A constructional approach to English verbal gerunds

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English verbal gerunds have long been of interest to syntacticians. Verbal gerund phrases display a mix of nominal and verbal properties which provide a challenge to any syntactic framework that assumes a strict version of X-bar theory. Various approaches have been proposed to get around these problems, but they all involve abandoning a fundamentally desirable theoretic assumption or adopting a highly abstract structure for which independent motivation is difficult to find, or both. An ideal analysis of verbal gerunds in English would be able to account for their mixed verbal and nominal properties without the addition of otherwise unmotivated mechanisms. In this paper, I will propose an analysis based on recent work in Construction Grammar and Head-driven Phrase Structure Grammar that treats verbal gerunds as a hybrid category that inherits some properties of nouns and some properties of verbs.

1 Properties of verbal gerunds

The strongest evidence for the nominal nature of verbal gerunds comes from the external distribution of verbal gerund phrases (VGerPs). VGerPs appear in contexts where otherwise only noun phrases can occur. For one, clauses, unlike NPs, are generally prohibited from occurring sentence internally, as shown in (1).

(1)   a. *I believe that Pat took a leave of absence bothers you.

      b. *Why does that Pat took a leave of absence bother you?

However, VGerPs are subject to no such constraint:

(2)   a. I believe that Pat's/Pat taking a leave of absence bothers you.

      b. Why does Pat's/Pat taking a leave of absence bother you?

This is a point about which there has been some disagreement in the literature. Reuland (1983), for instance, claims that accusative subject VGerPs cannot appear clause internally. However, consider the following examples:

(3)   a. *Did that Pat got arrested bother you?

      b. *Did for Pat to get arrested bother you?

      c. *Did to get arrested bother you?

      d. ?Did Pat getting arrested bother you?

  e. Did getting arrested bother you?

  f. Did Pat's getting arrested bother you?

  g. Did Pat's arrest bother you?

While (3d) may be somewhat awkward, there is a clear difference in acceptability between (3a–c) on the one hand and (3d–g) on the other. Therefore I think it is reasonable to conclude that with respect to the prohibition against sentence-internal clausal arguments, VGerPs behave like NPs and not like Ss.

 One thing worth observing here is that verbal gerund phrases do not have the full distribution of NPs. In particular, as we see in (4), verbal gerunds cannot be possessive specifiers.

(4) a. Pat's leave of absence's bothering you surprises me.

  b. *Pat's/Pat taking a leave of absence's bothering you surprises me.

But, as Zwicky and Pullum (1996) observe, only a restricted subclass of what are otherwise clearly NPs can show up as possessives. So, (4) suggests that verbal gerunds, like of the other cases they describe, fall into a "functionally restricted" subclass of nouns that cannot head possessive phrases.

 On the other side of things, there are contexts which admit verbal gerunds but not regular NPs. Jørgensen (1981) and Quirk et al. (1985:1230) discuss a class of predicative adjectives which select for an expletive subject and a verbal gerund complement, as in (5).

(5) There's no use (you/your) telling him anything.

The fact that the complement's subject can appear in the possessive shows that the complement really is a verbal gerund phrase and that this is not a case of subject-to-object raising. Examples such as this provide suggestive evidence that verbal gerunds form a subcategory of noun.

 While the external syntax of verbal gerunds is much like that of NPs, their internal structure is more like that of VPs. For one, VGers take accusative NP complements, while the nominal gerund in (6b) can only take a PP complement:

(6) a. (Pat's/Pat) loudly calling (*of) the roll started each day.

  b. The loud calling *(of) the roll started each day.

Another verb property of verbal gerunds is that verbal gerunds take adverbial modifiers. In contrast, common nouns take adjectival modifiers:

(7) a. Pat financed (me/my) carefully restoring the painting.

  b. The careful/*carefully restoration of the painting took six months.

Similarly, verbal gerunds, unlike nouns, can be negated with the particle *not:*

(8) a. Pat's not having bathed for a week disturbed the other diners.

    b. *The not processing of the election results created a scandal.

These facts have been used to motivate the claim that verbal gerunds must be verbs at some level. However, none of the behavior exhibited in (6)–(8) is unique to verbs. Some of the verb-like properties of gerunds, such as licensing adverbial modifiers, are also shared by determiners, prepositions, and adjectives:

(9) a. Sandy is awakened early almost every morning.

    b. Sandy lives directly beneath a dance studio.

    c. Sandy's apartment has an insufficiently thick ceiling.

Similarly, *not* can be used in some circumstances to negate adverbs, adjectives, PPs, and determiners:

(10) a. Not surprisingly, the defendant took the Fifth.

    b. The conference will be held in Saarbrücken, not far from the French border.

    c. Not many people who have gone over Niagara Falls live to tell about it.

These facts about modification and negation do not show that verbal gerunds are verbs. What they show is that verbal gerunds, unlike common nouns, are part of a larger class of expressions which includes verbs.

The complementation facts also do not constitute a strong argument that verbal gerunds must be verbs. Like verbs and verbal gerunds, prepositions also can take NP complements. On the other hand, some verbs only take PP complements:

(11) The strike extended *two weeks/through the summer.

The fact that some verbal gerunds take accusative objects is therefore not especially striking. What is important is that a verbal gerund, unlike a nominal gerund, takes the same complements as the verb from which it is derived:

(12) a. Chris casually put the roast in the oven.

    b. Chris's/Chris casually putting the roast in the oven appalled the visiting vegetarians.

    c. Chris's casual putting of the roast in the oven appalled the visiting vegetarians.

So, what we can say is that a VGerP headed by the *-ing* form of a verb has the same internal syntax as a VP headed by a finite form of that same verb.

To summarize, VGerPs have four basic properties that need to be accounted for. These are given in (13).

(13) a. A verbal gerund takes the same complements as the verb from which it is derived.

  b. Verbal gerunds are modified by adverbs and not by adjectives.

  c. The entire verbal gerund phrase has the external distribution of an NP.

  d. The subject of the gerund is optional and, if present, can be either a genitive or an accusative NP.

The properties in (13) are shared by accusative subject (acc-*ing*), genitive subject (POSS-ing), and subjectless (PRO-ing) verbal gerund phrases and are not shared by any other English constructions. The three types of verbal gerunds seem to be subtypes of a single common construction type, and any analysis of verbal gerunds ought to be able account for their similarities in a systematic way.

It is important to note, however, that there are differences among the three types which also must be accounted for (Reuland 1983, Abney 1987). Of course, the most obvious difference is the definitional one, namely the case of the subject. In that respect, POSS-ings are more like NPs, while acc-*ing*s are more like Ss. Another difference can be found in their agreement behavior when conjoined:

(14) a. That Pat came and that Chris left bothers/??bother me.

  b. Pat coming (so often) and Chris leaving (so often) bothers/??bother me.

  c. Coming (so often) and leaving (so often) bothers/??bother me.

  d. Pat's coming and Chris's leaving ??bothers/bother me.

  e. Pat and Chris *bothers/bother me.

Conjoined acc-*ing* or PRO-ing VGerPs, like conjoined Ss, prefer singular (or default) number agreement on the verb. Conjoined POSS-ing VGerPs, like conjoined nouns, prefer plural agreement. Furthermore, the two types of verbal gerunds cannot be comfortably conjoined:

(15) a. *Pat's coming and Chris leaving bothers/bother me.

  b. *Pat coming and Chris's leaving bothers/bother me.

The patterns of compatibility in (14) and (15) follow naturally from the assumption that acc-*ing* and POSS-ing VGerPs are of different semantic types. POSS-ing VGerPs, like NPs, have nominal semantics, with an index specified for person, number, and gender. In contrast, acc-*ing* VGerPs, like Ss, have propositional semantics.

Another difference between the two types of VGerPs pointed out by Abney (1987) is that POSS-ing but not acc-*ing* VGerPs with WH subjects can front under 'pied piping':

(16)   This is the reporter whose/*who(m) winning the Pulitzer Prize surprised Sandy.

Again, the same contrast can be seen between NPs and Ss:

(17)   a.   This is the reporter whose success surprised Sandy.

   b. *This is the reporter for whom to win the Pulitzer Prize surprised Sandy.

Here again is an instance where POSS-ing VGerPs pattern more like NPs while acc-*ing* VGerPs pattern like Ss. However, it is hard to see how this difference can be attributed to a difference in the semantics of the two types of gerund phrases. Instead, what this evidence shows is that at some purely syntactic level POSS-ing VGerPs have something in common with NPs while acc-*ing* VGerPs have something in common with Ss.

2   HPSG preliminaries

An ideal analysis of verbal gerunds in English would be able to account for their mixed verbal/nominal properties without the addition of otherwise unmotivated mechanisms. Recent work in Construction Grammar (Fillmore and Kay to appear) and Head-driven Phrase Structure Grammar (Pollard and Sag 1994) provide the foundation for such an analysis. Sag (to appear) proposes an elaboration of the HPSG X-bar theory to include hierarchically classified phrase structure rules. Under this view, the internal structure of a phrase is determined by both the lexical properties of the head and by the construction type of which the phrase is an instance. In this section, I will present a brief overview of the relevant features of Sag's (to appear) hierarchy of phrase types.

In HPSG, words and phrases are taken to be types of *signs,* "structured complexes of phonological, syntactic, semantic, discourse, and phrase structural information" (Pollard and Sag 1994:15). Signs are represented by typed feature structures, and the grammar of a language is represented as a set of constraints on types of signs. These sign types are further organized into a multiple-inheritance hierarchy to allow linguistic generalizations to be precisely stated.

Considerable work in HPSG has focused on examining the hierarchical structure of the lexicon. More recently, Sag (to appear) has investigated applying the same methods of hierarchical classification to types of phrasal signs. A small part of the phrase type hierarchy is given in (18).

(18)
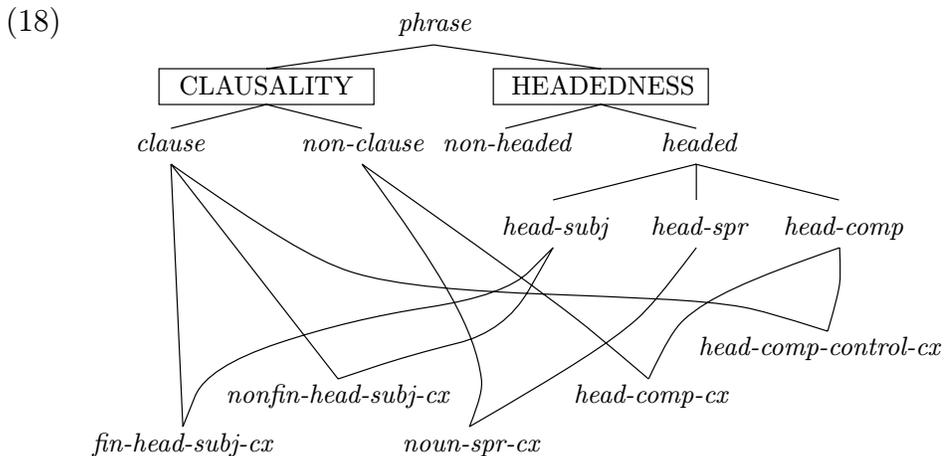
Phrases can be divided into two types: endocentric *headed* phrases and exocentric *non-headed* phrases. Since syntactic constraints are stated as constraints on particular types of signs, the HPSG Head Feature Principle can be represented as a constraint on all signs of the type *headed.* Headed phrases can be further subdivided according to the kind of subcategorization dependency they discharge: subject, specifier, or complement. In addition, constructions inherit constraints from the cross-cutting classification of phrases into either *clause*s or *non-clause*s. Among other things, clauses have a constraint on the type of their semantic content. A clause's content must be a *parameterized state of affairs (psoa),* something that roughly corresponds to a proposition.

These two hierarchical classifications define a set of constraints on phrasal signs. A *construction* is a phrasal sign type that inherits from both the *phrase* hierarchy and the *clause* hierarchy. Since a construction licenses a type of complex sign, it must include information about how both the form and the meaning are assembled from the form and the meaning of its component parts. A construction may inherit some aspects of its meaning from its supertypes, and in contrast to the strictly head-driven view of semantics presented by Pollard and Sag (1994), a construction may also have idiosyncratic meaning associated with it.

The *fin-head-subj-cx* and the *nonfin-head-subj-cx* constructions combine a subcategorized-for subject with a finite and non-finite head, respectively. The finite version, for normal English sentences like *They walk* requires a nominative subject. The non-finite version, for 'minor' sentence types like absolutes, requires an accusative subject. The *noun-poss-cx* construction combines a noun head with a possessive specifier to form a phrase with a *nom-*

obj (i.e., an index bearing unit) as the CONTENT value. To be more precise, the construction type *noun-poss-cx* is subject to the following constraint:

(19)
$$\begin{bmatrix} \textit{noun-poss-cx} \\[4pt] \text{SYNSEM}\,|\,\text{LOCAL} \begin{bmatrix} \text{CAT}\,|\,\text{HEAD } \textit{noun} \\ \text{CONT } \textit{nom-obj} \end{bmatrix} \\[12pt] \text{SPR-DTR}\,|\,\text{SYNSEM}\,|\,\text{LOCAL}\,|\,\text{CAT}\,|\,\text{HEAD} \begin{bmatrix} \textit{noun} \\ \text{CASE } \textit{gen} \end{bmatrix} \end{bmatrix}$$

3   A new analysis

As we saw in section 1, verbal gerunds display a mix of nominal and verbal properties that seems puzzling given many assumptions about syntactic structure. Various approaches have been proposed to get around these problems. Abney (1987) argues for a highly abstract phrase structure involving phonologically null heads and syntactic word formation. Pullum (1991) suggests allowing a V to project an NP under certain circumstances, but his analysis crucially depends on the default nature of the GPSG Head Feature Convention, something which has itself raised serious formal problems (Shieber 1986, Bouma 1993). Lapointe (1993) proposes a more conservative modification to standard notions of endocentricity by introducing dual lexical categories like ⟨N|V⟩, a V which projects a VP dominated by an NP. Wescoat (1994), on the other hand, proposes to preserve phrasal endocentricity by allowing a single word to project two different unordered lexical categories and therefore two different maximal phrases. While these analysis differ greatly in their technical details, they all assign VGerPs some variation of the following structure:

(20)

```
            NP
          /    \
       NP       VP
      /\\       /   \
   Brown's    V      NP
              |      /\\
          painting  his daughter
```
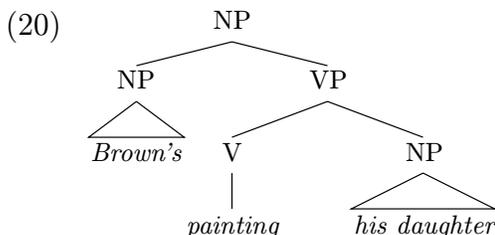
This reflects the traditional description of VGerPs as 'verbal inside, nominal outside' quite literally by giving VGerPs a VP node dominated by an NP node. However, since (20) is quite unlike the structures one typically finds in English, each of these analyses requires abandoning a fundamentally desirable theoretic assumption or adopting a highly abstract structure for which independent motivation is difficult to find.

The factorization of syntactic information in the HPSG lexicon allows an analysis which requires no such move. Words in HPSG select for arguments

of a particular category. Therefore, categorial information projected from the lexical head determines the external distribution of a phrase. Selectional information, from a lexical head's valence features, determines what kinds of other phrases can occur in construction with that head. Constructional information, represented as constra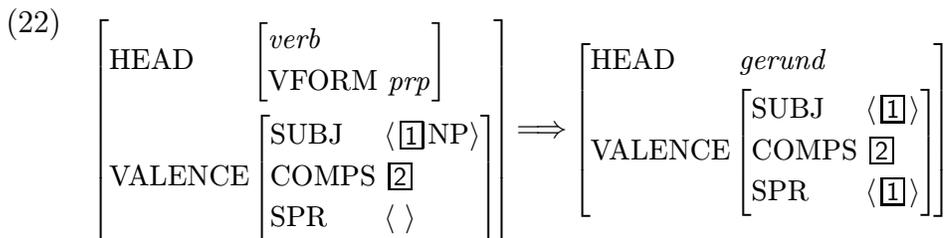ints on particular constructions, controls the combination of syntactic units. Within each of these three domains, VGerPs show fairly consistent behavior. What is unusual about verbal gerunds is their combination of noun-like categorial properties with verb-like selectional properties.

Within HPSG, the categorial properties of verbal gerunds are determined by their lexically specified HEAD value. Like all other linguistic objects, types of HEAD values can be arranged into a multiple inheritance type hierarchy expressing generalizations across categories. The distribution of VGerPs can be accounted for by the (partial) hierarchy of HEAD values in (21).

(21)

$$
\begin{array}{c}
head \\
\diagdown \\
noun \qquad verbal \\
\end{array}
$$

$$p\text{-}noun \quad c\text{-}noun \quad gerund \qquad verb \quad adjective$$
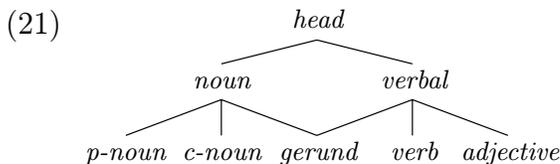
Since *gerund* is a subtype of *noun,* a phrase projected by a gerund will be able to occur anywhere an NP is selected for. Thus, VGerPs will have the external distribution of NPs. Adverbs modify objects of category *verbal,* which include verbs, adjectives, and verbal gerunds, among other things. Since adjectives only modify *c(ommon)-nouns,* VGerPs will contain adverbial rather than adjectival modifiers. Since *verb* is a distinct subclass of *verbal* disjoint from *gerund,* VGerPs will not have the distribution of true VPs. This cross-classification directly reflects the traditional view of gerunds as intermediate between nouns and verbs. By formalizing this intuitive view as a cross-classification of HEAD values, we can localize the idiosyncratic behavior of verbal gerunds to the lexicon.

The position of *gerund* in the hierarchy of HEAD values provides an immediate account of the facts in (13b) and (13c). The remaining two gerund properties in (13) can be accounted for most simply by the lexical rule in (22).

(22)
$$
\begin{bmatrix}
\text{HEAD} & \begin{bmatrix} verb \\ \text{VFORM } prp \end{bmatrix} \\
\text{VALENCE} & \begin{bmatrix} \text{SUBJ} & \langle \boxed{1}\text{NP} \rangle \\ \text{COMPS} & \boxed{2} \\ \text{SPR} & \langle \, \rangle \end{bmatrix}
\end{bmatrix}
\Longrightarrow
\begin{bmatrix}
\text{HEAD} & gerund \\
\text{VALENCE} & \begin{bmatrix} \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{COMPS} & \boxed{2} \\ \text{SPR} & \langle \boxed{1} \rangle \end{bmatrix}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{PHON} & \langle\text{peynt\i\ng}\rangle \\[4pt]
\text{SYNSEM}\,|\,\text{LOCAL} &
\begin{bmatrix}
\text{CAT} &
\begin{bmatrix}
\text{HEAD} & \begin{bmatrix} verb \\ \text{VFORM } prp \end{bmatrix} \\[10pt]
\text{ARG-ST} & \langle\boxed{1},\ \boxed{2}\rangle \\[6pt]
\text{VALENCE} &
\begin{bmatrix}
\text{SUBJ} & \langle\boxed{1}\text{NP}_{\boxed{3}}\rangle \\
\text{COMPS} & \langle\boxed{2}\text{NP}_{\boxed{4}}\rangle \\
\text{SPR} & \langle\,\rangle
\end{bmatrix}
\end{bmatrix} \\[30pt]
\text{CONT} &
\begin{bmatrix}
paint\text{-}rel \\
\text{ARTISTE } \boxed{3} \\
\text{MODEL } \boxed{4}
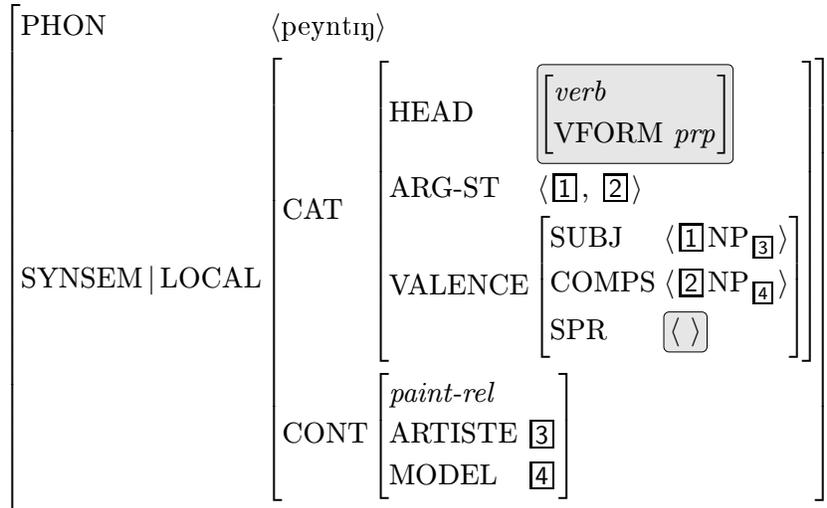\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Figure 1: Lexical entry for *painting* (participle).

This rule produces a lexical entry for a verbal gerund from the present participle form of the verb. The verbal gerund differs syntactically from the participle in two ways: it is of category *gerund* and it subcategorizes for both a specifier and a subject. Since a verbal gerund selects for the same complements as the verb it is derived from, the phrase formed by a verbal gerund and its complements will look like a VP. And, since a gerund selects for both a subject and a specifier, it will be eligible to head either a *nonfin-head-subj-cx,* which combines a head with an accusative NP subject, or a *noun-poss-cx,* which combines a head with a genitive NP specifier. Since the subject and specifier are identified with each other, no verbal gerund will be able to combine with both a subject and a specifier. Genitive subject VGerPs will inherit all the constraints that apply to possessive constructions in general, for example, restrictions on the specifier NP and on pied piping. The differences in agreement found between verbal gerunds with accusative subjects and those with genitive specifiers follow from the differences between the two constructions: the *noun-poss-cx* construction licenses a phrase with nominal semantics while the *nonfin-head-subj-cx* construction licenses a phrase with propositional semantics.

To see how these constraints interact to account for the syntax of verbal gerunds, it will be useful to consider an example of each type. First, consider the (partial) lexical entry for the present participle of the verb *paint,* in Figure 1. This entry states that there is a word (pronounced /peynt\i\ng/) which is the present participle form of a verb. It selects for two arguments, a subject and a complement, which fill the ARTISTE and MODEL roles of the verb's meaning. Most of the information in a lexical entry like Figure 1 is inherited from higher lexical types. In general, only the phonology, semantics,

$$
\begin{bmatrix}
\textit{noun-poss-cx} \\[4pt]
\text{CAT}
\begin{bmatrix}
\text{HEAD } \boxed{1} \\[4pt]
\text{VAL}
\begin{bmatrix}
\text{SUBJ} & \langle \boxed{2} \rangle \\
\text{COMPS} & \langle\,\rangle \\
\text{SPR} & \langle\,\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Left daughter:

$$
\boxed{2}
\begin{bmatrix}
\text{CAT} \,|\, \text{HEAD}
\begin{bmatrix}
\textit{noun} \\
\text{CASE } \textit{gen}
\end{bmatrix}
\end{bmatrix}
$$

Brown's

Right daughter:

$$
\begin{bmatrix}
\textit{head-comp-cx} \\[4pt]
\text{CAT}
\begin{bmatrix}
\text{HEAD } \boxed{1} \\[4pt]
\text{VAL}
\begin{bmatrix}
\text{SUBJ} & \langle \boxed{2} \rangle \\
\text{COMPS} & \langle\,\rangle \\
\text{SPR} & \langle \boxed{2} \rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{CAT}
\begin{bmatrix}
\text{HEAD } \boxed{1}\,\textit{gerund} \\[4pt]
\text{VAL}
\begin{bmatrix}
\text{SUBJ} & \langle \boxed{2} \rangle \\
\text{COMPS} & \langle \boxed{3} \rangle \\
\text{SPR} & \langle \boxed{2} \rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\qquad
\boxed{3}
\begin{bmatrix}
\text{CAT} \,|\, \text{HEAD } \textit{noun}
\end{bmatrix}
$$

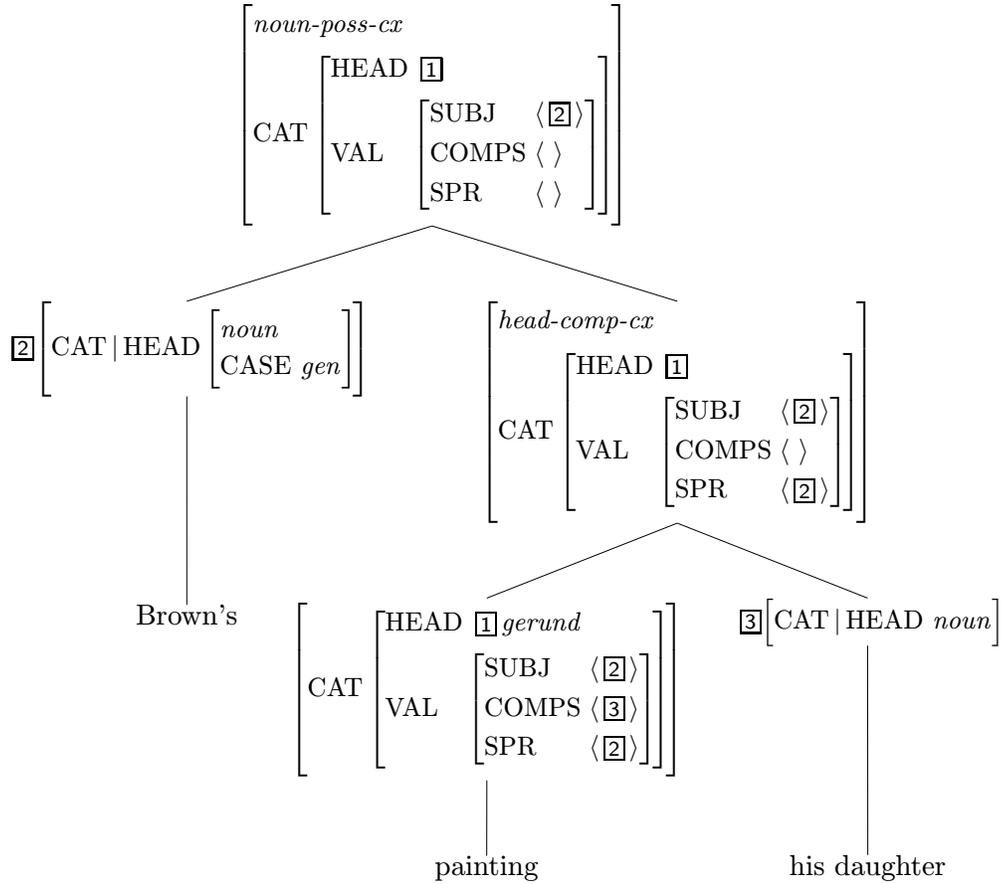painting   his daughter

Figure 2: *Brown's painting his daughter*

and perhaps subcategorization frame need to be stipulated for each lexical entry. From the entry in Figure 1, the lexical rule in (22) produces a matching entry that differs only in the shaded values. The output of the lexical rule is of category *gerund,* rather than *verb,* and the gerund selects for both a subject and a specifier. All other information about the verbs gets carried over from the input to the lexical rule.

Now we turn to the constructions which a verbal gerund is eligible to head. There are two cases, poss-ing VGerPs and acc-*ing* VGerPs. First we will look at the structure of the VGerP *Brown's painting his daughter,* shown in Figure 2. The head of this phrase, *painting,* is a verbal gerund formed by the lexical rule in (22). It combines with its complement NP (marked $\boxed{3}$) via the *head-comp-cx* construction. It then combines with a genitive specifier to form a *noun-poss-cx* construction.

Note that the resulting verbal gerund phrase still has an unsatisfied subj requirement, which is token-identical to the specifier *Brown's.* Since the two head/subject constructions require a nominative or accusative subject, the verbal gerund phrase will not be able to head a head/subject construction and

the subject requirement will never be discharged. This presents no difficulty for the analysis, as no constraint requires that NPs have an empty SUBJ list. In fact, it is crucial to Borsley's (to appear) analysis of predicative constructions described in Pollard and Sag (1994) that there be no such requirement. Since the entire phrase is an instance of *noun-poss-cx,* its content is a *nom-obj* by the constraint in (19). Since *nom-obj*'s have an index with person, number, and gender features, conjoined phrases with *nom-obj* semantics trigger plural agreement.

An equivalent example with an accusative subject would be *Brown painting his daughter.* This example differs from the previous example only in the way the subject combines with the head. The *nonfin-head-subj-cx* construction combines a non-finite head with an accusative subject. As before, the lingering SPR value will not create a problem, as no head-specifier construction allows an accusative specifier. The semantic content of the entire phrase will be an object of the type *psoa,* which has no index and therefor no person, number, or gender features. So, conjoined *psoa* objects trigger singular verb agreement.

As these examples show, the constructions that combine a verbal gerund with its complements and its subject or specifier are the same constructions used for building NPs, VPs, and Ss. This reflects the traditional view that VGerPs are built out of pieces of syntax 'reused' from other parts of the grammar. In one sense, under this analysis a verbal gerund together with its complements really is like V′. Both are instances of the same construction type and both are subject to any constraints associated with that construction. In the same way, a verbal gerund plus an accusative subject really do form an S, while a verbal gerund plus a genitive subject really do form an NP. So, these two types of verbal gerund phrases inherit the constraints on semantic type and pied piping associated with the construction type of which they are an instance. However, in a more important sense, a verbal gerund plus its complements forms a VGer′, which combines with an accusative or genitive subject to form a VGerP. The analysis presented here allows this similarity to be captured without weakening HPSG's strong notion of endocentricity.

4   Conclusion

By exploiting HPSG's hierarchical classification of category types and its inventory of elaborated phrase structure rules, we are able to account for the mixed behavior of English verbal gerunds without adding any additional theoretical mechanisms or weakening any basic assumptions. The analysis presented here does not require syntactic word formation and thus preserves lexical integrity. It also does not require any phonologically null elements or abstract structure, and it allows us to maintain the strong notion of endocentricity embodied by the HPSG Head Feature Principle. Finally, by making crucial reference to syntactic constructions, this analysis allows us to capture

on the one hand the similarities among the sub-types of verbal gerund phrases and on the other their similarities to other English phrase types.

Acknowledgements

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