Pseudo-partitives in English: an HPSG analysis

FRANK VAN EYNDE ⓘ
University of Leuven

and

JONG-BOK KIM ⓘ
Kyung Hee University
(Received 24 February 2022; revised 18 October 2022)

Pseudo-partitives are strings of the form $[N_1 - of - N_2]$ in which N_1 denotes a quantity or amount of whatever it is that N_2 denotes and in which N_2 is a bare nominal. Such strings come in two types, depending on whether the combination shares the NUMBER value of N_1 or N_2. The first type can be analyzed along familiar lines, but the second one is a hard nut to crack. The article presents existing treatments, showing that they all involve departures from independently motivated principles. As an alternative we propose an analysis that is cast in the Typed Feature Structure notation of Head-driven Phrase Structure Grammar. It handles both types of pseudo-partitives, arguing that N_1 and the preposition *of* are complement-selecting heads if the NUMBER value is shared with N_1, while N_1 and the preposition are head-selecting functors if the NUMBER value is shared with N_2. The switch from head to functor status is characteristic of grammaticalization and is shown to affect pseudo-partitives with a quantifier noun or a collection noun as N_1, but not pseudo-partitives with a measure noun or collection noun. Examples and quantitative data are extracted from COCA.

Keywords: pseudo-partitives, Head-driven Phrase Structure Grammar, functors, grammaticalization

1 Introduction

Pseudo-partitives are strings of the form $[N_1 - of - N_2]$, in which N_1 denotes a quantity or amount of whatever it is that N_2 denotes. Keizer (2007: 109) distinguishes between five types, adapting a classification proposed for Dutch in Vos (1999).

(1) (a) Quantifier-noun constructions: *a number of people*
  (b) Measure-noun constructions: *a pint of beer*
  (c) Container-noun constructions: *a box of chocolates*
  (d) Part-noun constructions: *a piece of cake*
  (e) Collection-noun constructions: *a herd of elephants*

Characteristic of pseudo-partitives is that N_2 is a bare nominal. It is in this respect that it differs from genuine partitives, in which N_2 is introduced by a definite determiner. Compare the pseudo-partitive *a piece of cake* with the partitive *a piece of the cake*.

Orthogonal to the semantic classification in (1) is the distinction between pseudo-partitives that are headed by N_1 (type A) and pseudo-partitives that are headed by N_2 (type B). A classical test to differentiate them is based on agreement with the finite verb, as in (2)–(3).

(2) (a) [A pound of cucumbers] yields about a pint of pickles.
     (b) [Roughly five billion pounds of carpet] end up in landfills each year.
(3) (a) [A lot of things] happen and change over the years.
     (b) [Lots of power] is necessary to churn heavy soil.

In (2) the finite verb shares the number value of N_1 (*pound*, *pounds*). This conforms to the expectation that N_1 is the head in a $[N_1 - of - N_2]$ combination. In *a pound of cucumbers*, for instance, it is the singular *pound* that heads the phrase and that determines the number value of the NP, in the same way as *picture* heads the phrase and determines the number value of *a picture of playing children*. By contrast, in (3) the finite verb shares the number value of N_2 (*things*, *power*), which suggests that the head of these $[N_1 - of - N_2]$ combinations is N_2. Many proposals have been made to accommodate this unusual pattern, but none is convincing, since they all resort to *ad hoc* departures from general principles on constituency and feature propagation (section 2). A first objective of the article is therefore to provide an analysis of both types of pseudo-partitives that is maximally compatible with independently motivated principles (section 3). For that purpose we employ the framework of Head-driven Phrase Structure Grammar. A second objective is to explore how the distinction between the two syntactic types relates to the semantic classification in (1) (section 4). For that purpose we make use of data from the 450-million-word *Corpus of Contemporary American English* (COCA; Davies 2008–). In a final part we extend the analysis to pseudo-partitives without *of*, as *in a few hands* and *a dozen eggs* (section 5).

2   Existing treatments

Pseudo-partitives of type A can be analyzed in the same way as most other $[N_1 - of - N_2]$ combinations, i.e. as a right-branching structure, in which N_1 is combined with a PP dependent, and in which the PP is headed by the preposition, as in figure 1. This straightforwardly accounts for the fact that the NP shares the number value of N_1.
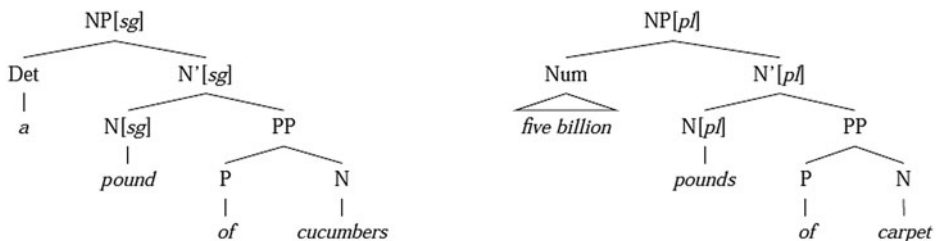

Figure 1. Type A pseudo-partitives

For pseudo-partitives of type B this structure is less appealing, though, since the noun that determines the number value of the combination (N_2) is in a position from which it normally cannot do this. Various proposals have been made to solve this. Most treat N_2 as the head and N_1 as part of its specifier or modifier. An early proposal of this kind is Akmajian & Lehrer (1976). For the pseudo-partitive in (4), they provide the structure in figure 2.

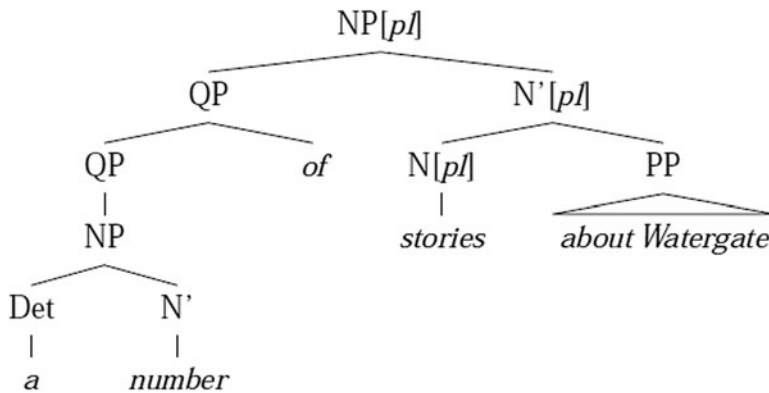(4) A number of stories about Watergate soon appeared.

Figure 2. Type B pseudo-partitives (Akmajian & Lehrer 1976: 398–9)

The NP *a number* projects a QP to which *of* is transformationally adjoined. The preposition is explicitly claimed to 'not form a constituent with the following N''(Akmajian & Lehrer 1976: 402). Evidence for this claim is provided by the contrast between (5) and (6).

(5) (a) A review [of a new book about French cooking] came out yesterday.
    (b) A review came out yesterday [of a new book about French cooking].
(6) (a) A number of stories about Watergate soon appeared.
    (b) *A number soon appeared of stories about Watergate.

The fact that the [*of* – NP] sequence in (5) can be extraposed, while its counterpart in (6) cannot, is seen as evidence that the former is a constituent, more specifically a PP, while the latter is not. The same kind of structure is proposed in Selkirk (1977) and in Traugott (2008). The latter, taking a diachronic perspective, argues that type B is the result of a grammaticalization process that has type A as its origin. It is schematized in (7) (Traugott 2008: 227).

(7) $[NP_1 \ [of \ NP_2]] > [[NP_1 \ of] \ NP_2]$
    Head $= NP_1$ $>$ Head $= NP_2$
    $NP_1 + $ Mod $>$ Mod $+ NP_2$

A variant of this treatment is that of Jackendoff (1977: 119–26). He treats *of* as a linking element, assigning a ternary structure, as in figure 3. A similar structure is proposed in Keizer (2007: 149).
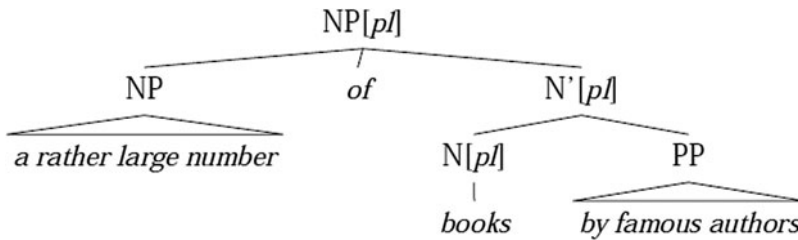

Figure 3. Type B pseudo-partitives (Jackendoff 1977: 122).

An advantage of the analyses in figures 2 and 3 is that the sharing of the number value is in line with standard assumptions. There is a problem, though, with the treatment of *of*, as pointed out in Huddleston & Pullum *et al.* (2002: 351–2). To spell it out they use the sentences in (8)–(9).

(8) (a) Most students like continuous assessment but [a lot __] prefer the old examination system.
     (b) *Most students like continuous assessment but [a lot of __] prefer the old examination system.
(9) (a) We called a meeting of the first-year students, [of whom a lot __] had complained about the assessment system.
     (b) *We called a meeting of the first-year students, [whom a lot of __] had complained about the assessment system.

Example (8) shows that N_2 can be omitted if its content can be retrieved from the context, if and only if the preposition is omitted as well, and (9) shows that N_2 can be extracted only if the preposition is pied-piped. This suggests that *of* forms a syntactic unit with N_2. To model this they adopt the same right-branching structure as for type A, albeit with the proviso that one has to imagine 'the grammatical number percolating upwards from the oblique rather than being determined by the head' (Huddleston & Pullum *et al.* 2002: 352). The resulting analysis is given in figure 4.

This accounts for the data in (8)–(9), but it also has some problems of its own. First, it involves a violation of the otherwise valid assumption that a nominal shares the number value of its head. Second, it licenses the combination of the indefinite article with a nominal that is claimed to be plural, contrary to the fact that this combination is normally ill-formed (*a protesters*). Third, the assignment of PP status to the combination of the preposition with N_2 is at odds with the fact that it cannot be extraposed, as illustrated in (6).

NP[*pl*]

Det — Nom[*pl*]

a

N — PP[*pl*]

number
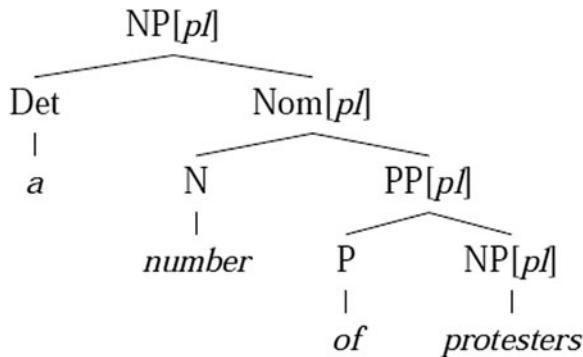
P — NP[*pl*]

of — *protesters*

Figure 4. Type B pseudo-partitives (Huddleston & Pullum *et al.* 2002: 351)

Taking stock, there is no shortage of proposals on the structure of type B pseudo-partitives, but there is none that simultaneously accounts for the fact that N_2 is the head and that *of* forms a syntactic unit – though not a PP – with N_2. Section 3 will present a proposal that does.

Besides the issue of determining the structure of type B there is the question of which of the two structures is the relevant one for some given pseudo-partitive. In the introduction we have used the subject–verb agreement test for that purpose, but this test has its limitations, since not all pseudo-partitives are in subject position and since not all verbs show overt agreement. Moreover, there are agreement mismatches, as in (10) and (11), quoted from Pollard & Sag (1994: 68–71).

(10) (a) Eggs is my favorite breakfast.
    (b) Eggs bothers me more than okra.
(11) (a) The faculty are all agreed on this point.
    (b) The faculty have voted themselves a new raise.

It is therefore common practice to use other criteria as well. We will discuss two of the more commonly adopted ones. The first is based on semantic selection. It is advocated in Akmajian & Lehrer (1976: 406–7), who argue that N_1 is the head in (12a), since it is the bottle that broke, and that N_2 is the head in (12b), since it is the wine that spilled.

(12) (a) A bottle of wine broke.
    (b) A bottle of wine spilled.

As pointed out by the authors, this criterion is sometimes at odds with the agreement test. In (13), for instance, the verb shows agreement with N_1, but in terms of semantic selection the head is N_2, since it is the wine that is fermenting.

(13) Two bottles of wine are/*is fermenting.

To solve the paradox, Akmajian & Lehrer (1976: 406–7) give precedence to the semantic selection test, adding that the agreement data should not be taken too

seriously, since there are other cases of number mismatches, as in (10)–(11). A problem with that solution is that the noun that meets the semantic selection requirements of a verb can be arbitrarily deeply embedded in the NP, as in (14).

(14) He was drinking [a pint filled to the brim with a brownish mixture of beer and coke].

The liquid denoting nouns in this sentence are part of a PP[*of*] that is part of a PP[*with*] that is part of a participial modifier of *pint*. Treating *beer and coke* as the head of the bracketed NP would yield a structure that is – to put it mildly – unfamiliar. Semantic selection is, hence, a shaky basis for motivating syntactic structure.

Another way out is suggested in Keizer (2007), who claims that 'it is possible for pseudo-partitives to have two heads: a semantic head (N_2) and a syntactic head (N_1)' (Keizer 2007: 124). The two usually coincide, but in (13) they do not. A problem with this solution is the vagueness of the notion of semantic head. Let us, for instance, take (15), quoted from Keizer (2007: 119).

(15) A glass of wine would make me incapable but not drunk.

The author treats N_2 as the semantic head, since 'it is obviously N_2 which satisfies the selection restrictions of the verb'. It can be wondered, though, whether this is so obvious. Are the selection restrictions of the verb *make* such that they are fulfilled by *wine* and not by *glass*? Or, if the whole VP is taken into account, is it the wine that makes me incapable but not drunk, or is it the quantity of wine that makes me incapable but not drunk? For Keizer it is obviously the former, but the latter could be argued to be more plausible, for if *a glass* is replaced by *twenty glasses* or *three bottles*, the predicate no longer seems applicable. In sum, when decoupled from the notion of syntactic head, the notion of semantic head tends to become murky.

A third way to deal with (13) is to give precedence to the agreement test and to limit the relevance of semantic selection to instances where the agreement test is inconclusive. In that case, the pseudo-partitive in (13) is unambiguously of type A, having N_1 as its head. This is the position that we adopt.

Another commonly used criterion is based on the lexical class of N_1. For that purpose Keizer (2007: 149) uses the classification in (1), repeated in (16).

(16) (a) Quantifier-noun constructions: *a number of people*
    (b) Measure-noun constructions: *a pint of beer*
    (c) Container-noun constructions: *a box of chocolates*
    (d) Part-noun constructions: *a piece of cake*
    (e) Collection-noun constructions: *a herd of elephants*

In her treatment, combinations with a quantifier noun, such as *number* and *lot*, are always of type B. Apparent counterexamples, as in (17), where the assignment of a type A structure is more plausible, are accommodated by the claim that N_1 is not really a quantifier noun.

(17) (a) [The true number of vacant posts] was one thousand four hundred.
　　(b) … display [a variable number of entries] in a window of fixed size.
　　(c) He arrives in the morning with six baguettes … and [two lots of paté].

Instead, *number* is claimed to be a measure noun in (17a) and (17b) (Keizer 2007: 139), and *lots* is claimed to be a part noun in (17c) (p. 118). Conversely, *load*, which is listed as a typical measure noun (p. 113), is claimed to be quantifier noun, when the assignment of a type B structure is considered more plausible, as in (18) (p. 128).

(18) it looks as though we are going out with [a whole load of engineers]

The ambivalence also affects other types of nouns: *tablespoon* is listed among the container nouns (p. 114), but is claimed to be a measure noun in (19) (p. 137), and *series* is treated as a collection noun in the conclusion (p. 150), but is claimed to be a container noun in (20).

(19) fry the sliced leeks in [two tablespoons of olive oil]
(20) [a series of changes] occurs which are historically described as Wallerian degeneration

Besides, *couple* is treated as a quantifier noun (p. 112), while its near-synonym *pair* is claimed to be a collection noun (p. 116). With such amount of waivering, it is unclear how the lexical classification in (16) can be used as a criterion for differentiating type A from type B uses.

　　As an alternative, we take the position that any of the nouns in (16) can be used as the N_1 in a pseudo-partitive of type A, and that many – but not all – are also used in pseudo-partitives of type B. This is in line with a common practice in studies on grammaticalization: the emergence of grammaticalized uses does not automatically lead to the extinction of the non-grammaticalized uses, but rather to their coexistence; see among others Traugott (2008). From this perspective, the relevant distinction is between nouns that are only used in type A pseudo-partitives and nouns that are also used in type B pseudo-partitives. It will be applied to a range of nouns in section 4.

3　Analysis

This section provides an analysis of the two types of pseudo-partitive that aims to meet the following two requirements. First, it should assign a more plausible structure to type B than any of the existing ones. More specifically, it should treat *of* as forming a constituent with N_2, as argued for in Huddleston & Pullum *et al.* (2002), but it should also treat N_2 as the head, as argued for in Akmajian & Lehrer (1976), Selkirk (1977), Jackendoff (1977) and many after them. Second, it should capture the intuition that type B results from a process of grammaticalization that has type A as its origin.

　　For this purpose we will use the framework of Head-driven Phrase Structure Grammar (HPSG) (Pollard & Sag 1994; Ginzburg & Sag 2000). This choice is motivated amongst others by the fact that the notion of head, which is of prime relevance for differentiating type A from type B, is at the center of attention in this framework, as suggested by its name. To keep the text self-contained we start with a brief introduction of the HPSG

notation (section 3.1). Then we propose analyses of the pseudo-partitive, first for type A (section 3.2) and then for type B (section 3.3).

3.1   The HPSG notation

The basic notion of linguistic analysis in HPSG is that of the sign, taken in the Saussurean sense as a unit of form and meaning. Properties of signs are spelled out in terms of typed feature structures. Objects of type *sign*, for instance, have a FORM feature and a SYNSEM feature.

(21) $sign : \begin{bmatrix} \text{FORM} & list\ (graph) \\ \text{SYNSEM} & synsem \end{bmatrix}$

(21) is a feature declaration. It consists of a type, a colon and a feature structure. Each of the features in the structure has a value that belongs to a type. In this case, the value of FORM is a list of graphs, such as *reads*, and the value of SYNSEM is an object of type *synsem*, i.e. a bundle of syntactic and semantic properties, such as being a verb and denoting an action.

Signs are organized in a hierarchy of which figure 5 provides the upper layers. Subtypes inherit the properties of higher types. *lexical-sign* and *phrase*, for instance, are subtypes of *sign* and therefore have the features that are declared for objects of type *sign*, i.e. FORM and SYNSEM. Besides, they may have features that are specific for the subtype and that differentiate them from other subtypes. Phrases, for instance, have a DAUGHTERS feature whose value is a list of signs, but lexical signs lack this feature.
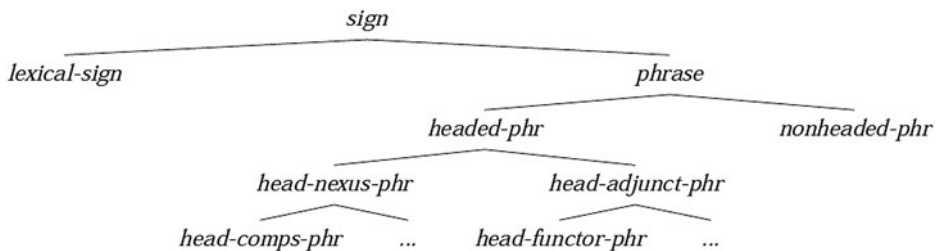
Figure 5. Upper layers of the hierarchy of signs

(22) $phrase : \begin{bmatrix} \text{DAUGHTERS} & list\ (sign) \end{bmatrix}$

Phrases are further differentiated into those that are headed and those that are not. The former have a HEAD-DTR feature whose value is a sign.

(23) $headed\text{-}phrase : \begin{bmatrix} \text{HEAD-DTR} & sign \end{bmatrix}$

The PP *with Georges*, for instance, has two daughters (*with* and *Georges*), of which the first one is the head daughter. Non-headed phrases, such as coordinate phrases, lack the

HEAD-DTR feature. For our purpose it is the headed phrases that matter. Its subtypes will be presented in sections 3.2 and 3.3.

To pave the way we need more detail about the SYNSEM values. They include amongst others the features CATEGORY and CONTENT, which model the main syntactic and semantic properties of a sign respectively. The CATEGORY feature has an object of type category as its value, and objects of that type are declared to have the features HEAD, COMPS and MARKING.[1]

(24) $category : \begin{bmatrix} \text{HEAD} & part\text{-}of\text{-}speech \\ \text{COMPS} & list \ (synsem) \\ \text{MARKING} & marking \end{bmatrix}$

The HEAD value is a part of speech, such as *verb* or *noun*. These may in turn be declared to have other features. Nouns, for instance, are declared to have a CASE feature.

(25) $noun : \begin{bmatrix} \text{CASE} & case \end{bmatrix}$

The COMPS value is a list of objects of type *synsem*. They capture the syntactic and semantic constraints which a sign requires its complements to have. Transitive verbs, for instance, have the COMPS value <NP>, meaning that take an NP as their complement. Signs that do not select a complement have the COMPS value < >, which is the empty list. The MARKING value differentiates signs that are fully saturated (*marked*) from signs that are not fully saturated (*unmarked*). Nominals, for instance, are marked if they contain a determiner and clauses are marked if they contain a complementizer.

The CONTENT feature has an object of type *semantic-object* as its value. Those objects are organized in a hierarchy, part of which is given in figure 6, quoted from Ginzburg & Sag (2000: 386).
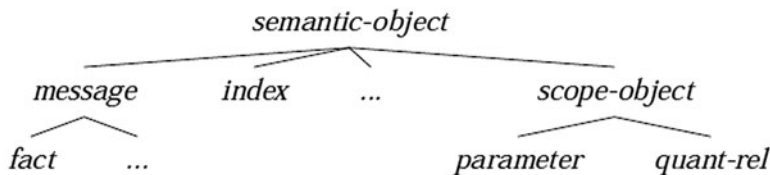

Figure 6. Part of the hierarchy of semantic objects

For our purpose it is the objects of type *scope-object* that matter, since they are the canonical type for nominals. They are declared to have the features INDEX and RESTRICTIONS.

---

[1] There are more, but we only mention those that are used in the rest of the text.

(26) *scope-object* :
$$\begin{bmatrix} \text{INDEX} & index \\ \text{RESTRICTIONS} & set\ (fact) \end{bmatrix}$$

Indices are comparable to discourse referents, but with the proviso that they contain information about person, number and gender.

(27) *index* :
$$\begin{bmatrix} \text{PERSON} & person \\ \text{NUMBER} & number \\ \text{GENDER} & gender \end{bmatrix}$$

Coindexed nominals, hence, share the values of these features. The RESTRICTIONS value is a set of facts which jointly capture the descriptive content of the nominal. The subtypes of *scope-object*, i.e. *quant-rel* and *parameter*, stand for scope-objects with and without quantifier respectively.

Since all signs have a SYNSEM feature, it follows that the CATEGORY and CONTENT features are not only present in lexical signs, but also in phrases. This provides the possibility to capture correlations between the CATEGORY and CONTENT values of a phrase and the CATEGORY and CONTENT values of its daughters. Such correlations are expressed in terms of implicational constraints, as in (28).

(28) **Head Feature Principle**

$$headed\text{-}phr \Rightarrow \begin{bmatrix} \text{SYNSEM} \mid \dots \mid \text{HEAD} & \boxed{1}\ part\text{-}of\text{-}speech \\ \text{HEAD-DTR} \mid \text{SYNSEM} \mid \dots \mid \text{HEAD} & \boxed{1} \end{bmatrix}$$

What this says is that a headed phrase shares the part of speech of its head daughter.[2] A phrase that has a verb as its head daughter, for instance, is a verb phrase. If the part-of-speech is declared to have other features, their values are shared as well. Nouns, for instance, are declared to have a CASE feature, and share its value with the phrases which they head.

Also for the values of the CONTENT feature there are correlations between a phrase and its daughters. A nominal phrase, for instance, shares the index of its head daughter, as spelled out in (29).

(29) **Semantic Inheritance Principle**

$$headed\text{-}phr \Rightarrow \begin{bmatrix} \text{SYNSEM} \mid \dots \mid \text{INDEX} & \boxed{1}\ index \\ \text{HEAD-DTR} \mid \text{SYNSEM} \mid \dots \mid \text{INDEX} & \boxed{1} \end{bmatrix}$$

Since indices are declared to have a NUMBER feature (see (27)), it is this constraint that models the propagation of the NUMBER value.

---

[2] Technically, the sharing is made explicit by the recurrence of the boxed integer.

A lot more could be said about the HPSG notation, but the above suffices as a background for the analysis of the pseudo-partitive.[3]

3.2 *Type A*

Pseudo-partitives of type A are exemplified by the bracketed strings in (2), repeated in (30).

(30) (a) [A pound of cucumbers] yields about a pint of pickles.
    (b) [Roughly five billion pounds of carpet] end up in landfills each year.

3.2.1 *of as a complement-selecting head*

The combination of a preposition with its nominal complement is entirely regular in type A pseudo-partitives: the preposition lexically selects a nominal complement and projects a saturated PP. The only special property concerns its semantic vacuity: in contrast to the preposition in *the cat on the mat*, which denotes a spatial relation between the cat and the mat, the preposition in *a pound of cucumbers* does not denote anything. This is clear among others from its absence in other languages. The Dutch and German equivalents of *a pound of cucumbers*, for instance, are respectively *een pond komkommers* and *ein Pfund Gurken*, rather than *een pond van komkommers* and *ein Pfund von Gurken* (Vos 1999). Besides, *of* is not only semantically vacuous in pseudo-partitives, but also in PP complements of verbs and adjectives, as in *beware of the dog* and *afraid of the wolf*, respectively. A common property of the semantically vacuous uses is that the choice of the preposition is not free: *beware* and *afraid* require their PP complement to be introduced by *of* and the same holds for *pound* in pseudo-partitives. Employing the features that were introduced in section 3.1, the properties of the preposition that matter at this point can be spelled out as in (31).

(31)
$$
\begin{bmatrix}
\text{CATEGORY} \begin{bmatrix}
\text{HEAD} & \textit{preposition} \\
\text{COMPS} & \left\langle \begin{bmatrix} ... \begin{bmatrix} \text{CATEGORY} \begin{bmatrix} \text{HEAD} & \textit{noun} \\ \text{COMPS} & \langle \ \rangle \end{bmatrix} \\ \text{CONTENT} \mid \text{INDEX} \ \boxed{1} \ \textit{index} \end{bmatrix} \end{bmatrix} \right\rangle \\
\text{MARKING} & \textit{of}
\end{bmatrix} \\
\text{CONTENT} \mid \text{INDEX} \ \boxed{1}
\end{bmatrix}
$$

The CATEGORY value contains HEAD, COMPS and MARKING features. The value of HEAD provides the part of speech, the value of COMPS spells out that it selects a nominal with an empty COMPS list, and the value of MARKING is set to *of*. The CONTENT value only

---

[3] Comprehensive introductions and surveys are provided in Sag, Wasow & Bender (2003), Levine (2017) and Müller *et al.* (2021).

contains the INDEX feature, and its value is required to be identical to that of the selected nominal ([1]). This captures the semantic vacuity.

To model the combination of the preposition with its complement, HPSG does not employ rewrite rules, as in PP → P NP. Instead, it employs an implicational constraint on phrases of type *head-comps-phr*.[4]

(32) **Head-Complement-Phrase**

$$head\text{-}comps\text{-}phr \Rightarrow \begin{bmatrix} \text{SYNSEM} \,|\,\ldots|\, \text{COMPS} \;\langle\;\rangle \\ \text{DAUGHTERS} \;\big\langle \boxed{1}, [\text{SYNSEM} \;\boxed{2}]\big\rangle \\ \text{HEAD-DTR} \;\boxed{1}\Big[\text{SYNSEM} \,|\,\ldots|\, \text{COMPS} \;\langle\boxed{2}\rangle\Big] \end{bmatrix}$$

In contrast to a rewrite rule, this constraint is cross-categorial. The head daughter can belong to any syntactic category, and so can its complement. The only requirement is that the complement matches the constraints which the head daughter has with respect to its complement. Technically, this is captured by the requirement that the *synsem* on the COMPS list of the head daughter be token-identical to the SYNSEM value of its non-head sister ([2]). For instance, if the head daughter requires its complement to be an accusative NP, then it is compatible with a sister that is nominal and accusative, but not with a PP or a VP. Moreover, the resulting phrase has an empty COMPS list, since it no longer requires a complement, after the addition of the selected complement.

Application to the PP in *a pound of cucumbers* yields the analysis in figure 7. The preposition is the head daughter and, hence, shares its HEAD value with the phrase ([1]). Its COMPS value ([2]) is matched with syntactic and semantic properties of its nominal complement and subtracted from the COMPS value of the phrase. Its MARKING value is also shared with the mother ([3]), since it must be available for checking the selection requirements of an external selector. The verb *beware* and the adjective *afraid*, for instance, select a PP that is introduced by *of*, rather than one that is introduced by *to*, *in* or *on*. The sharing is modeled by a constraint that subsumes those headed phrases in which the head daughter selects its non-head sister(s). Adopting the terminology of Sag (1997), we use the term *head-nexus-phr* for this type.

$$[\text{HEAD} \;\boxed{1}\,preposition\,, \text{COMPS} \;\langle\;\rangle\,, \text{MARKING} \;\boxed{3}\,of]_i$$

$$[\text{HEAD} \;\boxed{1}, \text{COMPS} \;\langle\boxed{2}\rangle\,, \text{MARKING} \;\boxed{3}]_i \qquad \boxed{2}\,[\text{HEAD} \;noun\,, \text{COMPS} \;\langle\;\rangle]_i$$
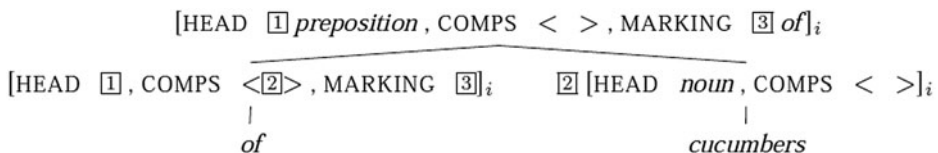
| | |
| of | cucumbers |

Figure 7. Combining the preposition with its nominal complement

---

[4] This version subsumes combinations with one complement, yielding a binary structure. For a version that also subsumes combinations with two or more complements, see Sag *et al.* (2003: 106).

(33) **Marking Feature Principle - I**

head-nexus-phr $\Rightarrow$ $\begin{bmatrix} \text{SYNSEM} \mid ... \mid \text{MARKING} & \boxed{1} \ \textit{marking} \\ \text{HEAD-DTR} \mid \text{SYNSEM} \mid ... \mid \text{MARKING} & \boxed{1} \end{bmatrix}$

Constraint (33) is obviously similar to the Head Feature Principle, but in contrast to the HFP, which applies to all headed phrases, it only applies to phrases in which the head daughter selects the non-head daughter(s).

Figure 7 also contains the indices. They are added as a subscript to the CATEGORY value of each node. The index of the preposition is identical to that of its complement, since it is semantically vacuous, and it is also identical to that of the PP because of the Semantic Inheritance Principle.

3.2.2 *N_1 as a complement-selecting head*

Turning now to the combination of N_1 with its PP sister, we assume that the PP is a complement of the noun, rather than an adjunct. Criteria to differentiate complements from adjuncts in nominals are provided in Huddleston & Pullum *et al.* (2002: 439–43). For post-head dependents the main criterion is based on what they call 'licensing by the head noun': while PP adjuncts are not required to contain some specific preposition by their head sister, as shown in (34a), the choice of the preposition in the PP[*of*] is constrained by N_1, as shown in (34b).

(34) (a) We prefer the week before/after/around Christmas.
  (b) I want a pound of/*for/*on cucumbers.

Another criterion is based on what they call 'positional mobility': while PP adjuncts can be put in any order, as shown in (35), the PP[*of*] sister of N_1 must precede other PP dependents, as shown in (36).

(35) (a) that cat of the neighbors with the long tail
  (b) that cat with the long tail of the neighbors
(36) (a) two pounds of cucumbers in one bag
  (b) *two pounds in one bag of cucumbers

Not mentioned in Huddleston & Pullum *et al.* (2002: 439–43), but equally telling, is the test of iteration. While PP adjuncts can be iterated, as in (37a), the PP sister of N_1 cannot be iterated, as shown in (37b).

(37) (a) They were dancing in the rain in Paris in the summer of 1987.
  (b) I want a pound of cucumbers (*of tomatoes).

In short, there is sufficient evidence for the assumption that N_1 takes its PP[*of*] sister as a complement. Technically, this is captured by the feature structure in (38).

(38)
$$
\begin{bmatrix}
\text{CATEGORY} & \begin{bmatrix}
\text{HEAD} & \textit{noun} \\
\text{COMPS} & \left\langle \begin{bmatrix} \ldots \begin{bmatrix} \text{CATEGORY} & \begin{bmatrix} \text{HEAD} & \textit{prep} \\ \text{COMPS} & \langle\ \rangle \\ \text{MARKING} & \textit{of} \end{bmatrix} \\ \text{CONTENT} \mid \text{INDEX} & i \end{bmatrix} \end{bmatrix} \right\rangle \\
\text{MARKING} & \textit{unmarked}
\end{bmatrix} \\
\text{CONTENT} & \begin{bmatrix}
\textit{parameter} \\
\text{INDEX} & j \\
\text{RESTRICTIONS} & \left\{ \begin{bmatrix} \text{CONTENT} & \begin{bmatrix} \textit{measure-rel} \\ \text{UNIT} & j \\ \text{MEASURED} & i \end{bmatrix} \end{bmatrix} \right\}
\end{bmatrix}
\end{bmatrix}
$$
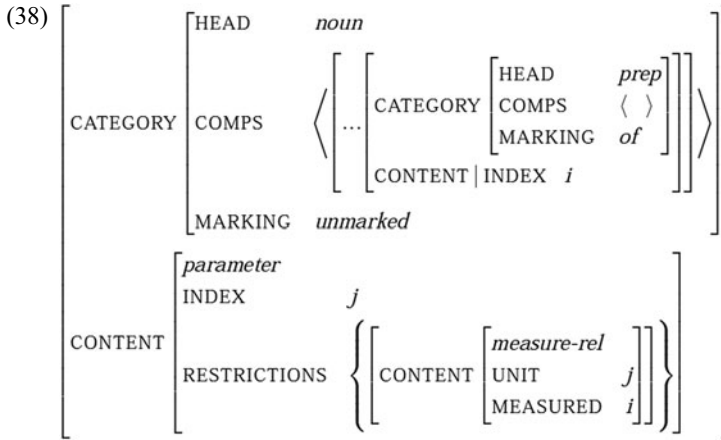
The CATEGORY value is similar to that of the preposition in (31). We are dealing with a noun that selects a complement that is required to take the form of a PP[*of*], and that is unmarked, i.e. determinerless. The CONTENT value, though, is rather different from that in (31), since the noun is not semantically vacuous. Instead, it denotes a unit (j) that is used for measuring whatever its PP complement denotes (i). Given that indices contain a NUMBER feature, the assignment of different indices to N_1 and its complement implies that the NUMBER value of N_1 may differ from that of its complement. That is necessary to license the combinations in (30), where the NUMBER values of N_1 and the NP in its complement are different (*pound of cucumbers* and *pounds of carpet*).

When applied to a specific noun and PP complement, the resulting structure is as shown in figure 8. N_1 shares its HEAD value ([1]), its MARKING value ([3]) and its index (j) with the phrase. Its COMPS value, by contrast, is matched with its PP sister ([2]) and subtracted from the COMPS list. The constraint that models this is exactly the same as the one that we used to model the combination of the preposition and its nominal complement in section 3.2.1, see (32).

$$
[\text{HEAD}\ [1]\ \textit{noun}\ ,\ \text{COMPS}\ <\ >\ ,\ \text{MARKING}\ [3]\ \textit{unmarked}]_j
$$

$$
[\text{HEAD}\ [1]\ ,\ \text{COMPS}\ <[2]>\ ,\ \text{MARKING}\ [3]]_j \qquad [2]\ [\text{HEAD}\ \textit{prep}\ ,\ \text{COMPS}\ <\ >\ ,\ \text{MARKING}\ \textit{of}]_i
$$

$$
\text{pound} \qquad\qquad\qquad\qquad \textit{of cucumbers}
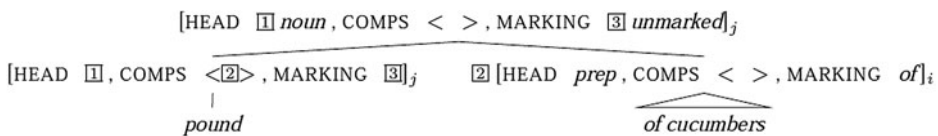$$

Figure 8. Combining N_1 with its PP complement

3.2.3 *The determiner as a head-selecting functor*

Having modeled the combinations of N_1 with its PP complement and of the preposition with its nominal complement, we now turn to the combination of the determiner and its

nominal sister. This combination is subject to constraints. The article in *a pound of cucumbers*, for instance, requires its sister to be nominal, singular and unmarked. This must be included in the lexical entry of the article in order to block the combination with verbs (**a have*), plural nouns (**a pounds*) and fully saturated NPs (**a the carpet*). It is in principle possible to include this in the COMPS value of article, but the consequence of this option is that the head of *a pound* is the article, rather than the noun. There are frameworks that welcome this consequence, such as the post-GB variants of Transformational Grammar, but HPSG adopts the more familiar assumption that the noun is the head in its combination with the article, following common practice in theory-neutral approaches (Van Eynde 2021). This implies that the non-head daughter, i.e. the article, needs the means to select and constrain its head sister. To model this, HPSG uses the SELECT feature. It is declared for objects of type *part of-speech* and is, hence, part of the HEAD value (Allegranza 1998; Van Eynde 1998).[5]

(39) *part-of-speech* : $\left[\text{SELECT} \quad synsem \right]$

Employing this feature, the CATEGORY value of the article is shown in (40).

(40)
$$\left[\begin{array}{l} \text{HEAD} \quad \left[\text{SELECT} \quad \left[\ldots \left[\begin{array}{l} \text{CATEGORY} \left[\begin{array}{ll} \text{HEAD} & noun \\ \text{COMPS} & \langle \ \rangle \\ \text{MARKING} & unmarked \end{array} \right] \\ \text{CONTENT} \,|\, \text{INDEX} \,|\, \text{NUMBER} \quad sing \end{array} \right] \right] \right] \\ \text{COMPS} \quad \langle \ \rangle \\ \text{MARKING} \quad a \end{array} \right]$$

The article selects an unmarked nominal as its head sister and requires its NUMBER value to be *singular*. Its COMPS value is the empty list and its MARKING value is set to *a*, which is a subtype of *marked*.[6]

In much the same way as the COMPS requirements of the head daughter must match the SYNSEM values of its non-head sister(s), the SELECT requirements of a non-head daughter must match the SYNSEM value of its head sister. This is modeled in a general constraint on phrases of type head-functor.

---

[5] Signs that do not select their head sister have the SELECT value *none*. Pollard & Sag (1994) used one feature, called MODIFIED, for selection by a member of a substantive part of speech (noun, verb, adjective, …) and another feature, called SPECIFIED, for selection by a member of a functional part of speech (determiner, complementizer, …). Since that distinction is hard to make and arguably spurious (Van Eynde 2006), it is not adopted in the functor treatment. The SELECT feature, hence, replaces both MODIFIED and SPECIFIED.

[6] The reason for assigning such a specific value is that there are constructions in which the indefinite article is the only possible determiner. Examples are the Big Mess Construction (*so big a/*any/*some mess*) and the Binominal Noun Phrase Construction (*her nitwit of a/*any/*some husband*). Modeling those requires the possibility to refer to *a* specifically (Kim & Sells 2014; Van Eynde 2018).

(41) **Head-Functor-Phrase**

$$\textit{head-functor-phr} \Rightarrow \begin{bmatrix} \text{DAUGHTERS} \ \langle [\text{SYNSEM} | \ldots | \text{SELECT} \ \boxed{1}] , \ldots \rangle \\ \text{HEAD-DTR} | \text{SYNSEM} \ \boxed{1} \ \textit{synsem} \end{bmatrix}$$

In the hierarchy of signs in figure 5, *head-functor-phr* is a subtype of *head-adjunct-phr*.[7] Typical of the latter is that the phrase shares its MARKING value with the non-head daughter, as spelled out in (42).

(42) **Marking Feature Principle - II**

$$\textit{head-adjunct-phr} \Rightarrow \begin{bmatrix} \text{SYNSEM} | \ldots | \text{MARKING} \ \boxed{1} \ \textit{marking} \\ \text{DAUGHTERS} \ \langle [\text{SYNSEM} | \ldots | \text{MARKING} \ \boxed{1}] , \boxed{2} \rangle \\ \text{HEAD-DTR} \ \boxed{2} \end{bmatrix}$$

The combination of the article and its nominal sister is modeled in figure 9. The SELECT value of the article matches the SYNSEM value of its nominal sister ($\boxed{2}$) and shares its MARKING value with the resulting NP ($\boxed{3}$), while the nominal head daughter shares its HEAD value ($\boxed{1}$) and its index with the phrase, as required by the Head Feature Principle and the Semantic Inheritance Principle.

Figure 9. Combining the article with its nominal head sister

3.2.4 Summing up

Pseudo-partitives of type A can be modeled in terms of the right-branching structure that was already given in figure 1. This section has added more detail, making use of the phrase type hierarchy of HPSG. More specifically, the combination of the preposition with its nominal sister has been shown to be an instance of *head-comps-phr* (section 3.2.1), and the same has been argued for the combination of N_1 with its PP sister (section 3.2.2), but the combination of the resulting nominal with the article has been argued to be an instance of another type of phrase, i.e. *head-functor-phr* (section 3.2.3).

3.3   Type B

Pseudo-partitives of type B are exemplified by the bracketed strings in (3), repeated in (43).

(43) (a) [A lot of things] happen and change over the years.
     (b) [Lots of power] is necessary to churn heavy soil.

---

[7] Another subtype of *head-adjunct-phr* is *head-independent-phr*. In that combination neither daughter selects the other.

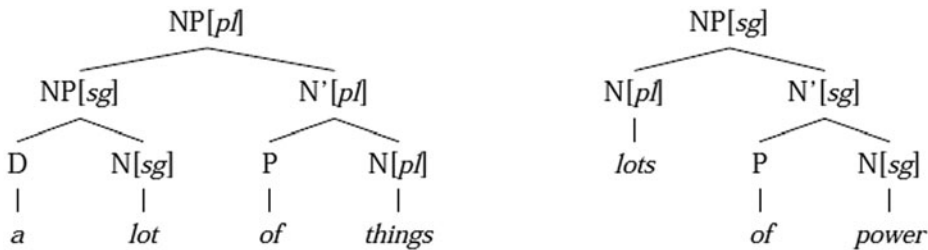For the analysis we adopt the structure spelled out in figure 10.

Figure 10. Internal structure of type B pseudo-partitives

This differs from the structures in figure 2 and figure 3, proposed in Akmajian & Lehrer (1976) and Jackendoff (1977) respectively, in that the preposition is neither part of a complex determiner nor a syncategorematic linker, but rather a part of the N_2 projection, as advocated in Huddleston & Pullum *et al.* (2002). At the same time, figure 10 also differs from the analysis in figure 4, proposed in Huddleston & Pullum *et al.* (2002), in that the preposition is not the head of a PP, but a functor that is adjoined to N_2. In fact, N_2 is not only the head in its combination with the preposition, but also in its combination with N_1. This straightforwardly accounts for the fact that the phrase shares its NUMBER value with N_2.

As compared to the analysis of type A in section 3.2, the intuition that type B is its grammaticalized variant, as argued in Traugott (2008), is made explicit by the syntactic role of the preposition and of N_1: while they have their usual head-of-PP and head-of-NP status in type A, they have functor status in type B. To model this we do not need to resort to any *ad hoc* devices. All we need is the phrase types, feature declarations and constraints that have already been introduced in sections 3.1 and 3.2. To demonstrate this we proceed in the same bottom-up manner as in the previous section, subsequently treating the combination of the preposition with N_2 (section 3.3.1), the combination of N_1 with its nominal sister (section 3.3.2) and the addition of the determiner (section 3.3.3).

3.3.1 *of as a head-selecting functor*
What differentiates the complement-selecting use of *of* in type A from its head-selecting use in type B is easy to glean from the rewrite rules in (44).

(44) (a) PP[*of*] → P[*of*] NP
    (b) NP[*of*] → P[*of*] NP

In the former, the preposition is the head of a PP; in the latter, it is adjoined to an NP. A criterion to differentiate them is the strandability test. Given that complements can be extracted, while heads cannot, it follows that strandable prepositions such as those in (45) are heads of PPs.

(45) (a) What are you [afraid of ___] ?
      (b) This is something we definitely want [a piece of ___].

By contrast, prepositions that are adjoined to an NP, cannot be stranded. This is the case for a number of uses of *of* that do not fit the (44a) mold. One is discussed and analyzed in Maekawa (2015: 146). It concerns the use of the preposition in *these kind/sort/type of problems*, as used in (46). Others are treated in Van Eynde (2018). They concern the use of *of* in the Binominal Noun Phrase Construction, as in (47), and in the *of* variant of the Big Mess Construction, as in (48) (Kim & Sells 2011; Van Eynde 2018).

(46) [These sort of problems] are very hard to solve.
(47) She divorced [her nitwit of a husband] last year.
(48) It was [so big of a mess] in there that we lost track.

In these uses the preposition cannot be stranded, as shown in (49).

(49) (a) *What does he like [these sort of ___] ?
      (b) *This is her husband whom [a nitwit of ___] she divorced last year.
      (c) *What was it [so big of ___] in there that you lost track?

The same holds for the preposition in type B pseudo-partitives, as demonstrated by Huddleston & Pullum *et al.*'s (8)–(9), repeated in (50).

(50) (a) *Most students like continuous assessment but [a lot of ___] prefer the old examination system.
      (b) *We called a meeting of the first-year students, whom [a lot of ___] had complained about the assessment system.

There is, hence, independent evidence for the assignment of functor status to the use of *of* in type B pseudo-partitives. Its properties are modeled in (51).

(51)
$$
\begin{bmatrix}
\text{HEAD} & \begin{bmatrix}
\textit{preposition} \\
\text{SELECT} & \begin{bmatrix}
\cdots & \begin{bmatrix}
\text{CATEGORY} & \begin{bmatrix}
\text{HEAD} & \textit{noun} \\
\text{COMPS} & \langle\ \rangle \\
\text{MARKING} & \textit{bare}
\end{bmatrix} \\
\text{CONTENT} & \textit{parameter}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix} \\
\text{COMPS} & \langle\ \rangle \\
\text{MARKING} & \textit{of}
\end{bmatrix}
$$

As compared to the head-of-PP use, spelled out in (31), there are many similarities, including the part of speech, the semantic vacuity, the MARKING value and the selection of a nominal sister. What differs, though, is the mode of selection. The nominal is not selected as a complement, but as a head, more specifically by the SELECT value. Besides, there are more specific constraints on the MARKING and CONTENT values of the

selected nominal. While the complement-selecting *of* does not impose any constraints on the MARKING value of its NP sister, the head-selecting *of* requires it to be *bare*, which is a subtype of *unmarked*. Similarly, while the complement-selecting *of* is compatible with both quantified and non-quantified nominals, the head-selecting *of* only combines with the latter, i.e. those of type *parameter*.[8] When combined with a specific nominal, the resulting analysis is as shown in figure 11. The SELECT value of the preposition ([2]) matches the SYNSEM value of the nominal and its MARKING value ([3]) is shared with the phrase, while the head daughter (N_2) shares its HEAD value ([1]) and its index (*i*) with the phrase.[9] Given that the index includes the NUMBER value, the net result is that *of power* is a singular nominal.

$$[\text{HEAD } \boxed{1} \; noun \, , \text{COMPS } < \; > , \text{MARKING } \boxed{3} \; of]_i$$

$$[\text{HEAD}|\text{SELECT } \boxed{2} \, , \text{COMPS } < \; > , \text{MARKING } \boxed{3}] \qquad \boxed{2} \; [\text{HEAD } \boxed{1} \, , \text{COMPS } < \; > , \text{MARKING } \; bare]_i$$
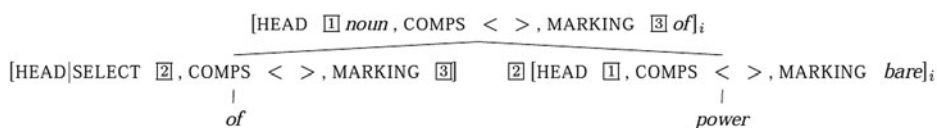
$$of \qquad\qquad\qquad\qquad power$$

Figure 11. Combining a prepositional functor with its head sister

Summing up, to pave the way for an analysis in which N_2 is the head in type B pseudo-partitives it is not necessary to resort to a poorly motivated treatment of the preposition, as in Akmajian & Lehrer (1976), Selkirk (1977), Jackendoff (1977), Keizer (2007) and Traugott (2008). Instead, it is possible to adopt the usual tree geometry and to get the desired outcome if one adopts the independently motivated assumption that there are prepositions which – in some of their uses – are head-selecting functors, rather than complement-selecting heads.[10]

3.3.2 *N_1 as a head-selecting functor*

Given the functor status of the preposition in type B pseudo-partitives, it follows that a phrase like *lots of power* is not an [N + PP] sequence, but a juxtaposition of two nominals. In such a combination, it is quite common for the rightmost nominal to be the head. In *John's sisters*, for instance, *sisters* is the most plausible candidate for head status, since it shares its CASE and NUMBER values with the phrase, while the other nominal is a functor, comparable to a possessive determiner, such as *his* or *our*. The same holds for combinations of a numeral and a noun. In *a thousand trees* and *one*
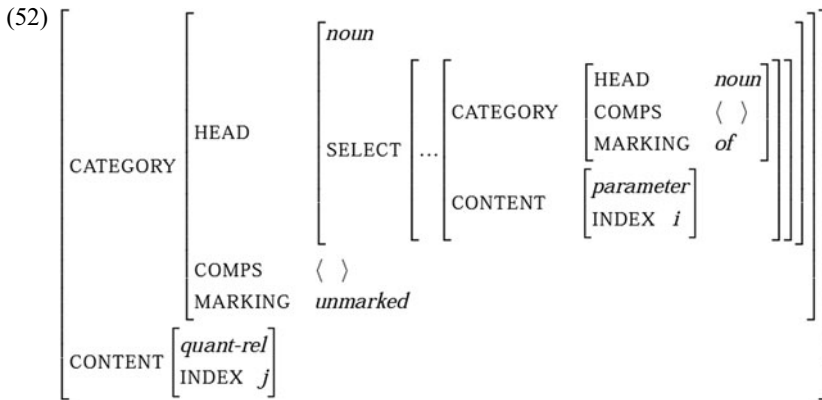
---

[8] Most constraints in (51) also hold for the other functor uses of the preposition. An exception is the MARKING value of the selected nominal, which is required to be *a* in the Binominal Noun Phrase Construction and in the *of* variant of the Big Mess Construction.

[9] Since *bare* is distinct from *of*, iteration is blocked, as it should be.

[10] Further evidence is provided by prepositions in other languages. Heinz & Matiasek (1994: 214), for instance, argue that 'a subclass of prepositions in German … can combine with NPs to form marked NPs'. In the same vein, Van Eynde (2004) demonstrates that certain uses of the Dutch *van* 'of' and *voor* 'for' are head-selecting functors in NPs rather than complement-taking heads of PPs.

hundred houses, for instance, the plural nouns are the most plausible candidates for head status, since they share their NUMBER value with the phrase, while the numerals are singular nouns with functor status. An HPSG analysis is provided in Maekawa (2016: 431–2). It builds on the functor analysis of the Dutch numerals in Van Eynde (2006).

Taking a cue from these analyses, we assume that the combination of the two nominals in a type B pseudo-partitive is right-headed too and that N_1 is a head-selecting functor, as spelled out in (52).

(52)

$$
\begin{bmatrix}
\text{CATEGORY} \begin{bmatrix}
\text{HEAD} \begin{bmatrix}
\textit{noun} \\
\text{SELECT} \begin{bmatrix} \ldots \begin{bmatrix}
\text{CATEGORY} \begin{bmatrix}
\text{HEAD} & \textit{noun} \\
\text{COMPS} & \langle \, \rangle \\
\text{MARKING} & \textit{of}
\end{bmatrix} \\
\text{CONTENT} \begin{bmatrix}
\textit{parameter} \\
\text{INDEX} \ i
\end{bmatrix}
\end{bmatrix} \end{bmatrix}
\end{bmatrix} \\
\text{COMPS} \ \langle \, \rangle \\
\text{MARKING} \ \textit{unmarked}
\end{bmatrix} \\
\text{CONTENT} \begin{bmatrix}
\textit{quant-rel} \\
\text{INDEX} \ j
\end{bmatrix}
\end{bmatrix}
$$

There is a lot that (52) has in common with its N_1 counterpart in type A pseudo-partitives, such as its part of speech, its MARKING value and its selection of an XP[*of*] sister. What differs is the mode of selection (by SELECT instead of COMPS) and the category of the selected sister (NP instead of PP). This syntactic difference is mirrored by a semantic one: while the N_1 in a type A pseudo-partitive denotes an object of type *parameter*, the N_1 in a type B pseudo-partitive denotes an object of type *quant-rel*. When combined with a specific nominal, the resulting analysis is as shown in figure 12. The phrase shares its HEAD value ([1]) and its index (*i*) with the rightmost nominal, and its MARKING value ([3]) with the functor daughter. The latter's SELECT value matches the SYNSEM value of its head sister ([2]). Since the NUMBER value is part of the index, which is shared with the head daughter, *lots of power* is treated as singular, as it should be.

A welcome consequence of this analysis is that it accounts for the contrast between (5) and (6), repeated in (53)–(54).

(53) (a) A review of a new book about French cooking came out yesterday.
    (b) A review came out yesterday of a new book about French cooking.
(54) (a) A number of stories about Watergate soon appeared.
    (b) *A number soon appeared of stories about Watergate.

The PP[*of*] sister of *review* in (53) can be extraposed, as is normal for PP dependents, but the sister of *number* in (54) cannot, since it is a nominal head rather than a PP dependent. The ill-formedness of (54b), hence, follows from the general constraint that heads cannot be extraposed.
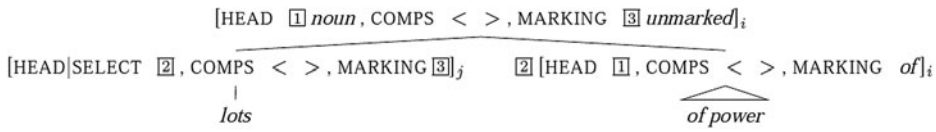
$$[\text{HEAD} \; \boxed{1} \; noun, \text{COMPS} \; < \; >, \text{MARKING} \; \boxed{3} \; unmarked]_i$$

$[\text{HEAD}|\text{SELECT} \; \boxed{2}, \text{COMPS} \; < \; >, \text{MARKING} \; \boxed{3}]_j \qquad \boxed{2} \; [\text{HEAD} \; \boxed{1}, \text{COMPS} \; < \; >, \text{MARKING} \; of]_i$

$lots \qquad\qquad of\ power$

Figure 12. Combining N_1 with its head sister

Summing up, the functor treatment of N_1 in type B pseudo-partitives yields the result we need without tinkering with the tree geometry, and receives support from the existence of other constructions in which a noun is used as a functor. As in the case of the preposition, it is worth stressing that the functor treatment is limited to specific uses. In the same way as *of* is used both as a complement-selecting head and as a head-selecting functor, quantifier nouns, such as *lot(s)* and *number*, are not only used as head-selecting functors in type B pseudo-partitives, but also as complement-selecting heads in type A pseudo-partitives, as illustrated in (17), repeated in (55).

(55) (a) [The true number of vacant posts] was one thousand four hundred.
   (b) … display [a variable number of entries] in a window of fixed size.
   (c) He arrives in the morning with six baguettes … and [two lots of paté].

The difference between nominal head and nominal functor uses will be explored in more detail in section 4.

3.3.3 Adding the determiner

The indefinite article in *a lot of things* must be part of the phrase that is headed by the singular N_1 *lot*, since it is not compatible with the plural N_2. This is reflected by the left-branching structure in figure 13.[11]
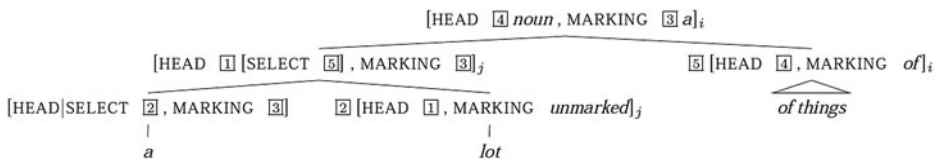

$$[\text{HEAD} \; \boxed{4} \; noun, \text{MARKING} \; \boxed{3} \; a]_i$$

$[\text{HEAD} \; \boxed{1} \; [\text{SELECT} \; \boxed{5}], \text{MARKING} \; \boxed{3}]_j \qquad\qquad \boxed{5} \; [\text{HEAD} \; \boxed{4}, \text{MARKING} \; of]_i$

$[\text{HEAD}|\text{SELECT} \; \boxed{2}, \text{MARKING} \; \boxed{3}] \qquad \boxed{2} \; [\text{HEAD} \; \boxed{1}, \text{MARKING} \; unmarked]_j \qquad of\ things$

$a \qquad\qquad lot$

Figure 13. Type B pseudo-partitive with phrasal N_1

The quantifying phrase *a lot* shares its HEAD value ($\boxed{1}$) and its index (j) with *lot*, and its MARKING value ($\boxed{3}$) with the article.[12] The latter's SELECT value matches the SYNSEM value

---

[11] The COMPS value is the empty list for each of the five nodes.
[12] The use of a MARKING value that uniquely singles out the indefinite article is motivated by the fact that the resulting phrase may be part of the Big Mess Construction, as in (i), quoted from Huddleston & Pullum *et al*. (2002: 350).

   (i) [How large a number of students] have enrolled, did you say?

of *lot* (②). The top node in figure 13 shares its HEAD value (④) and its index (*i*) with the rightmost nominal, and its MARKING value (③) with the quantifier *a lot*. The latter's SELECT value matches the SYNSEM value of *of things* (⑤). This SELECT value is, furthermore, shared with *lot* since it is part of its HEAD value (①). Since the NUMBER feature is part of the index, the resulting NP is plural, just like *things*. There is, hence, no need for a device that has 'the grammatical number percolating upwards from the oblique' (Huddleston & Pullum *et al.* 2002: 352), since *(of) things* is the head. Besides, this analysis also avoids another problem with the Huddleston & Pullum *et al.* approach, namely that the indefinite article is combined with a plural nominal in figure 4. This is not the case in figure 13, where the article combines with *lot* rather than with *lot of things*.

3.3.4 *Summing up*
In pseudo-partitives of type B the preposition is a head-selecting functor rather than a complement-selecting head (section 3.3.1) and the same holds for N_1 (section 3.3.2). The determiner, if there is one, is added to N_1 (section 3.3.3). The net result is that pseudo-partitives of type B share the index and, hence, the NUMBER value of N_2.

3.4 *Summary*

This section has provided an analysis of both types of pseudo-partitives. It is based on the assumption that type B is the grammaticalized counterpart of type A, as pointed out in Traugott (2008). Differently from the existing treatments of type B, which are at odds either with standard constituency tests or with general patterns of feature propagation, this treatment is based on assumptions that are independently motivated, in the sense that there are other prepositions and common nouns for which a functor treatment is more plausible than a head treatment.

4   Head or functor?

In the previous section we have used combinations with a measure noun (*pound*) to exemplify the properties of type A and combinations with a quantifier noun (*lot*) to exemplify the properties of type B. We have also signaled, though, that pseudo-partitives with a quantifier noun are not always of type B, as shown in (55). Rather than a problem, this is a confirmation of the assumption that type B is a grammaticalized counterpart of type A, since the existence of grammaticalized uses does not necessarily lead to the extinction of the original non-grammaticalized uses. In conformity with that assumption we make a distinction between nouns that occur in both types of pseudo-partitives (section 4.1) and nouns that only occur in type A pseudo-partitives (section 4.2). Much of the discussion will be devoted to the issue of how the type B uses can be differentiated from the type A uses.

For the purpose of concreteness the discussion is larded with examples and quantitative data from the 450-million-word *Corpus of Contemporary American English* (COCA; Davies 2008–). It consists of fragments from eight different genres, i.e. fiction (FIC),

popular magazines (MAG), newspapers (NEWS), academic texts (ACAD), spoken language (SPOK), TV and movies (TV/MOV), blogs (BLOG), and web pages (WEB).

4.1 Quantifier and collection nouns

Starting with the **quantifier** nouns, their use as N_1 in pseudo-partitives is canonically of type B, as in (56), where the verbs all share the number value of N_2.

(56) (a) A lot of things$_{pl}$ happen$_{pl}$ and change$_{pl}$ over the years. (COCA 2017 NEWS)
    (b) Lots of power$_{sg}$ is$_{sg}$ necessary to churn heavy soil. (COCA 2007 MAG)
    (c) A number of studies$_{pl}$ indicate$_{pl}$ that evaluation is an important part of metacognitive control. (COCA 1997 ACAD)
    (d) A multitude of challenges$_{pl}$ face$_{pl}$ the food-service industry. (COCA 1996 MAG)
    (e) Plenty of tickets$_{pl}$ remain$_{pl}$ for Saturday's game. (COCA 1997 NEWS)

Occasionally, though, the combinations are of type A, as in (57), where the verbs share the number value of N_1.

(57) (a) The number$_{sg}$ of new students continues$_{sg}$ to grow. (COCA 2003 NEWS)
    (b) A multitude$_{sg}$ of bowls turns$_{sg}$ bookshelves into functional display cabinet. (COCA 2009 MAG)

The contrast correlates with a difference in semantic interpretation: While the VPs in (56) express a property that is attributed to N_2, the VPs in (57) express a property that is attributed to N_1. The use of the singular verb in (57a), for instance, is due to the fact that it is the number that is claimed to grow rather than the students. Similarly, the use of a singular verb in (57b) conveys the information that it is not so much the bowls in themselves but rather their high number that has the effect of turning the bookshelves into a display cabinet.

To differentiate the type A from the type B uses the agreement test provides a useful criterion, but since it is only applicable to pseudo-partitives in subject position, it has its limitations. To overcome these we propose – generalizing from examples like those in (56) and (57) – four criteria that are also applicable to pseudo-partitives in other positions than the subject one.

First, while type A pseudo-partitives can be introduced by any kind of determiner, type B pseudo-partitives are either bare (*plenty*, *lots*) or introduced by the indefinite article (*a lot*, *a number*, *a multitude*).

Second, in type A pseudo-partitives the noun can be combined with a numeral, as in (58), where *lots* has the usual more-than-one interpretation.

(58) Just because [two lots of physicians] have decided not to merge does not mean our own course should falter. (COCA 2014 ACAD)

This addition is not licensed in type B pseudo-partitives, as in (56b).

Third, in type A pseudo-partitives the noun can be preceded by any adjective that is semantically compatible with it and the resulting combination has a compositional

meaning. In *the high number of new students* and *a variable number of entries* the adjectives *high* and *variable* modify the noun *number* and contrast with their respective antonyms *low* and *fixed* in the usual way. In type B pseudo-partitives the choice is limited to a small subset of the adjectives. For *a ... lot of*, for instance, the query in (59) yields 8,783 hits in COCA, of which 5,283 (60.15%) concern *whole* and 3,256 (37.07%) *awful*.

(59) a|an j* lot of

Moreover, the combination is not compositional. *whole* and *awful* have an intensifying function in this combination, rather than a descriptive one, and do not contrast with their antonyms *partial* and *gentle*. The fixed-phrase status of these combinations is especially clear in the case of *deal*, which can only be the N_1 of a type B pseudo-partitive when it is combined with either *great* or *good*.

(60) A great deal of people$_{pl}$ like$_{pl}$ to search feral swine. (COCA 2012 BLOG)

When *great* is omitted, the combination no longer qualifies as a pseudo-partitive. In (61), for instance, *deal* denotes a transaction rather than a quantity.

(61) Deals$_{pl}$ of this size also receive$_{pl}$ regulatory review. (COCA 2018 NEWS)

The same holds for *load*, which requires the presence of *whole* in type B pseudo-partitives, as in (62). If the adjective is omitted, as in (63), it denotes a delivery rather than a quantity.

(62) There is a whole load of stuff in the literature on bow shock. (COCA 2018 MAG)
(63) You want a load of bricks to arrive when it is ordered. (COCA 2015MAG)

Fourth, in type A pseudo-partitives the noun can take a plural affix and the resulting form has the usual more-than-one interpretation. The N_1 in *the rising numbers of foreign students*, for instance, denotes more than one number, in the same way as the first noun in *the tables in the corner* denotes more than one table. By contrast, in type B pseudo-partitives the noun either lacks a plural counterpart, as in the case of *plenty*, or if it has one, it does not have the usual more-than-one interpretation. In (56b), for instance, *lots* does not denote more than one lot, but rather a large quantity. It is in fact semantically equivalent to the singular *a lot*.

(64) sums up the characteristic properties of type B pseudo-partitives.

(64) Properties of the type B use:
    1. restrictions on the determiner (bare or indefinite article)
    2. incompatibility with numerals
    3. restrictions on the combination with adjectives (fixed phrase rather than compositional)
    4. neutralization of the number distinction

To model these properties we do not need to add much to what is already given in section 3. Property 1, for instance, is related to the difference in semantic type of N_1: while the complement-selecting heads that form the core of a type A pseudo-partitive have a

CONTENT value of type *parameter*, as spelled out in (38) in section 3.2.2, the head-selecting functors in a type B pseudo-partitive have a value of type *quant-rel,* as spelled out in (52) in section 3.3.2. As a consequence, given that most determiners select a nominal that denotes an object of type *parameter*, they are compatible with the former, but not with the latter. The exception is the indefinite article, which does not require the selected nominal to be of a specific semantic type and which is, hence, compatible with both. The semantic type of N_1 also accounts for Property 2. Given that numerals select a nominal that is not yet quantified, they are compatible with nouns that have a CONTENT value of type *parameter*, but not with nouns that have a CONTENT value of type *quant-rel*. Property 3 is due to lexicalization. The non-compositional nature of the combination with adjectives in type B is best handled by treating them as separate lexical units. This is especially clear for *great deal*, *good deal* and *whole load*, since they cannot be used as the N_1 in a type B pseudo-partitive, if the adjective is omitted. Property 4 is also due to lexicalization. The neutralization of the number distinction for *lot(s)* can be handled by treating *lot* and *lots* as separate lexical units, rather than as the singular and plural forms of the same lexeme.

Taken together, the conditions on N_1 in type B are quite restrictive, but when they are met, the pseudo-partitive is more likely to be of type B than of type A. This is confirmed by quantitative data from COCA. Using the search strings in (65), we can check for pseudo-partitive subjects whether the verb shares the number value of N_1 or N_2.

(65) (a) n-sg *of* n-pl verb-3sg or verb-base
    (b) n-pl *of* n-sg verb-3sg or verb-base

(65a) retrieves pseudo-partitives with a singular N_1 that immediately precede a verb that is tagged as *3sg*, c.q. *base*.[13] (65b) does the same for pseudo-partitives with a plural N_1. The results are summarized in table 1. They clearly show that the type B use is much more common than the type A use.

Table 1. *Pseudo-partitives with a quantifier noun as N_1*

a lot of N-pl V-sg	4	a lot of N-pl V-pl	209
a number of N-pl V-sg	8	a number of N-pl V-pl	150
a multitude of N-pl V-sg	2	a multitude of N-pl V-pl	24
plenty of N-pl V-sg	1	plenty of N-pl V-pl	120
lots of N-sg V-pl	4	lots of N-sg V-sg	163

Moreover, several of the combinations in the left column do not qualify as instances of type A. Some are simply ill-formed, such as (66), which should have a plural verb, and (67), which should have a plural N_2.

---

[13] The value *3sg* is assigned to the *-s* forms of the simple present tense; *base* is assigned amongst others to their plural counterparts. Since the pseudo-partitive immediately precedes the verb in (65), the strings do not subsume combinations with an intervening element, such as the adverb in *a lot of taxi drivers seldom go on holiday.*

(66) Plenty of guys has them. (COCA 1997 FIC)

(67) Lots of language use the JVM besides Java. (COCA 2012 BLOG)

Others are well-formed, but do not qualify as type A. An example is (68).

(68) A lot of melanocytes means$_{sg}$ a brown eye. (COCA 2012 BLOG)

This superficially looks like an instance of agreement with N_1, but a closer look reveals that something else is at work here, since the verb is also singular when both N_1 and N_2 are plural, as in (69).

(69) (a) Lots of dragonflies means$_{sg}$ it's gonna rain soon. (COCA 2003 MOV)
      (b) Lots of vegetables is$_{sg}$ key. (COCA 2015 MAG)

This suggests that the use of a singular verb in (68) and (69) is not due to the fact that the pseudo-partitive subjects are of type A, but rather to a number mismatch between subject and verb, comparable to what we see in (70).

(70) (a) Eggs is my favorite breakfast.
      (b) Eggs bothers me more than okra.

In their treatment of these 'singular plurals' Pollard & Sag (1994: 86–8) argue that they involve 'reference transfer', converting an NP with a plural index into an NP with a singular index. By the same token, we assume that the pseudo-partitive in (68) has a plural index, just like those in (69). It is, hence, of type B, and its combination with a singular verb is due to reference transfer.

Setting aside the ill-formed combinations and the instances of reference transfer, we are left with a very small number of genuine type A uses. One of them is (57b). Another one is (71).

(71) A lot$_{sg}$ of studies states$_{sg}$ that creativity can be achieved with just few moments of fun. (COCA 2012 BLOG)

In sum, pseudo-partitives which have a quantifier noun as N_1 that shows the four properties spelled out in (64) are nearly all of type B. In other words, quantifier nouns show a very high degree of grammaticalization when they are used in pseudo-partitives.

Turning now to the **collection** nouns, we observe the same coexistence of type A and type B uses. In type A, they may combine with any determiner, numeral or semantically compatible adjective, and have a plural counterpart with the canonical more-than-one interpretation. Moreover, if the pseudo-partitive is in subject position, the verb shows agreement with N_1, as in (72).

(72) (a) A group$_{sg}$ of police cruisers is$_{sg}$ speeding across the bridge with light and sirens. (COCA 2004 FIC)
      (b) A group$_{sg}$ of men is$_{sg}$ using green garbage cans. (COCA 1995 NEWS)

There are also instances, though, which show the agreement pattern that is characteristic of type B, as in (73).

(73) (a) A group of immigrants$_{pl}$ move$_{pl}$ in and, seemingly, overnight, they're far more successful than native residents. (COCA 1990 SPOK)

(b) A group of men$_{pl}$ sit$_{pl}$ on the sofas. (COCA 1996 FIC)

In this use, the collection noun does not combine with numerals. Replacing the article with the numeral *one*, for instance, yields a well-formed combination in (72), but not in (73). Equally telling is the fact that the plural *groups* is only used in type A pseudo-partitives.

Table 2 provides some quantitative data from COCA. They show that, as far as agreement is concerned, the pseudo-partitives with a singular collection noun are divided in roughly equal numbers over type A and type B, while pseudo-partitives with a plural collection noun are of type A. This shows that the collection nouns demonstrate a significantly lower degree of grammaticalization than the quantifier nouns.

Table 2. *Pseudo-partitives with a collection noun as N$_1$*

group of N-pl V-sg	103	group of N-pl V-pl	105
bunch of N-pl V-sg	77	bunch of N-pl V-pl	113
swarm of N-pl V-sg	23	swarm of N-pl V-pl	13
groups of N-sg V-pl	4	groups of N-sg V-sg	0
bunches of N-sg V-pl	3	bunches of N-sg V-sg	0
swarms of N-sg V-pl	3	swarms of N-sg V-sg	0

4.2 Measure and container nouns

Measure nouns denote units of weight (*pound*, *kilo*, *ton*, …), length (*foot*, *inch*, *meter*, …), content (*liter*, *gallon*, …), etc. When used in a pseudo-partitive, they do not show any of the characteristics of functor status: they are not restricted to being bare or indefinite; they routinely combine with numerals, as in *five liters of milk*; they combine with any adjective that is semantically compatible with a measure noun; and they show the usual number distinction: *liters of milk* denotes more than one liter of milk and is, hence, semantically different from *a liter of milk*. Moreover, when used in subject position, the verb shares the number value of N$_1$, as illustrated in (74) and (75).

(74) A pound$_{sg}$ of cucumbers yields$_{sg}$ about a pint of pickles. (COCA 2011 MAG)

(75) About two pounds$_{pl}$ of plutonium give$_{pl}$ off energy equal to 30 million … (COCA 1999 ACAD)

As is clear from the figures in table 3, there are some exceptions for combinations with a plural N$_1$. Some are listed in (76).

(76) (a) 1.5 million pounds of beef has$_{sg}$ been recalled. (COCA 2012 BLOG)

(b) Roughly ten inches of snow is$_{sg}$ expected to pile up across the Chicago area. (COCA 2018 NEWS)

Table 3. *Pseudo-partitives with a measure noun as N_1*

pound of N-pl V-sg	7	pound of N-pl V-pl	0
kilo of N-pl V-sg	1	kilo of N-pl V-pl	0
foot of N-pl V-sg	32	foot of N-pl V-pl	0
meter of N-pl V-sg	7	meter of N-pl V-pl	0
pounds of N-sg V-pl	21	pounds of N-sg V-sg	4
feet of N-sg V-pl	16	feet of N-sg V-pl	56
inches of N-sg V-pl	11	inches of N-sg V-sg	64

    (c) And today as much as six inches of snow is$_{sg}$ expected in the Upper Midwest. (COCA 2013 SPOK)

    (d) 1 to 2 feet of snow is$_{sg}$ expected over the Cascades. (COCA 2012 WEB)

Since N_2 is singular in these examples, they look like instances of type B, but the fact that they all include a numeral suggests otherwise. More plausible is the assumption that we are dealing with a number mismatch between subject and verb, comparable to what we see in (77).

(77) Five pounds is a lot of money.

Confirming evidence is provided by the existence of combinations in which both N_1 and N_2 are plural and in which the verb is singular nonetheless, as in (78).

(78) 11/2 pounds of beans makes 6 to 8 servings. (COCA 2012 WEB)

This is comparable to the combinations with *lots* in (69).

    The same observations can be made about pseudo-partitives with a **container** noun. The noun itself does not show any of the four functor properties and when the pseudo-partitive is in subject position, the verb shares the number value of N_1.

(79) (a) A box$_{sg}$ of chocolates is$_{sg}$ full of surprises. (COCA 1996 MAG)

     (b) A cup$_{sg}$ of lentils contains$_{sg}$ 25 percent of the RDA of iron for a woman. (COCA 1993 MAG)

(80) (a) Plastic bottles$_{pl}$ of paint sit$_{pl}$ in the alley. (COCA 1997 FIC)

     (b) Eight cups$_{pl}$ of tea give$_{pl}$ you the same amount of caffeine as three cups of coffee. (COCA 1999 MAG)

    In sum, pseudo-partitives with a measure or container noun as N_1 are invariably of type A. These nouns are complement-selecting heads and lack the grammaticalized functor uses.

4.3 Summing up

To differentiate pseudo-partitives of type B from those of type A we have used four criteria, i.e. the restriction to a small subset of determiners, the incompatibility with

numerals, the non-compositional nature of the combination with adjectives and the neutralization of the NUMBER distinction. Together with the agreement test, they provide evidence that pseudo-partitives with a measure or container noun are invariably of type A, while those with a quantifier or collection noun have both type A and type B uses. The current coexistence of grammaticalized functor uses and non-grammaticalized head uses for these nouns is a normal consequence of the fact that grammaticalization is a gradual process. For *a lot* this process is described in some detail in Traugott ([2008](#)), who locates the emergence of the grammaticalized (type B) use around the nineteenth century.

5 Pseudo-partitives without a preposition

Since the preposition that links N_1 to N_2 is semantically vacuous, it can be omitted without loss of information. This accounts for its absence in Dutch pseudo-partitives, not only when N_1 is a measure noun, as already shown in section 3.2.1, but also when it is a quantifier noun, as in *een aantal studenten* 'a number of students', a collection noun, as in *een groep toeristen* 'a group of tourists', or a container noun, as in *een fles* wijn 'a bottle of wine'. Pseudo-partitives without a preposition also exist in English, albeit on a more limited scale. For the discussion we distinguish between two types.

The first concerns combinations in which N_1 is a **quantifier** noun, as in (81)–(82).[14]

(81) A few hands$_{pl}$ go$_{pl}$ up when he asks if there are valid excuses. (COCA 1995 FIC)
(82) A great many things$_{pl}$ depend$_{pl}$ on that outcome. (COCA 2012 FIC)

In these combinations *few* and *many* show the typical characteristics of a head-selecting functor. They only combine with the indefinite article; they are not compatible with numerals; the combinations with an adjective are not compositional – with *many* sharing the property of *deal* that it requires the presence of either *great* or *good*; and they lack a plural counterpart (*fews, *manies*). Moreover, if the pseudo-partitive is in subject position, the verb shares the number value of N_2, as shown in (81)–(82). Exceptions are even less common than for the quantifier nouns that were discussed in section 4.1. COCA, for instance, contains 341 instances of [*a few* N_{pl}] and 102 of [*a good/great many* N_{pl}] in subject position, of which none is combined with a singular verb. Pseudo-partitives with *few* and *many* are, hence, invariably of type B, and the lexical entries of *few* and *many* are of the same kind as that of *lot*; see (52) in section 3.3.2. The only difference is that they select a bare nominal, instead of one that is introduced by *of*.

The second type of pseudo-partitives without a preposition concerns combinations in which N_1 belongs to a subclass of the **numeral** nouns, comprising *dozen*, *hundred*, *thousand* and *billion*. Examples from COCA are given in (83).

---

[14] The nouns *few* and *many* have adjectival counterparts. As adjectives, they can take a comparative or superlative affix, as in *fewer/more hands* and *fewest/most occasions*. As nouns, they are not compatible with these affixes.

(83) (a) A dozen eggs$_{pl}$ cost$_{pl}$ just over \$ 5 US (COCA 2012 BLOG)
      (b) A hundred kids$_{pl}$ play$_{pl}$ at the academy (COCA 2012 NEWS)
      (c) A billion bees$_{pl}$ swarm$_{pl}$ the Empire State Building (COCA 2012 WEB)

In contrast to the quantifier nouns (*few*, *many*), they are also used with a preposition, as in (84).

(84) (a) A dozen$_{sg}$ of eggs is$_{sg}$ approximately 1.5 pounds. (COCA 2010 WEB)
      (b) Dozens$_{pl}$ of vendors drop$_{pl}$ off and pick$_{pl}$ up merchandise. (COCA 2008 NEWS)

If used in the plural, the presence of the preposition is even obligatory: *dozens *(of) eggs*, *hundreds *(of) kids*, *billions *(of) bees*.

Comparing the examples in (83) and (84) the agreement facts suggest that the former are of type B, with the verb sharing the number value of N$_2$, while the latter are of type A, with the verb sharing the number value of N$_1$. This is confirmed by other properties of N$_1$. First, the indefinite article can be replaced by another determiner, such as the demonstrative *this*, in (84a), but not in (83a). Second, the indefinite article can be replaced by the numeral *one* in (84a), but not in (83a). Third, N$_1$ has a plural counterpart with the usual more-than-one interpretation in (84), but not in (83). Apparently, numeral nouns of type *dozen, hundred, thousand,* … behave as complement-selecting heads when the preposition is present, and as head-selecting functors when the preposition is omitted.

This brief discussion of pseudo-partitives without a preposition, hence, reveals yet another difference between the head and functor uses of N$_1$. If N$_1$ is a complement-taking head, the preposition cannot be omitted, but if it is a head-selecting functor, omission is possible for subclasses of N$_1$. The non-omissibility of the preposition in type A pseudo-partitives is in turn related to the fact that English nouns can take PP complements, but not NP complements.[15]

6 Conclusion

English pseudo-partitives are [N$_1$ – *of* – N$_2$[*bare*]] sequences. They come in two types, depending on whether they share the NUMBER value of N$_1$ (type A) or that of N$_2$ (type B). Type A can be analyzed along familiar lines, with N$_1$ taking a PP[*of*] complement, but type B is a harder nut to crack. Existing analyses resort to unorthodox treatments of the preposition (Akmajian & Lehrer 1976; Jackendoff 1977; Selkirk 1977; Keizer 2007) or unheard-of percolation mechanisms (Huddleston & Pullum *et al.* 2002). Employing the framework of Head-driven Phrase Structure Grammar we have developed an analysis of both types of pseudo-partitives in which the differences between them are shown to result from the different status of N$_1$: while it is a complement-selecting head in type A, it is a head-selecting functor in type B. The shift from head to functor status is an instance of grammaticalization and has been shown to apply in various degrees to

---

[15] Dutch and German are different in this respect. In these languages nouns can take an NP complement.

different classes of N_1. Making use of COCA, we have shown that it mainly affects the quantifier nouns and to a lesser extent the collection nouns, while the measure and container nouns are not affected. The shift from head to functor status of N_1 is mirrored by that of the preposition: while the preposition is the complement-selecting head of a PP in type A, it is a head-selecting functor in type B. In a last step, we have extended the analysis to pseudo-partitives without *of*.

Speaking in more general terms, the analysis of the English pseudo-partitive in this article has demonstrated how insights about the process of grammaticalization can be integrated into a framework for formal analysis. More specifically, the coexistence of head and functor uses for certain nouns and prepositions, which is synchronically motivated, mirrors the coexistence of grammaticalized and non-grammaticalized uses, which results from diachronic processes. From this perspective, the article shows how formal and functional approaches can be combined to shed light on issues where synchronic and diachronic considerations intertwine.

Authors' addresses:

Centrum voor Computerlinguïstiek
University of Leuven
Blijde Inkomststraat 21
3000 Leuven
Belgium
frank.vaneynde@kuleuven.be

Department of English Language and Literature
Kyung Hee University
26 Kyungheedae-ro, Dongdaemun-gu
Seoul 02447
Republic of Korea
jongbok@khu.ac.kr

References

Akmajian, Adrian & Adrienne Lehrer. 1976. NP-like quantifiers and the problem of determining the head of an NP. *Linguistic Analysis* 2, 395–413.

Allegranza, Valerio. 1998. Determiners as functors: NP structure in Italian. In Sergio Balari & Luca Dini (eds.), *Romance in HPSG*, 55–107. Stanford, CA: CSLI Publications.

Davies, Mark. 2008–. *The Corpus of Contemporary American English* (COCA): 520 million words, 1990–present. Available online at http://corpus.byu.edu/coca/

Ginzburg, Jonathan & Ivan A. Sag. 2000. *Interrogative investigations*. Stanford, CA: CSLI Publications.

Heinz, Wolfgang & Johannes Matiasek. 1994. Argument structure and case assignment in German, In John Nerbonne, Klaus Netter & Carl Pollard (eds.), *German in Head-driven Phrase Structure Grammar*, 199–236. Stanford, CA: CSLI Publications.

Huddleston, Rodney & Geoffrey K. Pullum *et al.* 2002. *The Cambridge grammar of the English language*. Cambridge: Cambridge University Press.

Jackendoff, Ray. 1977. *X-bar syntax: A study of phrase structure*. Cambridge, MA: MIT Press.

Keizer, Evelien. 2007. *The English noun phrase: The nature of linguistic categorization*. Cambridge: Cambridge University Press.

Kim, Jong-Bok & Peter Sells. 2011. The big mess construction: Interactions between the lexicon and constructions. *English Language and Linguistics* 15(2), 335–62.

Kim, Jong-Bok & Peter Sells. 2014. English binominal NPs: A construction-based perspective. *Journal of Linguistics* 51(1), 1–33.

Levine, Robert D. 2017. *Syntactic analysis: An HPSG-based approach*. Cambridge: Cambridge University Press.

Maekawa, Takafumi. 2015. Agreement mismatch between sort/kind/type and the determiner. In Stefan Müller (ed.), *Proceedings of the 22nd International Conference on Head-driven Phrase Structure Grammar*, 136–56. Stanford, CA: CSLI Publications.

Maekawa, Takafumi. 2016. Seminumerals, determiners and nouns in English. In Arnold Doug, Miriam Butt, Berthold Crysmann, Tracy Holloway King & Stefan Müller (eds.), *Proceedings of the Joint 2016 Conference on HPSG and LFG*, 422–41. Stanford, CA: CSLI Publications.

Müller, Stefan, Anne Abeillé, Robert D. Borsley & Jean-Pierre Koenig (eds.). 2021. *Head-driven Phrase Structure Grammar: The handbook*. Berlin: Language Science Press.

Pollard, Carl & Ivan A. Sag. 1994. *Head-driven Phrase Structure Grammar*. Stanford, CA, and Chicago: CSLI Publications and University of Chicago Press.

Sag, Ivan A. 1997. English relative clause constructions. *Journal of Linguistics* 33(2), 431–84.

Sag, Ivan A., Thomas Wasow & Emily M. Bender. 2003. *Syntactic theory: A formal introduction*. Stanford, CA: CSLI Publications.

Selkirk, Elisabeth O. 1977. Some remarks on Noun Phrase structure. In Adrian Akmajian, Peter Culicover & Thomas Wasow (eds.), *Studies in formal syntax*, 285–316. New York: Academic Press.

Traugott, Elizabeth C. 2008. Grammaticalization, constructions and the incremental development of language: Suggestions from the development of degree modifiers in English. In Regine Eckardt, Gerhard Jäger & Tonjes Veenstra (eds.), *Variation, selection, development: Probing the evolutionary model of language change*, 219–52. Berlin: De Gruyter Mouton.

Van Eynde, Frank. 1998. The immediate dominance schemata of HPSG. In Peter-Arno Coppen, Hans van Halteren & Lisanne Teunissen (eds.), *Computational linguistics in the Netherlands 1997*, 119–33. Amsterdam and Atlanta, GA: Rodopi.

Van Eynde, Frank. 2004. Minor adpositions in Dutch. *Journal of Comparative Germanic Linguistics* 7, 1–58.

Van Eynde, Frank. 2006. NP-internal agreement and the structure of the noun phrase. *Journal of Linguistics* 42(1), 139–86.

Van Eynde, Frank. 2018. Regularity and idiosyncrasy in the formation of nominals. *Journal of Linguistics* 54(4), 823–58.

Van Eynde, Frank. 2021. Nominal structures. In Müller *et al.* (eds.), 275–313.

Vos, Riet. 1999. A grammar of partitive constructions. PhD dissertation, Tilburg University.