Chapter 8

Nominal structures

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This chapter shows how nominal structures are treated in HPSG. The introduction puts the discussion in the broader framework of the NP vs. DP debate and differentiates three HPSG treatments, i.e. the specifier treatment, the DP treatment and the functor treatment. They are each presented in some detail and applied to the analysis of ordinary nominals. A comparison reveals that the DP treatment does not mesh as well with the monostratal surface-oriented nature of the HPSG framework as the other treatments. Then it is shown how the specifier treatment and the functor treatment deal with nominals that have idiosyncratic properties, such as the gerund, the Big Mess Construction and irregular P+NOM combinations.

1 Introduction

We use the term *nominal* in a theory-neutral way as standing for a noun and its phrasal projection. In this broad sense all of the bracketed strings in (1) are nominals.

(1) [the [red [box]]] is empty

For the analysis of nominals there are two main approaches in generative grammar. One treats the noun (N) as the head all the way through. In that analysis the largest bracketed string in (1) is an NP. The other makes a distinction between the nominal core, consisting of a noun with its complements and modifiers, if any, and a functional outer layer, comprising determiners, quantifiers and numerals. In that analysis the noun is the head of *red box*, while the determiner is the head of *the red box*, so that the category of the latter is DP.

The first approach, henceforth called the *NP approach*, prevailed in generative grammar up to and including the Government and Binding model (Chomsky

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1981). One of its modules, the categorial component, consists of phrase structure rules, such as those in (2).

(2) a. VP → V NP
b. NP → Det Nom

They are required to "meet some variety of X-bar theory" (Chomsky 1981: 5). The original variety is that of Chomsky (1970). It consists of the following cross-categorial rule schemata:

(3) a. X′ → X …
b. X″ → [Spec, X′] X′

X′ stands for the combination of a head X and its complements, where X is N, A or V, and X″ stands for the combination of X′ and its specifier "where [Spec,N′] will be analyzed as the determiner" (Chomsky 1970: 210). X-bar theory was further developed in Jackendoff (1977), who added a schema for the addition of adjuncts and who extended the range of X with P, the category of adpositions. A monostratal version of X-bar theory is developed in Generalized Phrase Structure Grammar (GPSG). Its application to nominals is exemplified in Figure 1, quoted from Gazdar et al. (1985: 126). The top node is the double-bar category N″, which consists

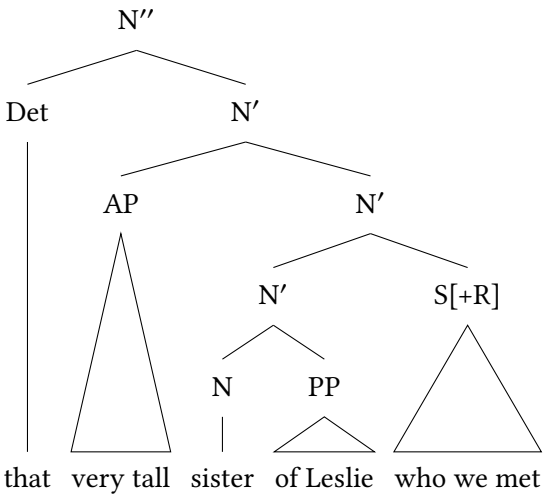

Figure 1: An instance of the NP approach

of the determiner and the single-bar category N′. The AP and the relative clause are adjoined to N′, and the lowest N′ consists of the noun and its PP complement.

The second approach, henceforth called the *DP approach*, results from an extension of the range of X in (3) to the functional categories. This was motivated by the fact that some of the phrase structure rules, such as (4), do not fit the X-bar mould.

(4) S → NP Aux VP

To repair this, the category Aux, which contained both auxiliaries and inflectional verbal affixes (Chomsky 1957), was renamed as I(nfl) and treated as the head of S. More specifically, I(nfl) was claimed to combine with a VP complement, yielding I′, and the latter was claimed to combine with an NP specifier (the subject), yielding I″ (formerly S). For the analysis of nominals such an overhaul did not at first seem necessary, since the relevant PS rules did fit the X-bar mould, but it took place nonetheless, mainly in order to capture similarities between nominal and clausal structures. These are especially conspicuous in gerunds, nominalized infinitives and nominals with a deverbal head, and were seen as evidence for the claim that determiners have their own phrasal projection, just like the members of I(nfl) (Abney 1987). More specifically, members of D were claimed to take an N″ complement (formerly Nom), yielding D′, and the latter was claimed to have a specifier sister, as in Figure 2. The DP approach was

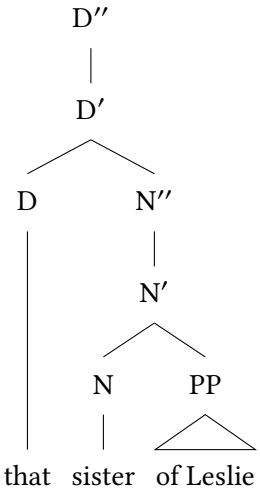

Figure 2: An instance of the DP approach

also taken on board in other frameworks, such as Word Grammar (Hudson 1990) and Lexical Functional Grammar (Bresnan 2001: 99).

Turning now to Head-Driven Phrase Structure Grammar, we find three different treatments. The first and oldest can be characterized as a lexicalist version of the NP approach, more specifically of its monostratal formulation in GPSG. It is first proposed in Pollard & Sag (1987) and further developed in Pollard & Sag (1994) and Ginzburg & Sag (2000). We henceforth call it the *specifier treatment*, after the role which it assigns to the determiner. The second is a lexicalist version of the DP approach. It is first proposed in Netter (1994) and further developed in Netter (1996) and Nerbonne & Mullen (2000). We will call it the *DP treatment*. The third adopts the NP approach, but neutralizes the distinction between adjuncts and specifiers, treating them both as functors. It is first proposed in Van Eynde (1998) and Allegranza (1998) and further developed in Van Eynde (2003), Van Eynde (2006) and Allegranza (2006). It is also adopted in Sign-Based Construction Grammar (Sag 2012; see also Müller 2020b: Section 1.4.2, Chapter 34 of this volume). We will call it the *functor treatment*. This chapter presents the three treatments and compares them wherever this seems appropriate.

We first focus on ordinary nominals (Section 2) and then on nominals with idiosyncratic properties (Section 3). For exemplification we use English and a number of other Germanic and Romance languages, including Dutch, German, Italian and French. We assume familiarity with the typed feature description notation and with such basic notions as unification, inheritance and token-identity (see Richter (2020), Chapter 3 of this volume on formal foundations and Abeillé & Borsley (2020), Chapter 1 of this volume on basic properties of HPSG).[1]

2 Ordinary nominals

We use the term *ordinary nominal* for a nominal that contains a noun, any number of complements and/or adjuncts and at most one determiner. This section shows how such nominals are analyzed in respectively the specifier treatment (Section 2.1), the DP treatment (Section 2.2) and the functor treatment (Section 2.3).

2.1 The specifier treatment

The specifier treatment adopts the same distinction between heads, complements, specifiers and adjuncts as X-bar theory, but its integration in a monostratal lexicalist framework inevitably leads to non-trivial differences, as will be demonstrated in this section. The presentation is mainly based on Pollard & Sag (1994)

[1] This chapter does not treat relative clauses, since they are the topic of a separate chapter (Arnold & Godard 2020, Chapter 15 of this volume).

and Ginzburg & Sag (2000). We first discuss the syntactic structure (Section 2.1.1) and the semantic composition (Section 2.1.2) of nominals, and then turn to nominals with a phrasal specifier (Section 2.1.3).

2.1.1 Syntactic structure

Continuing with the same example as in Figure 2, a relational noun, such as *sister*, selects a PP as its complement and a determiner as its specifier, as spelled out in the following CATEGORY value:

(5)
$$\begin{bmatrix} \textit{category} & \\ \textsc{head} & \textit{noun} \\ \textsc{spr} & \langle \textsc{Det} \rangle \\ \textsc{comps} & \langle \textsc{pp}[\textit{of}] \rangle \end{bmatrix}$$

The combination with a matching PP is subsumed by the *head-complements-phrase* type (Abeillé & Borsley 2020, Chapter 1 of this volume), and yields a nominal with an empty COMPS list. Similarly, the combination of this nominal with a matching determiner is subsumed by the *head-specifier-phrase* type, and yields a nominal with an empty SPR list, as spelled out in Figure 3.

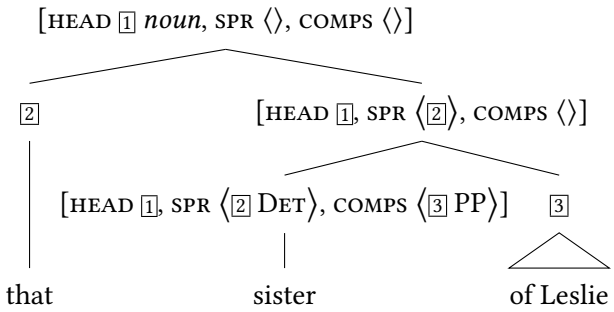

Figure 3: Adnominal complements and specifiers

Since the noun is the head of *sister of Leslie* and since the latter is the head of *that sister of Leslie*, the Head Feature Principle[2] implies that the phrase as a whole shares the HEAD value of the noun (1). The valence features, COMPS and SPR, have a double role. On the one hand, they register the degree of saturation of the nominal; in this role they supersede the bar levels of X-bar theory. On

[2] See Pollard & Sag 1994: 34 and Abeillé & Borsley (2020), Chapter 1 of this volume.

the other hand, they capture co-occurrence restrictions, such as the fact that the complement of *sister* be a PP, rather than an NP or a clause.

In contrast to complements and specifiers, adjuncts are not selected by their head sister. Instead, they are treated as selectors of their head sisters. To model this Pollard & Sag (1994: 55–57) employs the feature MOD(IFIED). It is part of the HEAD value of the substantive parts-of-speech, i.e. noun, verb, adjective and preposition. Its value is of type *synsem* in the case of adjuncts and of type *none* otherwise.

(6) *substantive*: [MOD *synsem* ∨ *none*]

Attributive adjectives, for instance, select a nominal head sister which lacks a specifier, as spelled out in (7).

(7)
$$\begin{bmatrix} \textit{category} \\ \text{HEAD} \begin{bmatrix} \textit{adjective} \\ \text{MOD}|\text{LOC}|\text{CATEGORY} \begin{bmatrix} \text{HEAD} & \textit{noun} \\ \text{SPR} & \textit{nelist} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The token-identity of the MOD(IFIED) value of the adjective with the SYNSEM value of its head sister is part of the definition of type *head-adjunct-phrase* (Abeillé & Borsley 2020, Chapter 1 of this volume). The requirement that the SPR value of the selected nominal be a non-empty list blocks the addition of adjectives to nominals which contain a determiner, as in **tall that bridge*.[3] Since the MOD(IFIED) feature is part of the HEAD value, it follows from the Head Feature Principle that it is shared between an adjective and the AP which it projects. As a consequence, the MOD(IFIED) value of *very tall* is shared with that of *tall*, as shown in Figure 4.

For languages in which attributive adjectives show number and gender agreement with the nouns they modify, the selected nominal is required to have specific number and gender values. The Italian *grossa* 'big', for instance, selects a singular feminine nominal and is, hence, compatible with a noun like *scatola* 'box', but not with the plural *scatole* 'boxes' nor with the masculine *libro* 'book' or *libri* 'books'.[4]

2.1.2 Semantic composition

Given the monostratal nature of HPSG, semantic representations do not constitute a separate level of representation, but take the form of attribute value pairs

[3] This constraint is overruled in the Big Mess Construction, see Section 3.3.

[4] This is an instance of concord (Wechsler 2020, Chapter 6 of this volume).

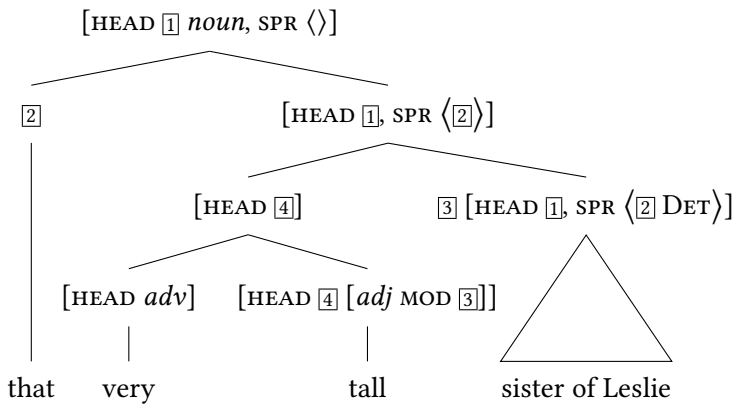

Figure 4: Adnominal modifiers

that are added to the syntactic representations. Phrase formation and semantic composition are, hence, modeled in tandem. Technically, the CONTENT feature is declared for the same type of objects as the CATEGORY feature, as spelled out in (8).

(8) *local*: $\begin{bmatrix} \textsc{category} & \textit{category} \\ \textsc{content} & \textit{semantic-object} \end{bmatrix}$

In the case of nominals the value of the CONTENT feature is of type *scope-object*, a subtype of *semantic-object* (Ginzburg & Sag 2000: 122). A scope-object is an index-restriction pair in which the index stands for entities and in which the restriction is a set of facts which constrain the denotation of the index, as in the CONTENT value of the noun *box*:

(9) $\begin{bmatrix} \textit{scope-object} \\ \textsc{index}\ \boxed{1}\ \textit{index} \\ \textsc{restr}\left\{\left[\begin{matrix}\textit{box} \\ \textsc{arg}\ \boxed{1}\end{matrix}\right]\right\} \end{bmatrix}$

This is comparable to the representations which are canonically used in Predicate Logic (PL), such as {x | *box*(x)}, where x stands for the entities that the predicate *box* applies to. In contrast to PL variables, HPSG indices are sorted with respect to person, number and gender. This provides the means to model the type of agreement that is called *index agreement* (Wechsler 2020: Section 4.2, Chapter 6 of this volume).

(10) $\textit{index}: \begin{bmatrix} \textsc{person} & \textit{person} \\ \textsc{number} & \textit{number} \\ \textsc{gender} & \textit{gender} \end{bmatrix}$

CONTENT values of attributive adjectives are also of type *scope-object*. When combined with a noun, as in *red box*, the resulting representation is one in which the indices of the adjective and the noun are identical, as in (11).[5]

(11) $\begin{bmatrix} \textit{scope-object} \\ \textsc{index}\ \boxed{1} \\ \textsc{restr}\left\{\begin{bmatrix} \textit{red} \\ \textsc{arg}\ \boxed{1} \end{bmatrix}, \begin{bmatrix} \textit{box} \\ \textsc{arg}\ \boxed{1} \end{bmatrix}\right\} \end{bmatrix}$

Also this is comparable to the PL practice of representing such combinations with one variable to which both predicates apply, as in {x | *red*(x) & *box*(x)}. What triggers the index sharing is the MOD(IFIED) value of the adjective, as illustrated by the AVM of *red* in (12) (Pollard & Sag 1994: 55).[6]

(12) $\begin{bmatrix} \textsc{category}|\textsc{head} & \begin{bmatrix} \textit{adjective} \\ \textsc{mod}|\textsc{loc}|\textsc{content} & \begin{bmatrix} \textit{scope-object} \\ \textsc{index}\ \boxed{1} \\ \textsc{restr}\ \boxed{\Sigma} \end{bmatrix} \end{bmatrix} \\ \textsc{content} & \begin{bmatrix} \textsc{index}\ \boxed{1} \\ \textsc{restr}\left\{\begin{bmatrix} \textit{red} \\ \textsc{arg}\ \boxed{1} \end{bmatrix}\right\} \cup\ \boxed{\Sigma} \end{bmatrix} \end{bmatrix}$

The adjective selects a scope-object, shares its index and adds its own restriction to those that are already present. The resulting CONTENT value is then shared with the mother.

To model the semantic contribution of determiners, Ginzburg & Sag (2000: 135–136) make a distinction between scope-objects that contain a quantifier (*quant-rel*), and those that do not (*parameter*). In terms of this distinction, the addition of a quantifying determiner to a nominal, as in *every red box*, triggers a shift from *parameter* to *quant-rel*. To capture this the specifier treatment employs the feature SPEC(IFIED). It is part of the HEAD value of the determiners, and its value is

[5] This is an example of intersective modification. The semantic contribution of other types of adjectives, such as *alleged* and *fake*, are modeled differently (Pollard & Sag 1994: 330–331). See also Kasper's (1997) work on scopal adjuncts and the discussion of it in Koenig & Richter (2020: Section 3.2), Chapter 23 of this volume.

[6] Boxed Greek capitals are used to indicate structure sharing for objects of type *set* (Ginzburg & Sag 2000: 23).

of type *semantic-object* (Ginzburg & Sag 2000: 362).[7]

(13) *determiner*: [SPEC *semantic-object*]

In the case of *every*, the SPEC value is an object of type *parameter*, but its own CONTENT value is a subtype of *quant-rel* and this quantifier is put in store, to be retrieved at the place where its scope is determined, as illustrated by the AVM of *every* in (14) (Ginzburg & Sag 2000: 204).

(14)
$$\begin{bmatrix} \text{CATEGORY}|\text{HEAD} \begin{bmatrix} \textit{determiner} \\ \text{SPEC} \begin{bmatrix} \textit{parameter} \\ \text{INDEX } \boxed{1} \\ \text{RESTR } \boxed{\Sigma} \end{bmatrix} \end{bmatrix} \\ \text{CONTENT } \boxed{2} \begin{bmatrix} \textit{every-rel} \\ \text{INDEX } \boxed{1} \\ \text{RESTR } \boxed{\Sigma} \end{bmatrix} \\ \text{STORE } \{\boxed{2}\} \end{bmatrix}$$

Notice that the addition of the SPEC feature yields an analysis in which the determiner and the nominal select each other: the nominal selects its specifier by means of the valence feature SPR and the determiner selects the nominal by means of SPEC.

2.1.3 Nominals with a phrasal specifier

Specifiers of nominals tend to be single words, but they can also take the form of a phrase. The bracketed phrase in [*the Queen of England's*] *sister*, for instance, is in complementary distribution with the possessive determiner in *her sister* and has a comparable semantic contribution. For this reason it is treated along the same lines. More specifically, the possessive marker *'s* is treated as a determiner that takes an NP as its specifier, as shown in Figure 5 (Pollard & Sag 1994: 51–54) and (Ginzburg & Sag 2000: 193).[8]

In this anaysis the specifier of *sister* is a DetP that is headed by *'s* and the latter takes the NP *the Queen of England* as its specifier.[9] Semantically, *'s* relates the

[7] In Pollard & Sag (1994: 45) the SPEC(IFIED) feature was also assigned to other function words, such as complementizers, and its value was of type *synsem*.

[8] The treatment of the phonologically reduced *'s* as the head of a phrase is comparable to the treatment of the homophonous word in *he's ill* as the head of a VP. Notice that the possessive *'s* is not a genitive affix, for if it were, it would be affixed to the head noun *Queen*, as in **the Queen's of England sister*, see Sag et al. (2003: 199).

[9] Since the specifier of *'s* is an NP, it may in turn contain a specifier that is headed by *'s*, as in *John's uncle's car*.

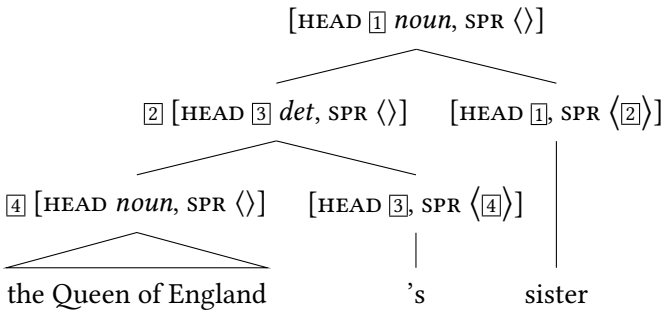

Figure 5: Phrasal specifiers

index of its specifier (the possessor) to the index of the nominal that it selects (the possessed), as spelled out in (15).[10]

(15)
$$\left[\begin{array}{l}\textsc{category}\left[\begin{array}{l}\textsc{head}\left[\begin{array}{l}\textit{determiner}\\ \textsc{spec}\left[\begin{array}{l}\textit{parameter}\\ \textsc{index}\ \boxed{1}\\ \textsc{restr}\ \boxed{\Sigma}\end{array}\right]\end{array}\right]\\ \textsc{spr}\left\langle\left[\textsc{index}\ \boxed{3}\right]\right\rangle\end{array}\right]\\ \textsc{content}\ \boxed{2}\left[\begin{array}{l}\textit{the-rel}\\ \textsc{index}\ \boxed{1}\\ \textsc{restr}\left\{\left[\begin{array}{l}\textit{poss-rel}\\ \textsc{possessor}\ \boxed{3}\\ \textsc{possessed}\ \boxed{1}\end{array}\right]\right\}\cup\boxed{\Sigma}\end{array}\right]\\ \textsc{store}\left\{\boxed{2}\right\}\end{array}\right]$$

The assignment of *the-rel* as the CONTENT value captures the definiteness of the resulting NP. Notice that this analysis contains a DetP, but in spite of that, it is not an instance of the DP approach, since the determiner does not head the nominal as a whole, but only its specifier.

2.2 The DP treatment

An HPSG version of the DP approach has been developed in Netter (1994) and Netter (1996). We sketch the main characteristics of this treatment in Section 2.2.1 and discuss some problems for it in Section 2.2.2.

[10] The terms *possessor* and *possessed* are meant to be understood in a broad not-too-literal sense (Nerbonne 1992: 8–9).

2.2.1 Functional complementation and functional completeness

The combination of a noun with its complements and its adjuncts is analyzed in much the same way as in the specifier treatment. The addition of the determiner, though, is modeled differently. It is not the nominal that selects the determiner as its specifier, but rather the determiner that selects the nominal as its complement. More specifically, it selects the nominal by means of the valence feature COMPS and the result of the combination is a DP with an empty COMPS list, as in Figure 6. In this analysis there is no need for the valence feature SPR. This looks like a gain

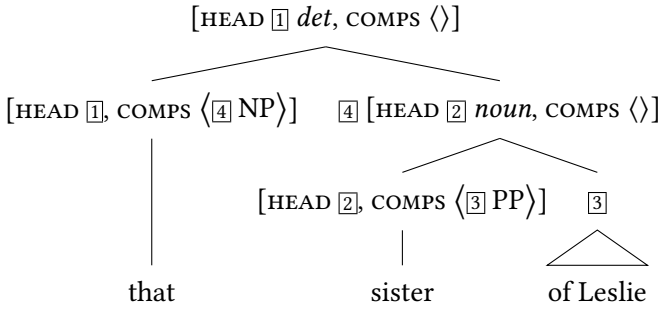

Figure 6: Propagation of the HEAD and COMPS values

of generalization, but in practice it is offset by the introduction of a distinction between functional complementation and ordinary complementation. To model it Netter (1994: 307–308) differentiates between major and minor HEAD features:

(16) $$\left[\text{HEAD}\left[\begin{array}{l}\text{MAJOR}\left[\begin{array}{l}\text{N } \textit{boolean}\\ \text{V } \textit{boolean}\end{array}\right]\\ \text{MINOR}|\text{FCOMPL } \textit{boolean}\end{array}\right]\right]$$

The MAJOR attribute includes the boolean features N and V, where nouns are [+N, –V], adjectives [+N, +V], verbs [–N, +V] and prepositions [–N, –V]. Besides, [+N] categories also have the features CASE, NUMBER and GENDER. Typical of functional complementation is that the functional head shares the MAJOR value of its complement (Netter 1994: 311–312).

(17) Functional Complementation: In a lexical category of type *func-cat* the value of its MAJOR attribute is token identical with the MAJOR value of its complement.

Since determiners are of type *func-cat*, they share the MAJOR value of their nominal complement and since that value is also shared with the DP (given the Head

Feature Principle), it follows that the resulting DP is [+N,–V] and that its CASE, NUMBER and GENDER values are identical to those of its nominal nonhead daughter. Nouns, by contrast, are not of type *func-cat* and, hence, do not share the MAJOR value of their complement. The noun *sister* in Figure 6, for instance, does not share the part-of-speech of its PP complement.

The MINOR attribute is used to model properties which a functional head does *not* share with its complement. It includes FCOMPL, a feature which registers whether a projection is functionally complete or not. Its value is positive for determiners, negative for singular count nouns and underspecified for plurals and mass nouns. Determiners take a nominal complement with a negative FCOMPL value, but their own FCOMPL value is positive and since they are the head, they share this value with the mother, as in Figure 7. In this analysis, a nominal is

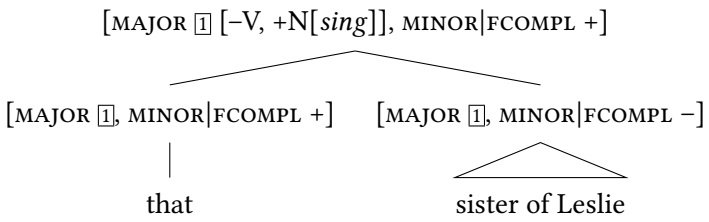

Figure 7: Propagation of the HEAD values

complete, if it is both saturated (empty COMPS list) and functionally complete (positive FCOMPL), as spelled out in (18) (Netter 1994: 312).

The MINOR features should be shared otherwise it is unclear why it is both + at the determiner and at the top node. Netter (1996: 136) shared the HEAD features along the head path. MINOR features are shared between det and NP via selection. Please change as adviced in earlier mail.

(18) Functional Completeness Constraint: Every maximal projection is marked as functionally complete in its MINOR feature.

2.2.2 Two problems for the DP treatment

Given the definition of functional complementation in (17) determiners share the MAJOR value of the nominals which they select and are, hence, nominal themselves, i.e. [+N, –V]. However, while this makes sense for determiners with (pro)nominal properties, such as the English demonstrative *that*, it is rather implausible for determiners with adjectival properties, such as the German inter-

rogative *welch-* 'which' and the Italian demonstrative *questo* 'this', which show the same variation for number, gender and case as the adjectives and which are subject to the same requirement on concord with the noun as the adnominal adjectives. Since such determiners have more in common with adjectives than with (pro)nouns, it would be more plausible to treat them as members of [+N, +V]. The problem also affects the associated agreement features, i.e. CASE, NUMBER and GENDER. If a determiner is required to share the values of these features with its nominal complement, as spelled out in (17), then we get implausible results for nominals in which the determiner and the noun do not show agreement. In the Dutch *'s lands hoogste bergen* 'the country's highest mountains', for instance, the selected nominal (*hoogste bergen*) is plural and non-genitive, while the selecting determiner (*'s lands*) is singular and genitive. The assumption that the latter shares the case and number of its nominal sister is, hence, problematic.

Another problem concerns the assumption "that all substantive categories will require the complement they combine with to be both saturated and functionally complete" (Netter 1994: 311). Complements of verbs and prepositions must, hence, be positively specified for FCOMPL.

this is not a problem

This, however, is contradicted by the existence of prepositions which require their complement to be functionally incomplete. The Dutch *te* and *per*, for instance, are not compatible with nominals that contain a determiner, also if the nominal is singular and count, as in *te (*het/een) paard* 'on horse' and *per (*de/een) trein* 'by train'. In this respect, they differ from most of the other Dutch prepositions, which require their nominal complement to have a determiner if it is singular and count, as in *ze viel van *(het) paard* 'she fell from *(the) horse' and *ze zit op *(de) trein naar Londen* 'she is on *(the) train to London'. This shows that there are prepositions which require their complement to be functionally complete, such as *van* and *op*, and prepositions which requitre it to be functionally incomplete, such as *per* and *te*. This distinction, though, cannot be made in an analysis that does not allow functionally incomplete complements.

2.3 The functor treatment

The functor treatment adopts the NP approach, but in contrast to the specifier treatment it does not model specification and adjunction in different terms, and it does not adopt the distinction between substantive (or lexical) categories and

functional categories.[11] The presentation in this section is mainly based on Van Eynde (2006) and Allegranza (2006). We first discuss the motivation which underlies the adoption of the functor treatment (Section 2.3.1) and then present its basic properties (Section 2.3.2). After that we turn to nominals with a phrasal specifier (Section 2.3.3) and to the hierarchy of MARKING values (Section 2.3.4).

2.3.1 Motivation

The distinction between specifiers and adjuncts is usually motivated by the assumption that the former are obligatory and non-stackable, while the latter are optional and stackable. In practice, though, this distinction is blurred by the fact that many nominals are well-formed without specifier. Bare plurals and singular mass nouns, for instance, are routinely used without specifier in English, and many other languages allow singular count nouns without specifier too. The claim that specifiers are obligatory is, hence, to be taken with a large pinch of salt. The same holds for their non-stackability. Italian possessives, for instance, are routinely preceded by an article, as in *il nostro futuro* 'the our future' and *un mio amico* 'a friend of mine'. The same holds for the Greek demonstratives, which are canonically preceded by the definite article. Also English has examples of this kind, as in *his every wish*.

Similar remarks apply to the distinction between lexical and functional categories. It plays a prominent role in the specifier and the DP treatment, both of which treat determiners as members of a separate functional category Det, that is distinct from such lexical categories as N, Adj and Adv. In practice, though, it turns out that the class of determiners is quite heterogeneous in terms of part-of speech. Van Eynde (2006), for instance, demonstrates that the Dutch determiners come in (at least) two kinds. On the one hand, there are those which show the same inflectional variation and the same concord with the noun as the prenominal adjectives: they take the affix *-e* in combination with plural and singular non-neuter nominals, but not in combination with singular neuter nominals, as shown for the adjective *zwart* in (19), for the possessive determiner *ons* 'our' in (20) and for the interrogative determiner *welk* 'which' in (21).[12]

[11] The term *functor* is also used in Categorial (Unification) Grammar, where it has a very broad meaning, subsuming the nonhead daughter in combinations of a head with a specifier or an adjunct, and the head daughter otherwise, see Bouma (1988). This broad notion is also adopted in Reape (1994). We adopt a more restrictive version in which functors are nonhead daughters which lexically select their head sister.

[12] If the adjective is preceded by a definite determiner, it also takes the affix in singular neuter nominals. This phenomenon is treated in Section 2.3.4.

(19) a. zwarte muren
black wall.PL

b. zwarte verf
black paint.SG.FEM

c. zwart zand
black sand.SG.NEU

(20) a. onze ouders
our parent.PL

b. onze muur
our wall.SG.MAS

c. ons huis
our house.SG.NEU

(21) a. welke boeken
which book.PL

b. welke man
which man.SG.MAS

c. welk boek
which book.SG.NEU

On the other hand, there are determiners which are inflectionally invariant and which do do not show concord with the noun, such as the interrogative *wiens* 'whose' and the quantifying *wat* 'some'.

(22) a. wiens ouders
whose parent.PL

b. wiens muur
whose wall.SG.MAS

c. wiens huis
whose house.SG.NEU

(23) a. wat boeken
some book.PL

b. wat verf
some paint.SG.FEM

c. wat zand
some sand.SG.NEU

In that respect, they are like nouns that appear in prenominal position, as in *aluminium tafels* 'aluminium tables' and *de maximum lengte* 'the maximum length'. There are, hence, determiners with adjectival properties and determiners with nominal properties. The distinction is also relevant for other languages. The Italian possessives of the first and second person, for instance, show the same alternation for number and gender as the adjectives and are subject to the same constraints on NP-internal concord, as illustrated for *nostro* 'our' in (24).

(24) a. il nostro futuro
the our future.SG.MAS

b. la nostra scuola
the our school.SG.FEM

c. i nostri genitori
the our parent.PL.MAS

d. le nostre scatole
the our box.PL.FEM

By contrast, the possessive of the third person plural, *loro* 'their', does not show any inflectional variation and does not show concord with the noun.

(25) a. il loro futuro
the their future.SG.MAS

b. la loro scuola
the their school.SG.FEM

c. i loro genitori
the their parent.PL.MAS

d. le loro scatole
the their box.PL.FEM

Confirming evidence for the distinction is provided by the fact that *loro* is also used as a personal pronoun, whereas the other possessive determiners are not.

(26) Enrico ha dato una scatola a loro/*nostro.
Enrico has given a box to them/*our
'Enrico gave them a box.'

In this context one has to use the pronoun *noi* 'us' instead. Besides, there are determiners with adverbial properties. Abeillé et al. (2004), for instance, assign adverbial status to the quantifying determiner in the French *beaucoup de farine*

'much flour', and the same could be argued to be plausible for such determiners as the English *enough* and its Dutch equivalent *genoeg*. In sum, there is evidence that the class of determiners is categorially heterogeneous and that a treatment which acknowledges this is potentially simpler and less stipulative than one which introduces a separate functional category for them.

2.3.2 Basics

Technically, the elimination of the distinction between specifiers and adjuncts implies that the SPR feature is dropped.[13] Likewise, the elimination of the distinction between lexical and functional categories implies that there is no longer any need for separate selection features for them; MOD(IFIED) and SPEC(IFIED) are dropped and replaced by the more general SELECT.

To spell out the functor treatment in more detail we start from the hierarchy of headed phrases in Figure 8. The basic distinction is that between *head-argument-phrase* and *head-nonargument-phrase*. In the former the head daughter selects its nonhead sister(s) by means of valence features, such as COMPS and SUBJ (but not SPR!), and it is their values that register the degree of saturation of the phrase, as shown for COMPS in Section 2.1.1. In head-nonargument phrases the degree of saturation is registered by the MARKING feature. It is declared for objects of type *category*, along with the HEAD and valence features.[14] Its value is shared with the head daughter in head-argument phrases and with the nonhead daughter in head-nonargument phrases, as spelled out in (27) and (28) respectively.

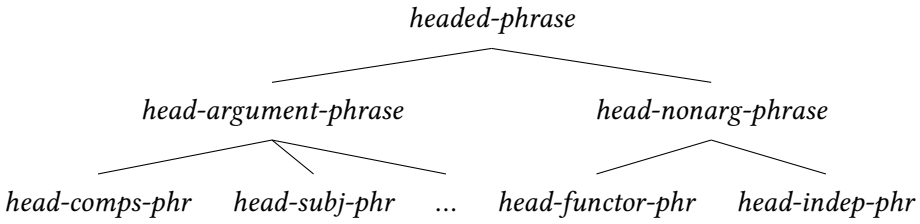

Figure 8: Hierarchy of headed phrases

[13] Intriguingly, Noam Chomsky has recently argued that there is no need for the notion of specifier in Transformational Grammar: "There is a large and instructive literature on problems with Specifiers, but if the reasoning here is correct, they do not exist and the problems are unformulable." Chomsky (2013: 43).

[14] The MARKING feature is introduced in Pollard & Sag (1994: 46) to model the combination of a complementizer and a clause.

(27) *head-argument-phrase* ⇒ $\begin{bmatrix} \text{SYNSEM|LOC|CATEGORY|MARKING } \boxed{1}\ \textit{marking} \\ \text{HEAD-DTR|SYNSEM|LOC|CATEGORY|MARKING } \boxed{1} \end{bmatrix}$

(28) *head-nonarg-phrase* ⇒ $\begin{bmatrix} \text{SYNSEM|LOC|CATEGORY|MARKING } \boxed{1}\ \textit{marking} \\ \text{DTRS} \left\langle \left[\text{SYNSEM|LOC|CATEGORY|MARKING } \boxed{1} \right], \boxed{2} \right\rangle \\ \text{HEAD-DTR } \boxed{2} \end{bmatrix}$

At a finer-grained level there is a distinction between two subtypes of *head-nonargument-phrase*. There is the type, called *head-functor-phrase*, in which the non-head daughter selects its head sister. This selection is modeled by the SELECT feature. Its value is an object of type *synsem* and is required to match the SYNSEM value of the head daughter, as spelled out in (29).

(29) *head-functor-phrase* ⇒ $\begin{bmatrix} \text{DTRS} \left\langle \left[\text{SYNSEM|LOC|CATEGORY|HEAD|SELECT } \boxed{1} \right], \boxed{2} \right\rangle \\ \text{HEAD-DTR } \boxed{2} \left[\text{SYNSEM } \boxed{1} \right] \end{bmatrix}$

The other subtype, called *head-independent-phrase*, subsumes combinations in which the nonhead daughter does not select its head sister.[15] In that case the SELECT value of the nonhead daughter is of type *none*, as spelled out in (30).

(30) *head-independent-phrase* ⇒
$\begin{bmatrix} \text{DTRS} \left\langle \left[\text{SYNSEM|LOC|CATEGORY|HEAD|SELECT } \textit{none} \right], \boxed{1} \right\rangle \\ \text{HEAD-DTR } \boxed{1} \end{bmatrix}$

An illustration of the functor treatment is given in Figure 9.

add a more telling title. What is the functor?

The combination of the noun with the adjective is an instance of *head-functor-phrase*, in which the adjective selects an unmarked nominal ($\boxed{3}$), shares its MARKING value ($\boxed{5}$), and, being a non-argument, shares it with the mother as well. The combination of the resulting nominal with the demonstrative is also an instance of *head-functor-phrase*, in which the demonstrative selects an unmarked nominal ($\boxed{4}$), but – differently from the adjective – its MARKING value is of type *marked*, and this value is shared with the mother ($\boxed{2}$). This accounts for the ill-formedness of **long that bridge* and **the that bridge*, since adnominal adjectives and articles are not compatible with a marked nominal. Whether an adnominal functor is marked or unmarked is subject to cross-linguistic variation. The Italian possessives, for instance, are unmarked and can, hence, be preceded by an article, as

[15] This type is introduced in Van Eynde (1998: 130). It will be used in Section 3 to deal with idiosyncratic nominals, such as the Big Mess Construction and the Binominal Noun Phrase Construction.

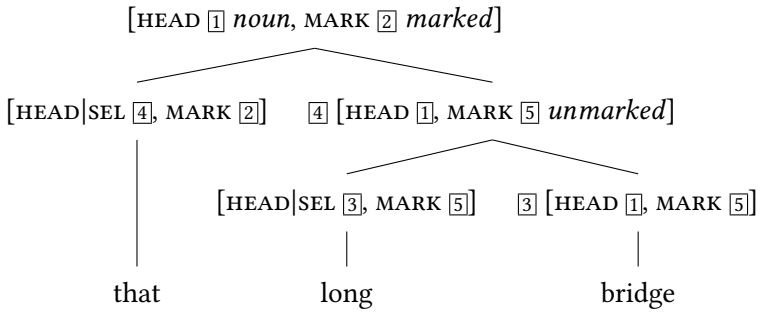

Figure 9: Adnominal functors

in *il mio cane* 'the my dog', but their French equivalents are marked: *(*le) mon chien* '(*the) my dog'.

In this treatment, determiners, understood as words that are in complementary distribution with the articles, are marked selectors of an unmarked nominal. Since this definition does not make reference to a specific part of speech, it is well equipped to deal with the categorial heterogeneity of the determiners. The English demonstrative *that*, for instance, can be treated as a pronoun, not only when it is used in nominal position, as in *I like that*, but also when it is used adnominally, as in *I like that bike*. What captures the difference between these uses is not the part-of-speech but the SELECT value: while the adnominal *that* selects an unmarked nominal, its nominal counterpart does not select anything.

2.3.3 Nominals with a phrasal functor

To illustrate how the treatment deals with phrasal functors we take the nominal *a hundred pages*. Since the indefinite article is not compatible with a plural noun like *pages* we assume that this phrase has a left branching structure in which the indefinite article selects the unmarked singular noun *hundred* – its plural counterpart is *hundreds* – and in which the resulting NP selects the unmarked plural noun *pages*, as spelled out in Figure 10.

The HEAD value of the entire NP is identified with that of *pages* (1), which accounts a.o. for the fact that it is plural: *a hundred pages are/*is missing*. Its MARKING value is identified with that of *a hundred* (2). The latter selects an unmarked plural nominal (3) and since it is itself a head-functor-phrase, its HEAD value is shared with that of the numeral *hundred* (4) and its MARKING value with that of the article (2). Moreover, the latter selects an unmarked singular nominal (5).

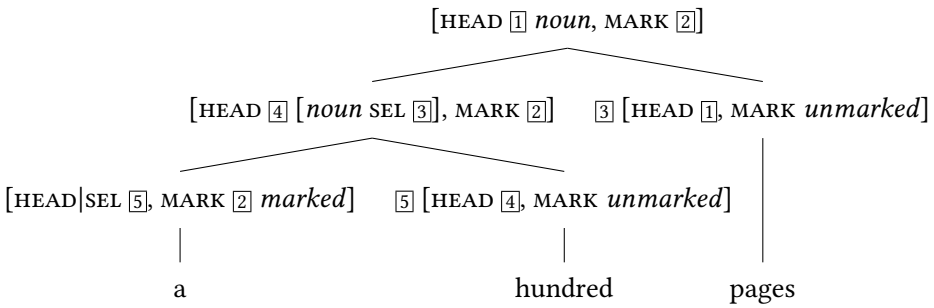

Figure 10: Phrasal functors

This treatment provides an account for the difference between the well-formed *those two hundred pages* and the ill-formed **those a hundred pages*. The former is licensed since numerals like *two* and *hundred* are unmarked, while the latter is not, since the article is marked and since it shares that value with *a hundred pages*.

2.3.4 The hierarchy of MARKING values

The distinction between marked and unmarked nominals in the functor treatment largely coincides with the distinction between nominals with an empty and a non-empty SPR value in the specifier treatment. However, while the latter simply captures the difference between nominals with and without determiner, the former can be used to capture finer-grained distinctions. To illustrate the need for such finer-grained distinctions let us take another look at the attributive adjectives of Dutch. As already pointed out in Section 2.3.2, they take the form without affix in singular neuter nominals, as in *zwart zand* 'black sand'. A complication, though, is that they canonically take the form with the affix if the nominal is introduced by a definite determiner, as in *het zwarte zand* 'the black sand'. This has consequences for the status of nominals with a singular neuter head: *zwart zand* and **zwarte zand*, for instance, are both unmarked, but while the former is well-formed as it is, the latter is only well-formed if it is preceded by a definite determiner. To model this Van Eynde (2006) differentiates between two types of *unmarked* nominals, as shown in Figure 11.

Employing the more specific subtypes, the adjectives without affix which select a singular neuter nominal have the MARKING value *bare*, while their declined counterparts which select a singular neuter nominal have the value *incomplete*. Since this MARKING value is shared with the mother, the MARKING value of *zwart*

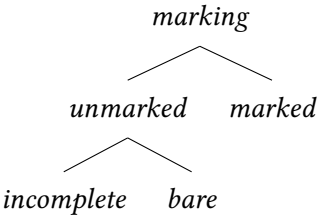

Figure 11: Hierarchy of MARKING values

zand is *bare*, while that of **zwarte zand* is *incomplete*. The fact that the latter must be preceded by a definite determiner is modeled in the SELECT value of the determiner: while definite determiners select an unmarked nominal, which implies that they are compatible with both bare and incomplete nominals, non-definite determiners select a bare nominal and are, hence, not compatible with an incomplete one, as in **een zwarte huis* 'a black house'. The MARKING feature is, hence, useful to differentiate bare nominals from incomplete nominals.

In a similar way, one can make finer-grained distinctions in the hierarchy of *marked* values to capture co-occurrence restrictions between determiners and nominals, as in the functor treatment of the Italian determiner system of Allegranza (2006). See also the treatment of nominals with idiosyncratic properties in Section 3.

2.4 Conclusion

This section has presented the three main treatments of nominal structures in HPSG. They are all surface-oriented and monostratal, and they are very similar in their treatment of the semantics of the nominals. The differences mainly concern the treatment of the determiners and the adjuncts. In terms of the dichotomy between NP and DP approaches, the specifier and the functor treatment side with the former, while the DP treatment sides with the latter. Overall, the NP treatments turn out to be more amenable to integration in a monostratal surface-oriented framework than the DP treatment, see also Müller (2020a). Of the two NP treatments the specifier treatment is closer to early versions of X-bar theory and GPSG. The functor treatment is closer to versions of Categorial (Unification) Grammar, and has also been adopted in Sign-Based Construction Grammar (Sag 2012: 155–157).

3 Idiosyncratic nominals

This section focusses on the analysis of nominals with idiosyncratic properties. Since their analysis often requires a relaxation of the strictly lexicalist approach of early HPSG, we first introduce some basic notions of Constructional HPSG (Section 3.1). Then we present analyses of nominals with a verbal core (Section 3.2), of the Big Mess Construction (Section 3.3) and of idiosyncratic [P + Nom] combinations (Section 3.4). Finally, we provide pointers to analyses of other nominals with idiosyncratic properties (Section 3.5).

3.1 Constructional HPSG

The lexicalist approach of early HPSG can be characterized as one in which the properties of phrases are mainly determined by properties of the constituent words and only to a small extent by properties of the combinatory operations. Pollard & Sag (1994: 391), for instance, employ no more than seven types of combinations, including those which were exemplified in Section 2.1.1, i.e. head-complements, head-adjunct and head-specifier.[16] Over time, though, the radical lexicalism gave way to an approach in which the properties of the combinatory operations play a larger role. The small inventory of highly abstract phrase types got replaced by a finer-grained hierarchy in which the types contain more specific and – if need be – idiosyncratic constraints. This development started in Sag (1997), was elaborated in Ginzburg & Sag (2000), and gained momentum afterward. Characteristic of Constructional HPSG is the use of a bidimensional hierarchy of phrasal signs. In such a hierarchy the phrases are not only partitioned in terms of HEADEDNESS, but also in terms of a second dimension, called CLAUSALITY, as in Figure 12.

The types in the CLAUSALITY dimension are associated with constraints, in much the same way as the types in the HEADEDNESS dimension. Clauses, for instance, are required to denote an object of type *message* (Ginzburg & Sag 2000: 41).

(31) *clause* ⇒ [SYNSEM|LOC|CONTENT *message*]

At a finer-grained level, the clauses are partitioned into declarative, interrogative, imperative, exclamative and relative clauses, each with their own constraints. Interrogative clauses, for instance, have a CONTENT value of type *question*, which

[16] The remaining four are head-subject, head-subject-complements, head-marker and head-filler.

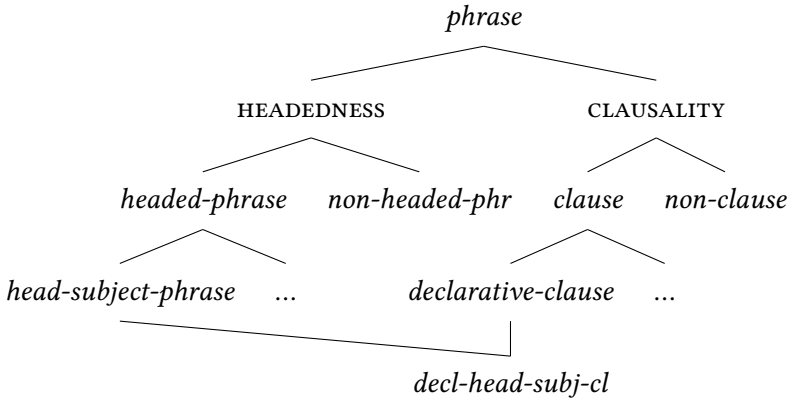

Figure 12: Bidimensional hierarchy of clauses

is a subtype of *message*, and indicative declarative clauses have a CONTENT value of type *proposition*, which is another subtype of *message*.

Exploiting the possibilities of multiple inheritance one can define types which inherit properties from more than one supertype. The type *declarative-head-subject-clause*, for instance, inherits the properties of *head-subject-phrase*, on the one hand, and *declarative-clause*, on the other hand. Besides, it may have properties of its own, such as the fact that its head daughter is a finite verb (Ginzburg & Sag 2000: 43). This combination of multiple inheritance and specific constraints on maximal phrase types is also useful for the analysis of nominals with idiosyncratic properties, as will be shown in Sections 3.2 and 3.3.

3.2 Nominals with a verbal core

Ordinary nominals have a nominal core, but there are also nominals with a verbal core, such as gerunds and nominalized infinitives. They are of special interest, since they figure prominently in the argumentation that triggered the shift from the NP approach to the DP approach in Transformational Grammar. Some examples of gerunds are given in (32)–(34), quoted from Quirk et al. (1985: 1290).

(32) [Brown's deftly painting his daughter] is a delight to watch.

(33) I dislike [Brown painting his daughter].

(34) Brown is well known for [painting his daughter].

The bracketed phrases have the external distribution of an NP, taking the subject

position in (32), the complement position of a transitive verb in (33) and the complement position of a preposition in (34). The internal structure of these phrases, though, shows a mixture of nominal and verbal characteristics. Typically verbal are the presence of an NP complement in (32)–(34), of an adverbial modifier in (32) and of an accusative subject in (33). Typically nominal is the presence of the possessive in (32).

To model this mixture of nominal and verbal properties (Malouf 2000: 65) develops an analysis along the lines of the specifier treatment, in which the hierarchy of part-of-speech values is given more internal structure, as in Figure 13. Instead of treating *noun*, *verb*, *adjective* etc. as immediate subtypes of *part-of-*

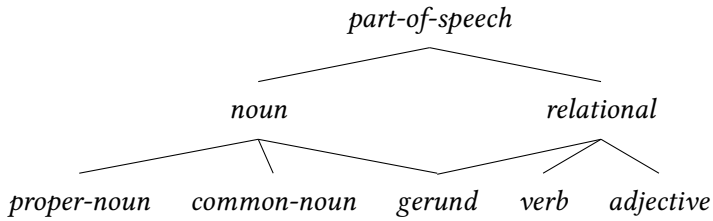

Figure 13: The gerund as a mixed category

speech, they are grouped in terms of intermediate types, such as *relational*, which subsumes a.o. verbs and adjectives, they are partitioned in terms of subtypes, such as *proper-noun* and *common-noun*, and they are extended with types that inherit properties of more than one supertype, such as *gerund*, which is a subtype of both *noun* and *relational*. Beside the inherited properties the gerund has some properties of its own. These are spelled out in a lexical rule which derives gerunds from the homophonous present participles (Malouf 2000: 66).

(35)
$$\begin{bmatrix} \textsc{head} & \begin{bmatrix} \textit{verb} \\ \textsc{vform}\ \textit{prp} \end{bmatrix} \\ \textsc{subj} & \langle \boxed{1}\ \textsc{np} \rangle \\ \textsc{comps} & \boxed{A} \\ \textsc{spr} & \langle\rangle \end{bmatrix} \Rightarrow \begin{bmatrix} \textsc{head} & \textit{gerund} \\ \textsc{subj} & \langle \boxed{1} \rangle \\ \textsc{comps} & \boxed{A} \\ \textsc{spr} & \langle \boxed{1} \rangle \end{bmatrix}$$

This rule says that gerunds take the same complements as the present participles from which they are derived ($\boxed{A}$).[17] Their compatibility with adverbial modifiers follows from the fact that adverbs typically modify objects of type *relational*,

[17] Boxed Roman capitals stand for objects of type *list*, as in Ginzburg & Sag (2000) and Sag et al. (2003).

which is a supertype of *gerund*. The availability of different options for realizing the subject is captured by the inclusion of the subject requirement of the present participle in both the SUBJ list and the SPR list of the gerund (1). To model the two options Malouf (2000: 15) employs the bidimensional hierarchy of phrase types in Figure 14.

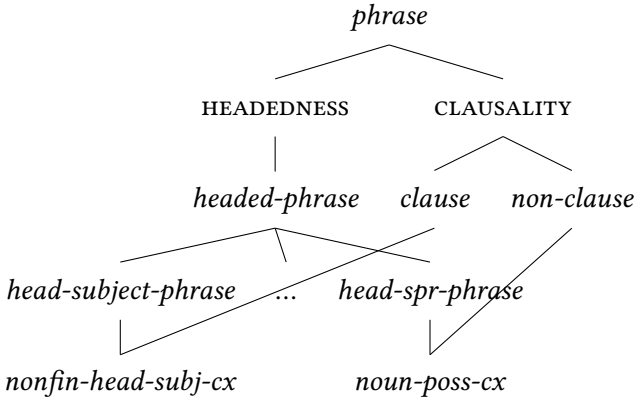

Figure 14: Bidimensional hierarchy of gerundial phrases

The combination with an accusative subject is subsumed by *nonfin-head-subj-cx*, which is a subtype of *head-subject-phrase* and *clause*. Its defining properties are spelled out in (36) (Malouf 2000: 16).

head-dtr structure sharing inherited? hence redundant?

(36) *nonfin-head-subj-cx* ⇒
$$\begin{bmatrix} \text{SYNSEM|LOC|CATEGORY|HEAD|ROOT} - \\ \text{DTRS}\left\langle \left[\text{SYNSEM|LOC|CATEGORY|HEAD} \begin{bmatrix} \textit{noun} \\ \text{CASE } \textit{acc} \end{bmatrix} \right], \boxed{1} \right\rangle \\ \text{HEAD-DTR } \boxed{1} \end{bmatrix}$$

This construction type subsumes combinations of a non-finite head with an accusative subject, as in (33). When the non-finite head is a gerund, the HEAD value of the resulting clause is *gerund* and since that is a subtype of *noun*, the clause is also a nominal phrase. This accounts for the fact that its external distribution is that of an NP. By contrast, the combination with a possessive subject is subsumed by *noun-poss-cx*, which is a subtype of *head-specifier-phrase* and *non-clause* (Malouf 2000: 16).[18]

head-dtr structure sharing inherited? hence redundant?

[18] Malouf treats the English possessive as a genitive, differently from Sag et al. (2003).

(37) *noun-poss-cx* ⇒
$$\begin{bmatrix} \textsc{synsem|loc} \begin{bmatrix} \textsc{category|head}\ \textit{noun} \\ \textsc{content}\ \textit{scope-object} \end{bmatrix} \\ \textsc{dtrs} \left\langle \left[\textsc{synsem|loc|category|head} \begin{bmatrix} \textit{noun} \\ \textsc{case}\ \textit{gen} \end{bmatrix} \right], \boxed{1} \right\rangle \\ \textsc{head-dtr}\ \boxed{1} \end{bmatrix}$$

This construction subsumes combinations of a nominal and a possessive specifier, as in *Brown's house*, and since *noun* is a supertype of *gerund*, it also subsumes combinations with the gerund, as in (32).

In sum, Malouf's analysis of the gerund involves a reorganization of the part-of-speech hierarchy, a lexical rule and the addition of two construction types.

3.3 The Big Mess Construction

In ordinary nominals determiners precede attributive adjectives. Changing the order yields ill-formed combinations, such as **long that bridge* and **very tall every man*. However, this otherwise illegitimate order is precisely what we find in the Big Mess Construction (BMC), a term coined by Berman (1974).

(38) a. It's [so good a bargain] I can't resist buying it.
b. [How serious a problem] is this?

The idiosyncratic order in (38) is required if the nominal is introduced by the indefinite article, and if the preceding AP is introduced by one of a small set of degree markers, including *so, as, how, this, that* and *too*.

3.3.1 A specifier treatment

A specifier treatment of the BMC is provided in Ginzburg & Sag (2000: 201). It adopts a left branching structure, as in [[[*so good*] *a*] *bargain*], in which *so good* is the specifier of the indefinite article and in which *so good a* is the specifier of *bargain*. This is comparable to the treatment of the possessive in [[[*the Queen of England*] *'s*] *sister*] in Section 2.1.3. However, while there is evidence that *the Queen of England's* is a constituent, since it may occur independently, as in (39), there is no evidence that *so good a* is a constituent, as shown in (40).

(39) This crown is [the Queen of England's].

(40) That bargain is [so good (*a)].

Instead, there is evidence that the article forms a constituent with the following noun, since it also precedes the noun when the AP is in postnominal position, as in (41).

(41) We never had [a bargain] [so good as this one].

It is, hence, preferable to assign a structure in which the AP and the NP are sisters, as in [[*so good*] [*a bargain*]].

3.3.2 A functor treatment

A structure in which the AP and the NP are sisters is adopted in Van Eynde (2007), Kim & Sells (2011), Kay & Sag (2012), Arnold & Sadler (2014) and Van Eynde (2018), all of which are functor treatments. They also share the assumption that the combination is an NP and that its head daughter is the lower NP. The structure of the latter is spelled out in Figure 15. The article has a MARKING value

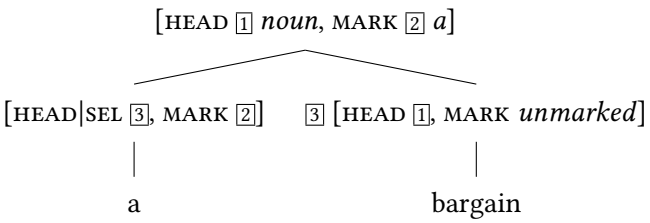

Figure 15: The lower NP

of type *a* which is a subtype of *marked* and which it shares with the mother.[19]

The AP is also treated as an instance of the head-functor type in Van Eynde (2007), Kim & Sells (2011) and Van Eynde (2018). The adverb has a MARKING value of type *marked*, so that the AP is marked as well, as shown in Figure 16. In combination with the fact that the article selects an unmarked nominal, this accounts for the ill-formedness of (42).

(42) a. * It's a so good bargain I can't resist buying it.
b. * A how serious problem is it?

By contrast, adverbs like *very* and *extremely* are unmarked, so that the APs which they introduce are admissible in this position, as in (43).

[19] The MARKING value of the article looks similar to its PHONOLOGY value, but it is not the same. The PHONOLOGY values of *a* and *an*, for instance, are different, but their MARKING value is not.

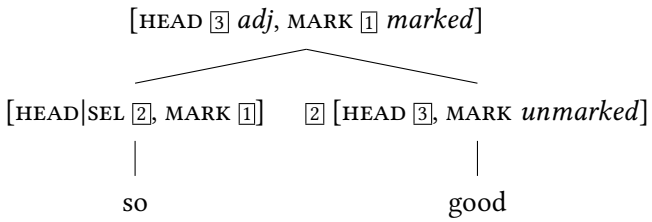

Figure 16: The marked AP

(43) a. This is a very serious problem.
b. We struck an extremely good bargain.

To model the combination of the AP with the lower NP it may at first seem plausible to treat the AP as a functor which selects an NP that is introduced by the indefinite article. This, however, has unwanted consequences: given that SELECT is a HEAD feature, its value is shared between the AP and the adjective, so that the latter has the same SELECT value as the AP, erroneously licensing such combinations as **good a bargain*. To avoid this Van Eynde (2018) models the combination in terms of a special type of phrase, called *big-mess-phrase*, whose place in the hierarchy of phrase types is defined in Figure 17.

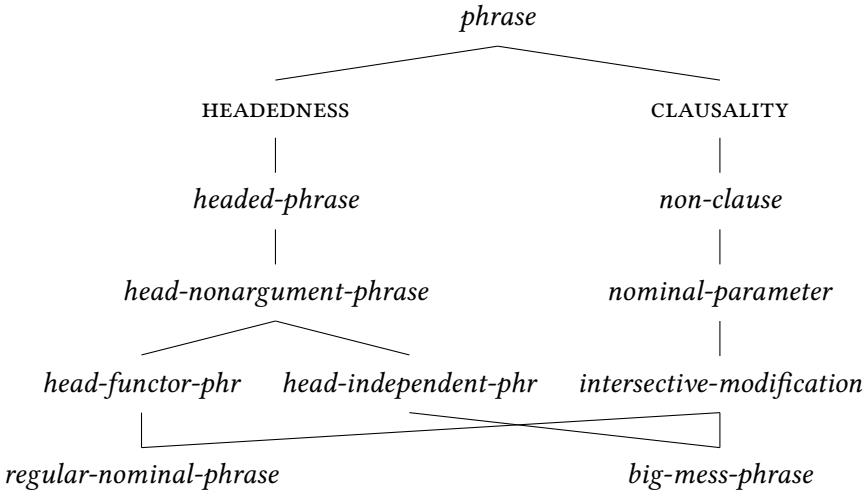

Figure 17: Bidimensional hierarchy of nominals

The types in the HEADEDNESS dimension are a subset of those in Figure 8.

The types in the CLAUSALITY dimension mainly capture semantic and category-specific properties, in analogy with the hierarchy of clausal phrases in Ginzburg & Sag (2000). One of the non-clausal phrase types is *nominal-parameter*:

(44) *nominal-parameter* ⇒
$$\begin{bmatrix} \text{SYNSEM|LOC} \begin{bmatrix} \text{CATEGORY|HEAD } \textit{noun} \\ \text{CONTENT} \begin{bmatrix} \textit{parameter} \\ \text{INDEX } \boxed{1} \\ \text{RESTR } \boxed{\Sigma_1} \cup \boxed{\Sigma_2} \end{bmatrix} \end{bmatrix} \\ \text{DTRS} \left\langle \left[\text{SYNSEM|LOC|CONTENT|RESTR } \boxed{\Sigma_1} \right], \boxed{2} \right\rangle \\ \text{HEAD-DTR } \boxed{2} \begin{bmatrix} \text{SYNSEM|LOC|CONTENT} \begin{bmatrix} \textit{parameter} \\ \text{INDEX } \boxed{1} \\ \text{RESTR } \boxed{\Sigma_2} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The mother shares its index with the head daughter (1) and its RESTR(ICTION) value is the union of the RESTR values of the daughters (Σ_1) and (Σ_2). In the hierarchy of non-clausal phrases, this type contrasts amongst others with the quantified nominals, which have a CONTENT value of type *quant-rel* (Ginzburg & Sag 2000: 203–205). A subtype of *nominal-parameter* is *intersective-modification*, as defined in (45).

since intersective-mod is a subtype of nominal-parameter, you do not have to mention head-dtr at all

(45) *intersective-modification* ⇒
$$\begin{bmatrix} \text{SYNSEM|LOC|CONTENT|INDEX } \boxed{1} \\ \text{DTRS} \left\langle \left[\text{SYNSEM|LOC|CONTENT|INDEX } \boxed{1} \right], \boxed{2} \right\rangle \\ \text{HEAD-DTR } \boxed{2} \end{bmatrix}$$

This constraint requires the mother to share its index also with the nonhead daughter. It captures the intuition that the noun and its nonhead sister apply to the same entities, as in the case of *red box*.[20]

Maximal types inherit properties of one of the types of headed phrases, on the one hand, and of one of the non-clausal phrase types, on the other hand. Regular nominal phrases, for instance, such as *red box*, are subsumed by a type, called *regular-nominal-phrase*, that inherits the constraints of *head-functor-phrase*, on the one hand, and *intersective-modification*, on the other hand. Another maximal type is *big-mess-phrase*. Its immediate supertype in the CLAUSALITY hierarchy is the same as for the regular nominal phrases, i.e. *intersective-modification*, but the one in the HEADEDNESS hierarchy is different: being a subtype of *head-independent-phrase*, its nonhead daughter does not select the head daughter. Its

[20] Another subtype of *nominal-parameter* is *inverted-predication*, which subsumes amongst others the Binominal Noun Phrase Construction and certain types of apposition, see Section 3.5.

SELECT value is, hence, of type *none*. Beside the inherited properties the BMC has some properties of its own. They are spelled out in (46).

If this is the definition, the structure sharing is redundant since it is inherited from the supertype. You should at least add a footnote saying that this structure sharing does not have to be given but is here for explanatory purposes only.

(46) *big-mess-phr* ⇒

$$\left[\begin{array}{l} \textsc{dtrs}\left\langle \left[\begin{array}{ll} \textit{head-functor-phrase} & \\ \textsc{synsem|loc|category} & \left[\begin{array}{ll} \textsc{head} & \textit{adjective} \\ \textsc{marking} & \textit{marked} \end{array}\right] \end{array}\right], \boxed{1} \right\rangle \\ \textsc{head-dtr}\ \boxed{1}\left[\begin{array}{ll} \textit{regular-nominal-phrase} & \\ \textsc{synsem|loc|category|marking} & a \end{array}\right] \end{array}\right]$$

The head daughter is required to be a regular nominal phrase whose MARKING value is of type *a*, and the nonhead daughter is required to be an adjectival head-functor phrase with a MARKING value of type *marked*. This licenses APs which are introduced by a marked adverb, as in *so good a bargain* and *how serious a problem*, while it excludes unmarked APs, as in **good a bargain* and **very big a house*. Iterative application is not licensed, since (46) requires the head daughter to be of type *regular-nominal-phrase*, which is incompatible with the type *big-mess-phrase*. This accounts for the fact that a big mess phrase cannot contain another big mess phrase, as in **that splendid so good a bargain*.

A reviewer remarked that this analysis allows combinations like *so big a red expensive house*, suggesting that it should not. We are not sure, though, that this combination is ill-formed. Notice, for instance, that the sentences in (47), quoted from Zwicky (1995: 116) and Troseth (2009: 42) respectively, are well-formed.

(47) a. How big a new shrub from France were you thinking of buying?
b. That's as beautiful a little black dress as I've ever seen.

In sum, the analysis of the Big Mess Phrase involves the addition of a type to the bidimensional hierarchy of phrase types, whose properties are partly inherited from its supertypes and partly idiosyncratic.

3.4 Idiosyncratic P+NOM combinations

When an ordinary nominal combines with a preposition, the result is a PP. The French *de* 'of', for instance, heads a PP in *je viens de Roubaix* 'I come from Roubaix'. In *beaucoup de farine* 'much flour', by contrast, *de* has a rather different role, as argued in Abeillé et al. (2004). Similar contrasts can be found in other languages. The English *of*, for instance, heads a PP in *the dog of the neighbors*, but its role in *these sort of problems* is rather different, as argued in Maekawa (2015).

3.4.1 A specifier treatment

In their specifier treatment of *beaucoup de farine* 'much flour' Abeillé et al. (2004) treat *de* as a weak head. Typical of a weak head is that it shares nearly all properties of its complement, as spelled out in (48).

(48)
$$\left[\begin{array}{ll}\textsc{category} & \left[\begin{array}{ll}\textsc{head} & \boxed{1}\\ \textsc{subj} & \boxed{A}\\ \textsc{spr} & \boxed{B}\\ \textsc{comps} & \left\langle\left[\begin{array}{ll}\textsc{category} & \left[\begin{array}{ll}\textsc{head} & \boxed{1}\\ \textsc{subj} & \boxed{A}\\ \textsc{spr} & \boxed{B}\\ \textsc{comps} & \langle\rangle\\ \textsc{marking} & \textit{unmarked}\end{array}\right]\\ \textsc{content} & \boxed{4}\end{array}\right]\right\rangle\\ \textsc{marking} & \textit{de}\end{array}\right]\\ \textsc{content} & \boxed{4}\end{array}\right]$$

de has the same values for HEAD, SUBJ, SPR and CONTENT as its nominal complement. The only difference concerns the MARKING value: *de* requires an unmarked complement, but its own MARKING value is of type *de*. Since it shares this MARKING value with the mother, the latter is compatible with specifiers that require a nominal that is introduced by *de*, such as *beaucoup* 'much'/'many', whose AVM is given in (49).[21]

(49)
$$\left[\begin{array}{ll}\textsc{category}|\textsc{head} & \left[\begin{array}{ll}\textit{adverb}\\ \textsc{spec}|\textsc{loc} & \left[\begin{array}{ll}\textsc{category} & \left[\begin{array}{ll}\textsc{head} & \textit{noun}\\ \textsc{spr} & \langle \mathrm{X}\rangle\\ \textsc{marking} & \textit{de}\end{array}\right]\\ \textsc{content} & \left[\begin{array}{ll}\textsc{index} & \boxed{1}\\ \textsc{restr} & \boxed{\Sigma}\end{array}\right]\end{array}\right]\end{array}\right]\\ \textsc{content} & \boxed{2}\left[\begin{array}{ll}\textit{beaucoup-rel}\\ \textsc{index} & \boxed{1}\\ \textsc{restr} & \boxed{\Sigma}\end{array}\right]\\ \textsc{store} & \{\boxed{2}\}\end{array}\right]$$

The selected nominal is required to be unsaturated for SPR and to have a MARKING value of type *de*. The determiner itself is treated as an adverb that shares the index and the restrictions of its nominal head sister. Conversely, the latter also

[21] In this AVM, quoted from Abeillé et al. (2004: 18), the value of SPEC is of type *synsem*, as in Pollard & Sag (1994), and not of type *semantic-object*, as in Ginzburg & Sag (2000).

selects its specifier via its SPR value, following the mutual selection regime of the specifier treatment, see Section 2.1.2.

Technically, there is a similarity between the weak head treatment and the definition of functional complementation in Netter (1994), see Section 2.2.1. In both cases the head, whether weak or functional, inherits the properties of its complement, except for those that are captured by a special feature, such as MARKING or MINOR. There are also differences, of course, for while Netter (1994) applies the functional head analysis to the determiners, Abeillé et al. (2004) apply the weak head analysis to *de*, but not to *beaucoup*. That is why the former is an instance of the DP approach and the latter of the NP approach.

3.4.2 A functor treatment

In a functor treatment of *beaucoup de farine* 'much flour' both *de* and *beaucoup* are functors. The former selects a nominal of type *bare* and has a MARKING value of *de* which it shares with the mother. The latter selects a nominal with the MARKING value *de* and has a MARKING value of type *marked* which it shares with the NP as a whole, as spelled out in Figure 18.

add glosses to de in figure

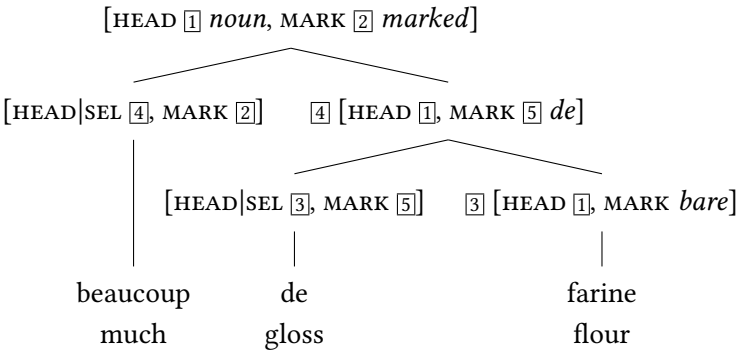

Figure 18: A prepositional functor

Since the noun is the head daughter of *de farine*, the latter's part-of-speech, valence and meaning are shared directly with *farine*, rather than via the AVM of *de*, as in the weak head treatment.

Comparing the functor treatment with the weak head specifier treatment, a major difference concerns the status of *de*. In the former it is unifomly treated as a semantically vacuous preposition; in the latter it shares the part-of-speech and

CONTENT value of its complement, so that it is a noun with a CONTENT value of type *scope-object* in *beaucoup de farine* and a verb with a CONTENT value of type *state-of-affairs* in (50), where it takes an infinitival VP as its complement.

(50) De sortir un peu te ferait du bien.
to go.out a bit you would.do good
'Going out a bit would do you some good.'

In some cases, this sharing leads to analyses that are empirically implausible. An example is discussed in Maekawa (2015), who provides an analysis of English nominals of the *kind/type/sort* variety. A typical property of these nominals is that the determiner may show agreement with the rightmost noun, as in *these sort of problems* and *those kind of pitch changes*, rather than with the noun that it immediately precedes. To model this Maekawa considers the option of treating *of* and the immediately preceding noun as weak heads, but dismisses it, since it has the unwanted effect of treating *kind/type/sort* as plural. As an alternative, he develops an analysis in which *of* and the preceding noun are functors (Maekawa 2015: 149). This yields a plural nominal, but without the side-effect of treating *kind/type/sort* as plural.

3.5 Other nominals with idiosyncratic properties

There are many more types of nominals with idiosyncratic properties, but the alotted time and space are not sufficient to provide a full survey here. Instead, we mention some that have been analyzed in HPSG terms and add pointers to the relevant literature.

Comparable to the nominals with a verbal core, such as gerunds and nominalized infinitives, are nominals with an adjectival core, as in *the very poor* and *the merely skeptical*. They are described and provided with an HPSG analysis in Arnold & Spencer (2015).

A much studied nominal with idiosyncratic properties is the Binominal Noun Phrase Construction (BNPC), exemplified in (51).

(51) a. She blames it on [her nitwit of a husband].
b. She had [a skullcracker of a headache].

In contrast to ordinary [NP–*of*–NP] sequences, as in *an employee of a Japanese company*, where the first nominal is the head of the entire NP, and where the second nominal is part of its PP adjunct, the BNPC shows a pattern in which the relation between the nominals is a predicative one: her husband is claimed to be

a nitwit, and the headache is claimed to be like a skullcracker. HPSG treatments of the BNPC are provided in Kim & Sells (2014) and Van Eynde (2018). The latter uses the phrase type hierarchy in Figure 17, defining the BNPC as a maximal type that inherits from *head-independent-phrase* and *inverted-predication*. To capture the intuition that the second nominal is the head of the entire NP, the preposition *of* is treated as a functor that selects a nominal head, as in Maekawa's treatment of the preposition in *these sort of problems*, see Section 3.4.

Another special case is apposition. It comes in (at least) two types, known as close apposition and loose apposition. Relevant examples are given in (52).

(52) a. [My brother Richard] is a soldier.
b. [Sarajevo, the capital of Bosnia,] is where WW I began.

Both types are compared and analyzed in Kim (2012) and Kim (2014). Van Eynde & Kim (2016) provides an analysis of loose apposition in the Sign-Based Construction Grammar framework.

Idiosyncratic are also the nominals with an extracted determiner, as in the French (53) and the Dutch (54).

(53) Combien as-tu lu [__ de livres en latin]?
how.many have-you read of books in Latin
'How many books have you read in Latin?'

(54) Wat zijn dat [__ voor vreemde geluiden]?
what are that for strange noises
'What kind of strange noises are those?'

The French example is analyzed in Abeillé et al. (2004: 20–21) and the Dutch one in Van Eynde (2004: 47–50). Other kinds of discontinuous NPs are treated in De Kuthy (2002).

4 Conclusion

This chapter has provided a survey of how nominals are analyzed in HPSG. Over time three treatments have taken shape, i.e. the specifier treatment, the DP treatment and the functor treatment. Each was presented and applied to ordinary nominals in Section 2. A comparison showed that the treatments which adopt the NP approach fit in better with the surface-oriented monostratal character of HPSG than the DP treatment.

Add: As for now there is no worked out analysis of the semantics of functor-based analyses.

We then turned to nominals with idiosyncratic properties in Section 3. Since their analysis often requires a relaxation of the strictly lexicalist stance of early HPSG, we first introduced some basic notions of Constructional HPSG and then applied them to such idiosyncratic nominals as the gerund, the Big Mess Construction and irregular P+NOM combinations. Some of these analyses adopt the specifier treatment, others the functor treatment. When both are available, as in the case of the Big Mess Construction and irregular P+NOM combinations, the functor treatment seems more plausible. Finally, we have added pointers to relevant literature for other nominals with idiosyncratic properties, such as those with an adjectival core, the Binominal Noun Phrase Construction, apposition and discontinuous NPs.

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