19

When a Head is not a Head: A Constructional Approach to Exocentricity in English

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19.1 Introduction

As the name of the framework suggests, one of the driving forces behind traditional HPSG analyses is the notion of *head*. With the exception of a few non-headed constructions (i.e., mostly coordination), constructions are typically seen as being headed by a particular word or phrase with the nonhead constituting a complement, specifier or adjunct. The head determines the internal composition of a phrase and is responsible for its external distribution. Moreover, syntactic headedness, as determined by morphosyntactic criteria, is typically assumed to coincide with semantic headness. In the case of NPs, for instance, this means that the semantic contribution (including the index) of the entire phrase is provided by the element that is the head by morphosyntactic criteria (typically the noun).

In this paper, we intend to challenge this view of heads on the basis of two constructions from English. In both instances, we will argue that the constituents that are responsible for the internal combinatorial make-up of the phrase do not constitute heads because they fail both to determine the external distribution of the phrase and to contribute the semantic index of the projected phrase. At the same time, however, we will show that it is possible to view these cases not as random departures from more well-behaved headed constructions, but instead as particular instantiations of more general construction types which do not impose strict conditions on external headedness.

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19.2 English free relatives

As has been observed, for instance by Bresnan and Grimshaw (1978), free relative constructions (FRC) in English involve ordinary *wh*-filler-head structures which have the external distribution not of a clause but rather of the initial relative phrase. For instance, the examples in (1) show that, despite appearing clause-like, free relatives do not share other properties of clausal structures such as *it*-extraposition.

(1) a. It was unclear [what Bozo planted in his garden].
b.*It got Bozo into trouble [what he planted in his garden].

A number of solutions to the problem of accounting for the non-clausal external behavior of FRCs have been proposed, involving either phonologically unexpressed modified nouns or unary phrase structures (cf. Müller 1999 for German).

More recent proposals have attributed the external distribution directly to the filler phrase. In the analyses of Lee (2001) and Kim (2001), this is achieved by treating the clausal part as an (obligatory) adjunct to the relative phrase. However, such an approach leads to a dichotomy between the constructions that match an initial filler against a gap in a following clausal structure. In addition to ordinary filler–head structures, we need to assume that the same function can be performed by certain head–adjunct structures, even though they are structures that do not usually concern themselves with filler-gap dependencies. Furthermore, we need to posit the existence of adjunct clauses which do not seem to occur in any context outside free relative constructions.

Apart from these conceptual issues, a greater problem for analyses of this kind is that the relative phrase does not fully determine the external distribution of an FRC. For instance, Pollard and Sag (1994, 69) note that in examples like (2a), the whole FRC behaves like a singular NP despite the plural head *dogs*. Similarly, examples such as (2b) are understood in terms of the owner of the dogs being the addressee, not the dogs themselves.[1] [2]

(2) a. Whoever's dogs are running around in the garden is in big trouble.
b. You ought to talk to whoever's dogs they let run on the lawn.

[1] A somewhat milder instance of the same problem arises from mismatches in case, as observed by Lee (2001):

(i) Whomever he likes gives us a big headache later.

[2] Following Ginzburg and Sag (2000), we assume here that the relative phrase is always a filler even when it has subject status as in (2a). However, nothing we say here hinges on this assumption.

Thus, it seems that an analysis of FRCs that simply makes the initial phrase the head (for instance in the form of a head–adjunct structure) can neither make the relationship with ordinary filler–head structures explicit nor is it sufficient to properly predict the external distribution of the FRC.

19.3 English measure phrases

The second construction of English we will examines is characterized by the form *N of NP*, which serves to individuate mass or multiplex substances, indicate the amount of the substance and classify the substance along dimensions such as shape, dimensionality and extension. Some examples are *cup of coffee*, *bunch of flowers*, *square of cloth*, and *herd of elephants*. For ease of discussion we will refer to the first noun, say *cup*, as X and the second noun, say *coffee* as Y; thus giving us an *X of Y* phrase. The similarity in function between lexical items like *cup* or *square* and classifiers found in prototypical classifier systems has led researchers like Lehrer (1986) to propose that English possesses something akin to a classifier construction, which we will here refer to as a "measure phrase construction", or "EMP" (following Dodge and Wright 2002). Some examples of the construction follow in (3). Attested examples will be marked by "@"; all our attested examples come from the British National Corpus.

(3) a.@Place a **tablespoon of grape mixture** into the centre of each plate.
b.@The adult female lays **large clusters of eggs** (shown here magnified 15 times) sometimes wrapping them in bands around twigs.
c.@**Swarms of flies and mosquitoes** hover over the marshes.
d.@Thereafter he was allowed only six **boatloads of brushwood** a year, to be taken out under view of the bailiff.
e.@My catering was limited to brewing endless **mugs of insipid coffee** and opening packets of custard creams.
f.@Two women were trapped in the cabin, with only **inches of air space**, as the boat filled with icy water.
g.@The teacher, Beth, recites eleven **seconds of poetry** once they are quiet.

The problems posed by these measure phrase constructions fall into two categories. The first is the "transparency" of their head nouns with respect to external syntax; this includes both modifier placement and the selectional restrictions of verbs with EMPs as complements. The second is the strange agreement properties they exhibit, i.e., the ability

of the whole phrase to receive a plural index even when the head noun (X) is singular. For the first problem we encounter attested examples such as those found in (4):

(4) a.[@]A toddler was fighting for his life last night after he **swallowed** a bottle of **lethal acid** at a doctor's surgery.
b.[@]The adult female **lays** large clusters of **eggs** (shown here magnified 15 times) sometimes wrapping them in bands around twigs.
c.[@]The pair had been drinking all day and Jones downed more than 10 pints, while Miss Smith, 29, **drank** six or seven pints of **cider**, Nottingham Crown Court was told yesterday.
d.[@]Tammuz was watching TV alone, **eating** a bag of **Munchi-Chipz**.

The verb's selectional restrictions are satisfied by the EMP-internal noun or Y, (as discussed in Dodge and Wright 2002); in example (4a), it is unlikely that the toddler has swallowed the bottle itself; the bottle indicates the amount of lethal acid. In example (4b), the adult female is laying eggs, not clusters. In example (4d), Tammuz is eating Munchi-Chipz, not the bag itself.

Considered on its own, however, the phrase *bag of Munchi-Chipz* is not necessarily an EMP. There are phrases which are form-identical to EMPs, but are actually instantiations of a different construction, as becomes apparent when these phrases appear in a larger clause. In this more straightforwardly headed construction, the noun is followed by a prepositional phrase which modifies it, giving an indication of its contents. An example is given in (5):

(5) [@]The **bottle of champagne** took five attempts to **break** ...

Here the bottle itself is being broken, and *champagne* indicates what its contents are.

A near minimal pair is given in (6):

(6) a. The partygoers drank a bottle of champagne.
b. The partygoers smashed a bottle of champagne over the ship's prow.

In (6a) the verb *drank* selects for a liquid, which is satisfied by *champagne*. In (6b) the predicate *smashed* requires a solid physical object, which is supplied by *bottle*, the head noun. Even though the internal syntax of both phrases is identical, in one case *bottle* is transparent, allowing the non-head *champagne* to be the category determinant of the entire phrase and to satisfy *drink*'s selectional restrictions. In the other case there is a straightforward modificational relationship between the

N and the PP, with *of champagne* telling us more about the bottle-object. The external semantic distribution of *bottle of champagne* can either be predictable from the distribution of *bottle* or the distribution of *champagne*. In the case of the EMP in (6a), we know that the sentence is intuitively about champagne, the lower noun. Consider the example in (7):

(7) [@]No less than 53 extras portrayed the wartime travelling public, not forgetting a **crate of live chickens**, **one of which** actually **laid an egg** on set!

Here it is clear that *crate of live chickens* is picking out a particular group of chickens because it is followed by *one of which*, which can only refer to the chickens (especially since it laid an egg).

EMPs can also be embedded within each other as is illustrated in (8):

(8) a.[@]Dr. Robert Shore and Dr H Choudhury both dose with one granule in 110 ml water putting one tablespoon in a **glass of 110mls of water** ...

b.[@]He rummaged about in a chest of drawers, and then produced a **box of sheets of paper** with dried flowers that Leverrier had collected and mounted.

c.[@]A door opened, and Isay entered with a **tray of platters of food**.

d.[@]When I open it a **load of bits of paper** fall out and flutter to the ground.

Again we find that in these sentences, the phrase is intuitively about the most embedded noun, and the other elements of the clause are sensitive to this. Consider the example in (9) that illustrates a verb selecting through an embedded EMP.

(9) In a year, the average American **drinks** the equivalent of 5 24-count cases of 12-ounce cans of **soda**.

Intuitively, the patient of *drink* is *soda*, the most embedded noun, not *case* or *can*.

The second area of "transparency" in EMPs is that a modifier on the periphery of the EMP (next to the X) can modify qualities of the lower noun, Y. Examples are given in (10):

(10) a.[@]The only other colours are provided by a snaking **blue-black** ribbon of **tarmac** ...

b.[@]Soon Maggie held a **golden** BALL of **thread** and St Margaret had one end of it firmly attached to her finger.

c.[@]A long **white** strip of **cloth** linked them all from hand a hand

as they made their way down through the sleet and open snowy fields.

d.[@] A **bitter** cup of **coffee**, a rude salesgirl, a failed attempt to get the right ingredients for a vegetable lasagna, are the signposts of the day, and they are massive.

e.[@] Your husband needs to relax before he hits the sack. Make him a **delicious** cup of **99 tea**, Brenda, it licks other bedtime drinks—and it'll put an end to his night-time grinding!

f.[@] As our taxi made its way up the winding road to the north west of the island, we passed immaculate terraces filled with olive and citrus groves beneath which tethered goats grazed on the **dry** clumps of **grass**.

In all of these cases the adjective immediately adjacent to X is modifying properties of Y. Consider the pair in (11):

(11) a. I ate a can of mouth-watering beans.
b. I ate a mouth-watering can of beans.

Mouth-watering can appear in either position, next to the X or next to the Y, and still modify a property of the *beans*.[3] This possibility is striking because other classes of N-of-NP constructions do not allow this. For instance, consider (12):

(12) a. The mother of the injured boy refused to speak to the police.
b.*The injured mother of the boy refused to speak to the police.

In (12b) *injured* cannot precede *mother* and still be construed as modifying *boy*. Only the EMP licenses modifiers to appear adjacent to X (the first noun).

Whenever the larger clausal context requires a physical object reading, however, an alternation like that in (11a) and (11b) is disallowed, even though the phrase may be form-identical to an EMP. This is illustrated by the contrast in (13):

(13) a. In protest, I **smashed** a can of their mouth-watering beans against my head.
b.*In protest, I **smashed** a mouth-watering can of their beans against my head.

There is a second area in which EMPs prove interesting; measure phrases behave unusually with respect to agreement properties. Consider the attested corpus sentences in (14) and (15):

[3] However, as Tibor Kiss (p.c.) has pointed out to us, whenever quantity-denoting expressions such as *amount* are modified, the modifier seems to obligatorily construed with *amount*, not with *beans*:

(i) She prepared a mouth-watering amount of beans.

(14) a. A **herd of zebras**, hence, **produces** about a quarter to a third of **its** weight in prey carcasses each year.
b. Here, a **small clump of scarlet tulips brings** a disproportionate flash of brilliance to a spring dalliance of Daphne mezereum, muscari, erythronium and Magnolia stellata.

(15) a. To ease the pressure, a **truckload of Commandos were** taken to the rear, where **they** could relax for a couple of days.
b. A **herd of Asian elephant cows with calves drink** and **cool themselves** with mud.

The default agreement pattern is with X, the syntactic head, as expected, shown in (14). Note that the semantic head, the contributor of the semantic category of the entire phrase, is still *zebras* or *tulips*. It would appear that agreement is thus a property of syntactic heads. However, the sentences in (15) illustrate the possibility of agreement being determined by the measured multiplex (*Commandos* or *elephant cows*). When individuals are particularly salient in a collection they can, by means of semantic construal, coerce the entire phrase into being treated as a plural entity. This is further demonstrated by the use of the pronoun *they* in example (15a) which has the antecedent *a truckload of Commandos*.

With the embedded EMP, the agreement can be even trickier, as illustrated in (16):

(16) When I open it, a **load of bits of paper fall out** and **flutter** to the ground.

Here *fall out* and *flutter* agree with *bits*, which is the middle element and somehow the most salient.

At this point one may wonder if the agreement facts are a peculiarity of British English (which can make nouns like *government* plural). This doesn't appear to be the case since both agreement patterns were found in the BNC, as the preceding examples demonstrate. A second concern might be whether or not the agreement facts are the result of the proximity of the plural Y noun and the verb. However, this does not appear to be the case for several reasons: The first is that, as seen in (14a) and (15a), a plural or singular pronoun can be used later in the clause, suggesting that the EMP has really been conceptualized as either singular or plural. Secondly as seen in (16), the verb doesn't have to agree with the closest noun phrase, even when agreement doesn't take place with the syntactic head.

When the X is plural, agreement is necessarily plural, as illustrated in (17):

(17) a. Signalled by changes in the weather, great **herds of these**

deer follow ancestral migration routes to sheltered valleys and more ample food supplies.

b.*Great herds of these deer follows ancestral migration routes.

An additional agreement fact to note is that the determiner always agrees with the syntactic head, the X, as is demonstrated in (18) (cf. Casillas Martínez 2001).

(18) *These herd of Asian elephant cows with claves drink and cool themselves with mud.

In sum, a single notion of agreement cannot simply be linked directly with the semantic index because (1) the determiner always agrees with the "syntactic head" and (2) sentences exist where the semantic head is Y; but agreement still occurs with X. Consider the example in (19):

(19) The **herd of zebras is** finally eating its favorite plant again, after the plants' brush with extinction.

Here, the agreement is singular, but it is the zebras which are eating. This sentence is about *zebras* but the agreement doesn't have to be linked to *zebras*.

The one final complication that we will discuss is that the acceptance of plural agreement seems to depend on the lexical item in question as can be seen from the examples in (20).

(20) a. A school of remoras were silently attaching to an unsuspecting shark.

b. A circle of crows were hovering overhead.

c.?An entire boatload of bananas were eaten by the children.

d.*A bag of peas were lying on the floor.

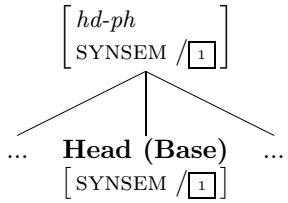
e.*A pile of logs were burning.

Clearly, the complexities of agreement in measure phrases combined with the category determinant facts point to the necessity of rethinking the notion of head. The base on which the internal syntax rests need not be identical to the elements of a construction that determine its external behavior.

19.4 Heads as bases

The solution we propose for analyzing the two construction types just discussed can be seen as an elaboration of the Generalized Head Feature Principle (GHFP) of Ginzburg and Sag (2000, 33), given in (21):

(21) **Generalized Head Feature Principle**

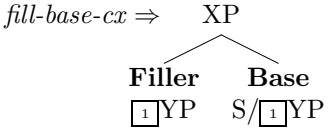


Since the identity of SYNSEM values is not a strict requirement but rather a default, we expect that a range of nonidentities between head daugher and mother are possible. In Ginzburg and Sag (2000), a primary concern is the nonidentity of valence information. Here we would like to explore the possibilities of even more extreme departures of the identity between head and mother.

19.4.1 Free relatives reconsidered

We first consider the case of FRCs. In the case of filler-initial constructions, we posit that there is a general phrase type in which a clausal expression is combined with a phrase that matches that clause's gap information, shown in (22). In order to avoid confusion with regular notions of headedness, we choose the more neutral labels "base" and "filler" to refer to the clausal and the filler parts, respectively (hence the label of **Head** in (21) now corresponds to our notion of **Base**).[4]

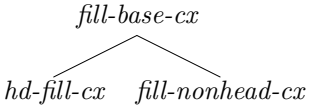
(22) **Filler-base construction**



Our notion of filler-base construction is a more abstract version of Sag and Ginzburg's (2002) notion of *hd-fill-cx*. The *hd-fill-cx* is now a subtype of our notion of filler-base construction, as part of the partial constructional hierarchy shown in (23):

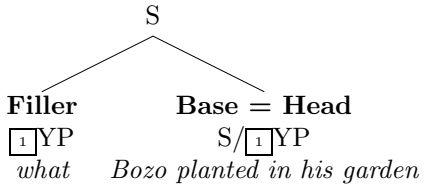
[4]Our notion of "base" is not unlike the one proposed by Zwicky (1993). However, there are important differences. First, Zwicky focuses his discussion only on nuclear constructions and does not address the status of "displacement". Thus, unless one wishes to subsume those under "specifier–specified" constructions, Zwicky's notion of "base" does not directly extend to those cases. Second, and more importantly, Zwicky's criteria for headedness unambiguously pick out the measure noun as the head and the base (cf. also Zwicky 1993:305), while our claim here is precisely that in such constructions there may be a mismatch between base and head properties.

(23) **Constructional hierarchy**



A regular *wh*-interrogative clause constitutes a subtype of the *fill-base-cx* construction in which the base contributes the category and content information for the entire construction, i.e., a clausal structure with some type of (open) propositional semantics, as outlined in (24):

(24) **Endocentric filler-base construction** (*hd-fill-cx*):
E.g., interrogative clause



We propose to analyze FRCs as another instance of filler–base constructions, but with different constraints on the syntactic and semantic properties of the mother node. Borrowing from Lee (2001) and Kim (2001), we utilize F-REL as a feature that characterizes phrases that are eligible to occur as fillers in FRCs.[5]

Furthermore, it is the value of the filler's F-REL feature—which we assume to be projected from the relevant *wh*-word—that determines the content of the entire FRC.[6] The **Base** part, i.e., the clausal structure, licenses the combination with the filler via (22) but does not itself contribute to the external properties of the entire construction. The details of this subconstruction are further spelled out in (25):[7]

[5]Thus, initial phrases in free relative constructions also need to be distinguished semantically. Extending the proposal made in Kim (2001), we can locate the difference between "specific" and "nonspecific" free relative clauses in the quantificational contributions made by the relative pronouns of either kind, as outlined in (i):

(i) a. *what*

$$\begin{bmatrix} \text{CAT } noun \\ \text{CONT } \boxed{2}(the\,\boxed{1}(thing(\boxed{1}))) \\ \text{F-REL } \{\boxed{1}\} \\ \text{Q-STORE } \{\boxed{2}\} \end{bmatrix}$$

b. *whatever*

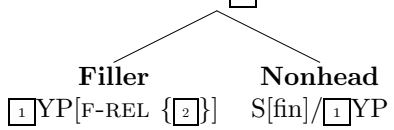
$$\begin{bmatrix} \text{CAT } noun \\ \text{CONT } \boxed{2}(forall\,\boxed{1}(thing(\boxed{1}))) \\ \text{F-REL } \{\boxed{1}\} \\ \text{Q-STORE } \{\boxed{2}\} \end{bmatrix}$$

[6]As Marianne Desmets (p.c.) has pointed out to us, this assumption requires further refinement. While it works well for FRCs that have argument status, in the case of FRC adjuncts, as in (i), the relative phrase (here: *whenever*) acts as a modifier of both the event described by the relative clause and the matrix clause:

(i) I'll leave whenever you want to leave.

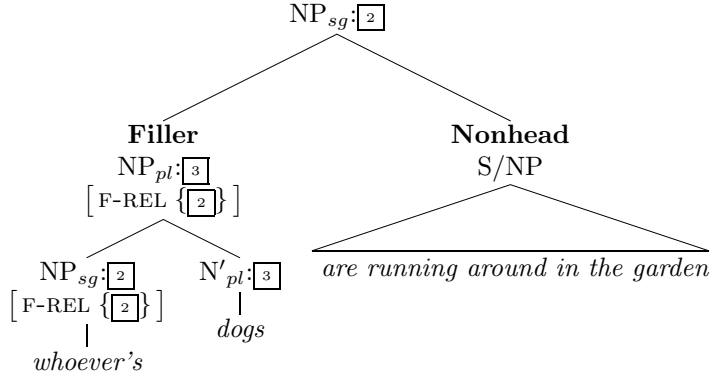
[7]One issue which we will not attempt to resolve here is whether a free relative

(25) **Filler-nonhead construction** (e.g., free relatives)
fill-nonhead-cx ⇒ YP′:[2]



A more elaborated example of a free relative clause, which is an example of an exocentric filler-base construction is presented in (26):

(26) **Example of free relative construction**



As a consequence of our analysis, the ordinary notion of syntactic head can be viewed as a special case of base. A head is a base which, in addition to determining the internal syntax of a phrase, also determines the external distribution. Typically bases are heads, but as the above example shows, they do not need to be. Under the view espoused here, such departures do not require a radically different analysis of the internal syntax.

19.4.2 English measure phrases reconsidered

The proposal made here can also be fruitfully applied to the problem of English measure phrases. This time, however, the constructions at issue are subinstances of base-complement structures. In addition to the regular combinations in which the noun contributes both the morphosyntactic and semantic head (cf. (6b)), we assume that there exists another way of licensing such combinations, giving rise to the partial constructional hierarchy in (27):

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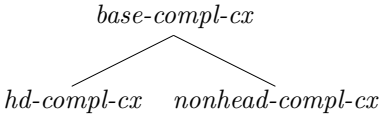
construction is always NP in category or whether there is flexibility in categorial status, depending on whether the phrase is an NP or PP. Kim (2001) argues for the first position, while traditionally the second view has been espoused (see, e.g., Bresnan and Grimshaw 1978, Baker 1995).

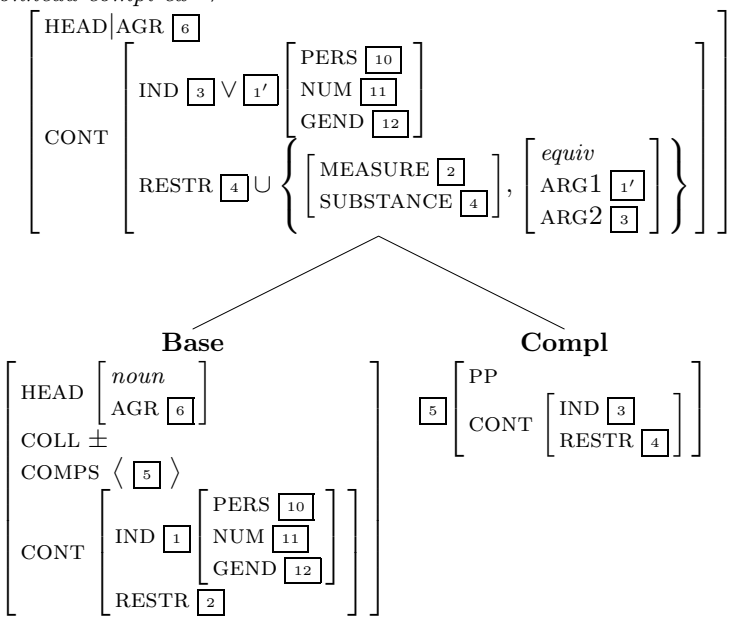
(27) **Constructional hierarchy**



English measure phrases are one instance of the *nonhead-compl-cx* type of construction, described in more detail in (28):

(28) **Nonhead-complement construction** (e.g., EMP)

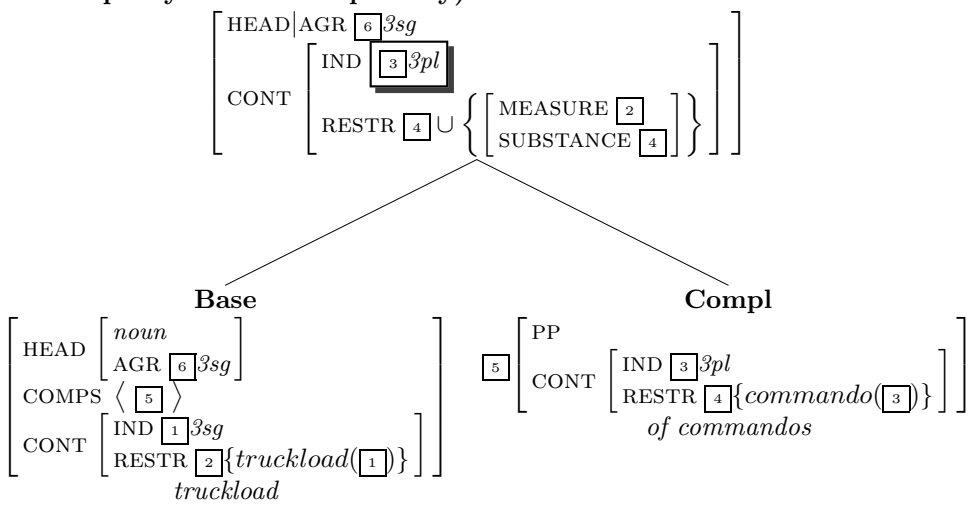
nonhead-compl-cx ⇒



As one can see from (28) the index of the resulting phrase is determined disjunctively. In the first case, Y is the semantic "head" of the construction and determines its external distribution by means of the index 3. This is the case where we find plural agreement. Everything about the index is shared, including its information about number, person and gender.

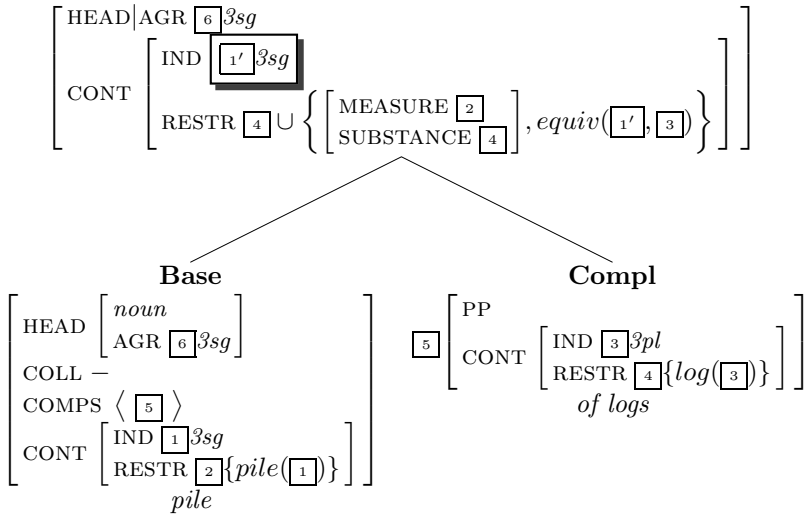
This situation corresponds to examples such as (15a) above and is illustrated more formally in (29):

(29) **EMP as instance of *nonhead-compl-cx* (full morphosyntactic transparency)**



The second possibility is that a new index, $\boxed{1'}$, is created, which gets its person, gender and number information from the Base. Crucially, the index is still distinct from the Base's index. There is still an unresolved issue, however. In our current analysis the RESTR values are shared. However, the value of RESTR is a set of restrictions on $\boxed{3}$, not $\boxed{1'}$. Thus something must ensure that the relations restricting $\boxed{3}$ are also restrictions on $\boxed{1'}$. That is, $\boxed{1'}$ and $\boxed{3}$ are semantically equivalent, hence (28) contains a constraint of semantic equivalence. A verb or adjective is sensitive to the semantics of the Nonbase when it combines with the EMP. For examples such as (20e), this gives rise to the analysis outlined in (30):

(30) **EMP as instance of *nonhead-compl-cx*, (semantic transparency only)**



Furthermore we propose a feature, COLL, which determines whether or not a particular lexical item has enough collectivizing properties to allow for a "transparent" determination of the index of the measure phrase. This varies from speaker to speaker and is also affected by context, but for simplicity's sake, we will state this as a feature in each speaker's lexicon. Thus, the most common case will be that $\boxed{1'}$ is constructed as the index. This makes sense if we consider NP-internal concord. As (30) shows, the NP-internal concord is always with the base and its AGR information; this is also the element which is the morpho-syntactic locus. Speakers might, therefore, prefer concord and agreement to depend on the same element in a phrase, if possible. Many measure expressions also allow for the other possibility, that is, having the Nonbase determine the morphosyntactic properties of the entire phrase.

Others, such as *pile*, however, appear to be highly resistant to letting the Nonbase determine the external distribution of the phrase, as was seen in (20e) above. Such expressions require that the phrase's index always be determined from their own ($\boxed{1}$), as is illustrated in (30). This is captured by marking them as $\left[\text{COLL} -\right]$, which in turn limits the choice of index to $\boxed{1'}$.

One final complication is how to block singular agreement when the Base is plural, but the Nonbase is singular as in *two strips of cloth*. In our figure there is actually nothing preventing this, because the

index can always be directly taken from the Nonbase. We would like to propose that although the morphological marking is on the Base; semantically speaking, pluralization takes the entire phrase in its scope. As a result, this pluralization blocks any "transparency", which may otherwise allow for singular Y to affect the external behavior of the entire phrase. We will leave it for future research to make this idea more precise.[8]

19.5 Summary and conclusion

The approach argued here lets us have our cake and eat it too: we can account for the special properties of FRCs and measure phrases without having to treat them as unrelated deviations from more established patterns. Rather, in terms of their internal syntax (i.e., the factors that license the combination in the first place) they can be analyzed in a manner that is fully parallel to the case of more "well-behaved", better known, fully headed counterparts.[9] Thus our approach allows us to weave a tighter web of constructional relationships and to state the shared properties of internal syntax across related constructions at just the right level.

From this vantage point, a conventional headed construction is simply one in which the properties of the entire expression can be straightforwardly predicted from the properties of the base. If successful, the approach outlined here may replace the binary distinction of endocentric and exocentric with a more fine-grained typology of how properties of the phrase are determined from its constituent parts.

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[8] Another issue which the proposal in (28) glosses over is the fact that in *X of Y*, *of+Y* forms a PP constituent whose semantic properties are largely determined by Y, rather than the syntactic head *of*. The issue of such semantically vacuous prepositions has received quite a bit of attention over the years, culminating in van Eynde's (2002) recent work on "minor prepositions" (in Dutch). Alternatively, one could imagine extending the present account of exocentricity to such cases as well and treating the preposition as as the Base, but not necessarily as the head of the phrase.

[9] In some ways this is similar to the mixed category cases discussed by Malouf (1999), except that in the cases considered here, the mixed category behavior is arguably not reducible to lexical properties.

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