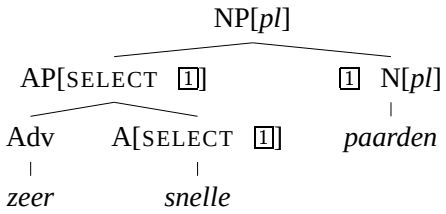
The value of the SELECT feature can be used to model NP-internal agreement. The Dutch nondeclined prenominal adjectives, for instance, can be stipulated to select a singular neuter nominal, whereas their declined counterparts can be claimed to select a nominal which is either plural or singular nonneuter. Since the SELECT feature is part of the HEAD value, it is shared between the adjective and the AP which it projects, as in:[5]

[3]The notion 'functor' is also used in a broader sense. In (Reape, 1994, 154), for instance, it covers all kinds of selectors, including the heads in head-complement combinations. In my use the term only covers the selecting non-head daughters.

[4]The SELECT feature is a generalization of the MOD and SPEC features of Pollard and Sag (1994). For a similar proposal to replace MOD and SPEC with a single selection feature, see Soehn and Sailer (2003). Non-head daughters which do not select their head sister have the SELECT value *none*. Predicative adjectives, for instance, are complements, rather than functors, and therefore have the SELECT value *none*.

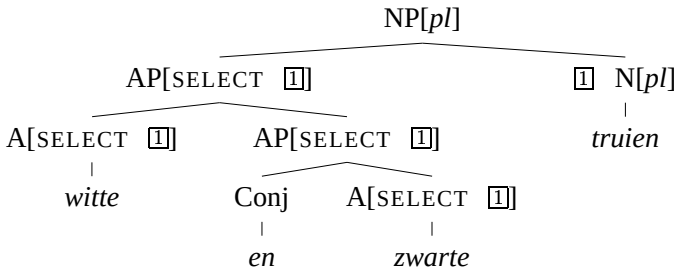
[5]Throughout the paper, I use the notation XP for all phrasal signs, no matter whether they are fully saturated or not.

(8)



Combining the functor treatment with the Pollard and Sag (1994) treatment of coordination the symmetric coordination of prenominal adjectives can be analysed as follows.

(9)



The propagation of the SELECT value over both conjuncts follows from the strong version of the Coordination Principle, which requires the conjunct daughters to share the CATEGORY and NONLOCAL value of the mother (Pollard and Sag, 1994, 202). As for the relation between the conjunction and the conjunct which it introduces, it is not spelled out in Pollard and Sag (1994) how it can be modeled. Taking into account that it is the conjunct and not the conjunction which shares its HEAD value with the mother, I assume that it is a headed type of phrase in which the conjunct is the head daughter and the conjunction its functor.[6]

2.3 Asymmetric coordination in prenominal APs

Turning now to the asymmetric coordination in *wit en zwarte truien*, it seems logical to treat the final conjunct as the head daughter of the AP, for in that case we automatically predict that it is this conjunct which shows variation for declension and which shares its SELECT value with the phrase.

However, surveying the inventory of headed phrase types, there is none which looks appropriate to capture the particular properties of the asymmetric coordination. Treating the head as a selector is not attractive, for in that case the first conjunct must be a complement or a subject of the second one, both of which are implausible. More specifically, the complement treatment is implausible, since color denoting adjectives, such as *zwarte*, are not supposed to take any complements, and the subject treatment is implausible, since prenominal adjectives do not

[6]The *select* value of the conjunction cannot be very specific, since conjunctions combine with nearly anything. The fact, though, that it is of type *synsem* is significant, since it implies that there has to be some conjunct.

take a subject; instead their first argument is realized by the nouns they modify. The alternative of treating the non-head daughter as the selector is not very attractive either, for in that case the nondeclined adjectives must be assigned a disjunctive SELECT value: one for selecting a singular neuter nominal (see 2.2) and one for selecting an AP which is introduced by a conjunction. Moreover, it is not only the systematic ambiguity which is unattractive, there is also the problem that the selection of one conjunct by another does not mesh well with the intuitive notion of selection: there is no intuitively clear sense in which *wit* can be claimed to select the final conjunct in *wit en zwarte truien*. In this respect, it resembles the symmetric coordination in *witte en zwarte truien*, for which it is commonly assumed that there is no selection either. So, unless one is prepared to resort to a totally novel notion of selection, it is unattractive to treat the first conjunct as the selector of the second one. This leaves us with a problem, though, for if neither daughter selects the other, then there is no existing phrase type which can be used to model the asymmetric coordination, at least if we limit ourselves to the usual inventory of headed phrase types.

Looking beyond the usual inventory, there is one which comes close to meeting the requirements. It concerns a type of headed phrase in which neither daughter selects the other. It is mentioned in Van Eynde (1998) under the name *head-independent-phrase*, but its role in the grammar and its properties have so far been left implicit. To repair this I now propose the following definition.

(10)
$$\left[\begin{array}{l} \textit{head-independent-phr} \\ \text{DTRS} \left\langle \left[\text{SYNSEM} \mid \text{LOC} \left[\begin{array}{ll} \text{CAT} \mid \text{HEAD} \mid \text{SELECT} & \textit{none} \\ \text{CONT} \mid \text{INDEX} & \boxed{1} \end{array}\right]\right], \boxed{2} \right\rangle \\ \text{HEAD-DTR} \ \boxed{2}\left[\text{SYNSEM} \mid \text{LOC} \mid \text{CONT} \mid \text{INDEX} \ \boxed{1}\right] \end{array}\right]$$

The defining property of the phrases of type *head-independent* is that both daughters have the same index (1). This captures the fact that the conjuncts jointly denote a single property. The adjectives in *wit en zwarte truien*, for instance, jointly denote the property of being partly white and partly black. As such, they contrast with the adjectives in the symmetric *witte en zwarte truien*, in which the conjuncts denote distinct and even mutually exclusive properties.

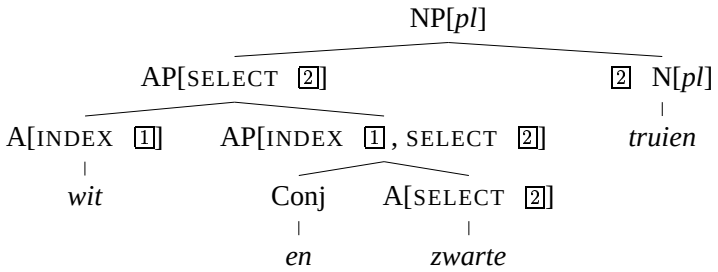
The asymmetric nature of the coordination is captured by the assignment of head status to the final conjunct: the head daughter (2) is identified with the rightmost daughter.[7] As such, it shares its HEAD value with the mother, including the SELECT feature. The absence of any relation of selection between the daughters is captured by the lack of a reference to the valence features and by the assignment of the value *none* to the SELECT feature of the non-head daughter. Independent evidence for tis assignment is provided by the fact that the adjective in the first conjunct does not show variation for declension, for this lack of variation is a defining

[7] This is consistent with the commonly held view that Dutch is predominantly head-final.

property of adjectives with the value *none*. The adjectives in predicative positions, for instance, are also invariably nondeclined, see footnote 4.

Employing this new phrase type, the analysis of the nominal with an asymmetrically coordinated AP can be modeled as follows.

(11)



The INDEX value is shared between the conjuncts, but it is only the last conjunct which shares its SELECT value with the AP as a whole.

2.4 Some related constructions

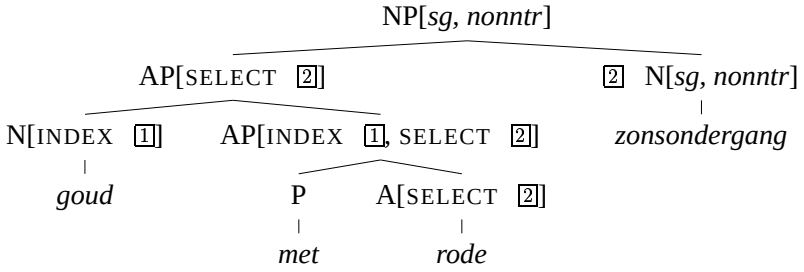
As might be expected, the distinction between symmetric and asymmetric coordination is not only applicable to conjunction, but also to disjunction. In *witte of zwarte truien* 'white-DCL or black-DCL sweaters', for instance, the coordination is symmetric and distributive, in the sense that it can be paraphrased as *witte truien of zwarte truien*. By contrast, the AP in *een of andere kerel* 'one or other-DCL guy', is asymmetric and non-distributive. It is only the last conjunct which is declined, even though the first one does have a declined counterpart (*ene* 'one-DCL'), and it cannot be paraphrased as *een kerel of andere kerel*. This is due to the fact that the conjuncts jointly denote a single property, rather than a disjunction of mutually distinct properties.

Another instance of asymmetric coordination is provided by the prenominal APs in *de Frans-Duitse grens* 'the French-German-DCL border' and *financieel-economische berichten* 'financial-economic-DCL messages'. The conjuncts in these examples jointly denote a single property and are asymmetric, but in contrast to the previous examples, they are not separated by a conjunction. Instead, they are simply juxtaposed.[8]

What is less expected perhaps, is that the final conjunct can also be introduced by a preposition. Let us, for instance, take the APs in *een zwart met bruine mantel* 'a black with brown-DCL coat' and *een goud met rode zonsondergang* 'a gold with red-DCL sunset', both quoted from (Haeseryn et al., 1997, 407). The second example is especially interesting since its first conjunct is a noun (*goud*) rather than an adjective (*gouden*). This makes the asymmetric nature of the phrase more conspicuous and provides clear evidence for the assumption that it is the rightmost daughter which heads the phrase.

[8]The presence of the hyphen is a matter of orthographic convention; in spoken language there is no overt sign which separates the adjectives.

(12)



Notice that the preposition in this combination is not the head of a PP, but a non-head sister in an adjectival projection. The difference between complement selecting (major) prepositions, which are heads of PPs, and head selecting (minor) prepositions, which are non-head sisters in XP projections, is motivated and exemplified extensively in Van Eynde (2004).

3 Asymmetric coordination in NPs

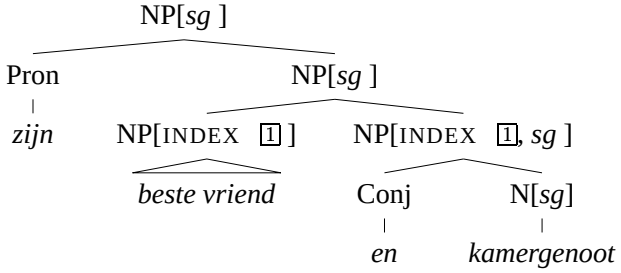
To illustrate the relevance of the distinction between symmetric and asymmetric coordination for NPs, let us take the following pair of sentences.

(13) Zijn beste vriend en zijn lief hebben hem bedrogen.
his best friend and his girlfriend have him cheated
'His best friend and his girlfriend have cheated on him.'

(14) Zijn beste vriend en kamergenoot heeft hem bedrogen.
his best friend and roommate has him cheated
'His best friend and roomate has cheated on him.'

In the symmetric type of coordination, the conjuncts denote mutually distinct entities and since the sum of two singulars gives a plural, the resulting NP requires the finite verb to be plural. By contrast, in (14) the conjuncts jointly denote a single individual, so that the resulting NP requires the finite verb to be singular. This clearly suggests that we have another instance of the head-independent phrase type. More specifically, we have an instance of asymmetric coordination, in which the rightmost conjunct shares its NUMBER value with the NP.

(15)

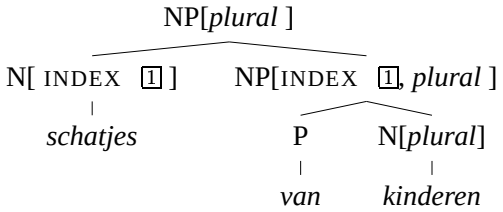


The index sharing guarantees that the conjuncts have the same referent and the fact that the last conjunct is the head accounts for the singular nature of the NP as a whole.

As in the case of the prenominal APs, it is not necessary that the head daughter be introduced by a conjunction. It can also be introduced by a preposition. To illustrate this, let us take the NP *een schat van een kind* 'a treasure of a child'. This NP is ambiguous: it can have the usual interpretation of a noun with a postnominal PP and denote some treasure which belongs to a child, but it also has a second interpretation, in which the child is said to be very precious. In that interpretation, *kind* is the semantic head of the NP, and *schat* its prenominal dependent (Haeseryn et al., 1997, 854). Other examples of this kind are *een kast van een huis* 'a castle of a house', *een boom van een kerel* 'a tree of a guy' and *een serpent van een wijf* 'a snake of a woman'. The secondary interpretation can only be obtained under certain conditions. First, the head noun must be indefinite: *een schat van dat kind* 'a treasure of that child' can only have the first (N+PP) interpretation. Second, the qualifying noun must have the same number as the head noun; they must both be singular, as in the previous examples, or they must both be plural, as in *schatten van kinderen* 'treasures of children'. Mixtures, as in *schatten van een kind* 'treasures of a child' and *een schat van kleine kinderen* 'a treasure of small children' can only have the first (N+PP) interpretation.

To model the secondary interpretation, I assume that the second noun is not only the semantic head of the entire NP, but also its syntactic head. This implies that the preposition *van* 'of' is not the head of a PP, but a minor functor, and that the first noun is a prenominal non-head sister of the *van*+NP combination.

(16)



The relation between the modifying noun and the head noun is once again a typical instance of the head-independent type of combination, for, first, they jointly denote one and the same group of individuals, which implies that they have the same index, and second there is no relation of selection between them.

4 Prenominal NPs

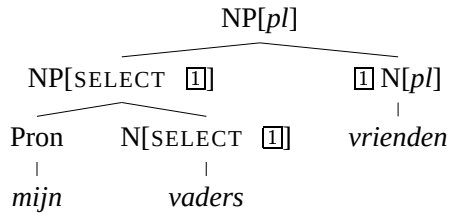
NPs which are used in prenominal position, such as genitives, possessives and numerals, can also take the form of head-independent phrases.

4.1 Prenominal genitives as functors

In contrast to the APs, the prenominal NPs do not show morpho-syntactic agreement with the nouns they modify. The pronoun in *wiens paarden* 'who-GEN horses', for instance, is singular, masculine and genitive, whereas the modified noun is plural, neuter and non-genitive. This lack of morpho-syntactic agreement, however, does not imply that there are no constraints on the combination of a prenominal NP and its nominal head sister. To mention just one, a genitive NP can only be combined with a nominal which is not fully saturated, such as the bare plural *paarden*, and yields a nominal which is fully saturated, in the sense that it can no longer be combined with a determiner, as in *(*de) wiens paarden*. As demonstrated in Van Eynde (2003), these constraints can be captured straightforwardly in terms of the functor treatment of the prenominals.

Predictably, if the prenominal genitive is not a single word but a phrase, the requirement for an unsaturated nominal is shared with the head daughter of the genitive NP; moreover, it is also on that daughter that the genitive affix is realized. In *mijn vaders vrienden* 'my father-GEN friends', for instance, the genitive *-s* is added to *vader*. Since CASE is a HEAD feature, just like SELECT, this can be modeled as follows:

(17)



In words, *mijn vaders* is genitive and selects an unsaturated nominal, because its head daughter has these properties. The possessive pronoun *mijn* 'my' is in its turn a functor of *vaders*.

4.2 Apposition in prenominal genitives

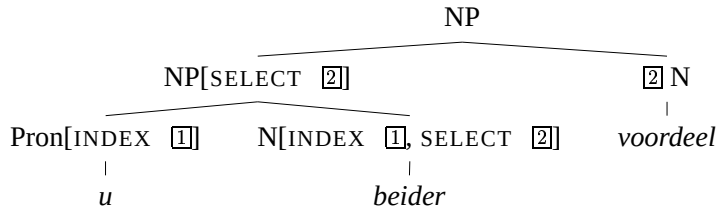
Let us now examine the genitives in *met ons aller instemming* 'with us all-GEN consent' and *in u beider voordeel* 'in you both-GEN advantage'. In both examples, the prenominal is an NP which consists of a pronoun and a genitive nominal. This is clear a.o. from the fact that in the alternative postnominal realization both the pronoun and the genitive appear after the nominal, as in *met de instemming van ons allen* 'with the consent of us all-PL' and *in het voordeel van u beiden* 'in the advantage of you both-PL'. In this respect, there is an obvious similarity with *mijn vaders vrienden*, which in its postnominal realization takes the form of *de vrienden van mijn vader* 'the friends of my father'. Another similarity concerns the fact that the genitive affix is added to the last word of the NP: it is the quantifying *aller* and *beider* which bear the genitive plural *-er*, whereas the preceding pronoun is

accusative.[9]

At the same time, there are also some important differences between *u beider voordeel* and *mijn vaders vrienden*. For a start, while the possessive and the noun in *mijn vaders* have mutually distinct denotations, the personal pronoun and the quantifying genitive in *u beider* jointly denote one and the same set of individuals. This accounts for the fact that the number value of the possessive may differ from the one of its head, whereas there is number agreement between the personal pronoun and the quantifying genitive in *u beider*. More specifically, since *beider* and *aller* are inherently plural, the preceding pronoun must be plural too, cf. *ons/u/*mij/*hem aller* 'us/you/*me/*him all-GEN'. Second, while the possessive pronoun in *mijn vaders* can naturally be treated as a functor which selects an unsaturated nominal and which yields a saturated NP, the personal pronoun *u* does not qualify as a selector of *beider*, since it is typical of personal pronouns that they only select a nominal when they are genitive, not when they are accusative.

An analysis which neatly captures both the similarities and the differences between both types of genitives is the one in which *u beider* is treated as a phrase of type *head-independent*.

(18)



In this analysis, the genitive *beider* is the head daughter of the genitive NP, while the personal pronoun *u* is its non-head sister. Given the general constraint that the SELECT value of the non-head daughter must be *none*, the analysis automatically and correctly predicts that the personal pronoun cannot take the genitive form, for if it were genitive, it would select an unsaturated nominal and have a SELECT value of type *synsem*.

4.3 Prenominal possessives

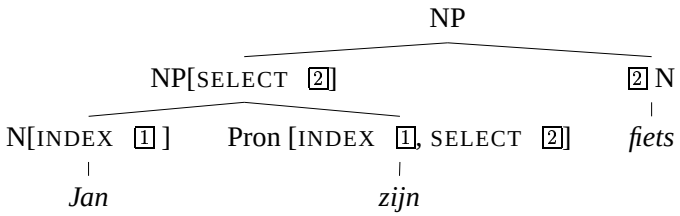
While the prenominal genitives belong to a formal register, there is a semantically equivalent construction which is distinctly informal. It consists of a possessive pronoun preceded by an NP in standard case, as in *Jan zijn fiets* 'John his bike'. This

[9]There is a tendency to replace the personal pronoun with a possessive one, as in *in uw beider voordeel* 'in your both-GEN advantage' (Haeseryn et al., 1997, 356). Backing this up, a Google search, carried out in February 2005, yielded 795 occurrences of *u aller* vs. 4306 of *uw aller*, and 285 occurrences of *u beider* vs. 782 of *uw beider*. While the use of the possessive can be seen as a simplification, since it is much more common for a possessive to occur in a prenominal position than for an accusative pronoun, it also complicates the relation between syntax and semantics, since the meaning of the possessive in *in uw beider voordeel* is still the one of a personal pronoun, as demonstrated by fact that the corresponding postnominal is not *in uw voordeel van beiden*, but rather *in het voordeel van u/*uw beiden* 'the advantage of you/*your both'.

construction is rarely used in written language, but it is very common in colloquial Dutch (Haeseryn et al., 1997, 294).

The NP which precedes the possessive cannot only be a proper noun, such as *Jan*, but also a pronoun, as in *iemand z'n fiets* 'somebody his bike' or a common noun with a definite determiner, as in *mijn zus haar schoenen* 'my sister her shoes' and *die mannen hun kinderen* 'those men their children'. The possessive and the preceding NP denote one and the same (group of) individual(s) and must, hence, share their index. The ensuing number agreement accounts for the contrast in *die mannen hun/*z'n/*haar kinderen* 'those men their/*his/*her children', and the ensuing gender agreement accounts for the contrast in *mijn zus haar/*zijn schoenen* 'my sister her/*his shoes'. Moreover, since the preceding NP is invariably of the third person, it also accounts for the fact that the possessives in this construction must be of the third person, cf. *iemand z'n/*je/*m'n kinderen* 'somebody his/*your/*my children'. Since index sharing is a defining property of the head-independent phrase type, it is a plausible candidate for the analysis.

(19)



Further evidence for this treatment is provided by the fact that there is no relation of selection between the daughters. Possessive pronouns do not take any subjects or complements, and NPs do not select possessives: it would, for instance, be farfetched and unintuitive to claim that *Jan* selects the possessive *zijn*.

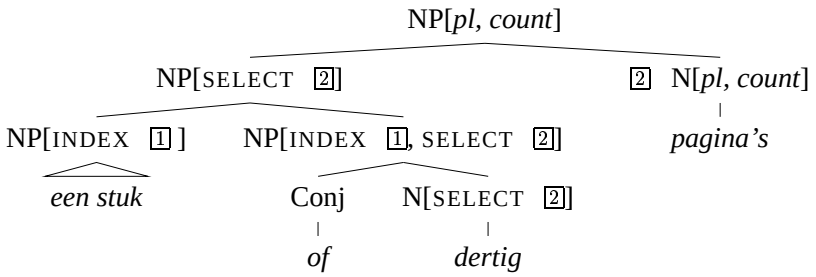
4.4 Prenominal numerals

Returning to the main theme, we have seen in this section that there are prenominal NPs, notably among the genitive and possessive ones, which show the characteristic properties of the head-independent type of combination. The examples all concerned combinations in which the head daughter is not introduced by any closed class word. They are, hence, instances of juxtaposition.

To demonstrate that there are also cases in which the head daughter is introduced by a conjunction, let us take the quantifying prenominal in *een stuk of dertig pagina's* 'a piece or thirty pages'. This prenominal contains an indefinite NP, the conjunction *of* 'or' and a numeral. Its meaning can be paraphrased as 'around thirty', and has little to do with disjunction. In contrast to *twintig of dertig pagina's* 'twenty of thirty pages', which can be paraphrased as *twintig pagina's of dertig pagina's* 'twenty pages or thirty pages', it cannot be paraphrased as *een stuk pagina's of dertig pagina's* 'a piece pages or thirty pages'. As a matter of fact, the first conjunct is not even compatible with a plural count noun: * *een stuk pagina's*. Hence, the two parts of the coordination do not denote different amounts, but rather

one and the same amount, and it is only the second part which requires a plural count noun: the first conjunct does not share this requirement. This strongly suggests that the numeral *een stuk of dertig* is another instance of the head-independent phrase type.[10]

(20)



Both parts of the prenominal are NPs, but it is only the latter which shares its HEAD value and, hence, its SELECT value with the prenominal as a whole.

5 Conclusion

Some phrases, such as the prenominal AP in *wit en zwarte truien* 'white and black-DCL sweaters', show an unusual mixture of properties, for on the one hand there is some good evidence that they are headed, but on the other hand none of the familiar headed phrase types is well equiped to deal with them. To model such combinations, I have employed a type of phrases, called *head-independent-phrase*, building on a proposal in Van Eynde (1998). Typical of the phrases of this type is that they are right-headed, that neither daughter selects the other, and that the daughters share their index. The new phrase type is not only useful to model cases of asymmetric coordination, but also of apposition, as in *u beider voordeel* 'you both-DCL advantage' and *Jan z'n fiets* 'John his bike', and of some other idiosyncratic combinations, such as *een schat van een kind* in the meaning of 'a very precious child'.

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[10] For evidence that the numerals are nouns, see Jackendoff (1977).

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