Remarks on Marking

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Abstract

This paper calls for a reexamination of the Marking Theory of HPSG, which in its standard form involves a considerable amount of dedicated formal machinery, but which proves to be inapplicable for most types of grammatical marking. As an alternative, it is demonstrated that head-marker phrases can be reanalyzed as head-complement structures, with the marking element treated as the syntactic head. This approach allows the elimination of all marking-specific formal apparatus, with the exception of the attribute MARKING, which percolates as an ordinary HEAD feature, and whose function is significantly expanded.

The proposed approach allows marking elements to be related to other lexical heads (prepositions, in particular), and marking constructions are better integrated in the grammar, rather than being grouped into an exceptional class of head-marker phrases.

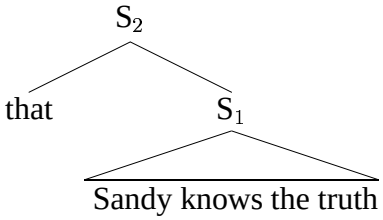
1 Assumptions and Consequences

The Marking Theory in Pollard and Sag (1994) is introduced primarily in order to analyze a single construction—*that*-marked finite clauses in English—although a few other potentially relevant constructions are mentioned in passing. Focusing on *that*-clauses for the moment, consider the simple example

(1) Kim fears [that Sandy knows the truth].

A satisfactory analysis of the bracketed phrase must meet a number of requirements. First, it must license the binary combination of *that* (which I will refer to pre-theoretically as the "marking element," as opposed to "marker") with the sentence *Sandy knows the truth* (I ignore other conceivable, but implausible syntactic analyses of this construction):

(2)



Second, the analysis must account for the contribution of the marking element *that*—i.e., S_2 should differ from S_1 at least in bearing a feature like [+THAT]. This is needed because depending on the context, the complementizer *that* is prohibited, optional, or obligatory, and this cannot be explained on semantic grounds.[1] The chosen analysis also needs to be able to rule out the following badly-formed structures:

(3) a. * Kim fears that that Sandy knows the truth.
b. * Kim fears that Sandy know/to know/knowing the truth.
c. * Kim fears that Sandy's knowledge of the truth.

[1] I will ignore the possibility of phonological selection or suppression of the word *that*.

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1.1 Standard analysis

The solution adopted in Pollard and Sag (1994) is to introduce a Head-Marker Schema licensing structures as in (2). The basic constraint on head-marker phrases is as follows:

(4)

$$\textit{hd-mark-ph} \Rightarrow \left[\text{DTRS} \left[\begin{array}{l}\textit{head-mark-struc}\\ \text{MARK-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD} \;\; \textit{marker}\end{array}\right]\right]$$

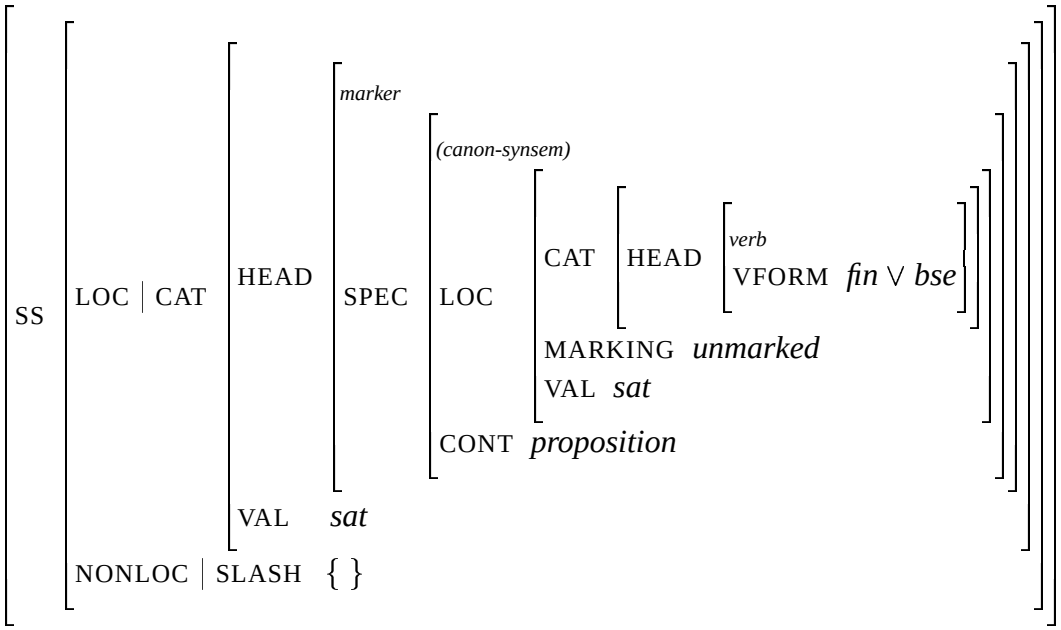
The part of speech *marker* is a subtype of *functional* and introduces the *synsem*-valued SPECIFIED attribute. The SPEC Principle requires the sharing of the marker daughter's SPEC value with the head daughter's SYNSEM value. The disjunctive MARKING Principle states that the head-marker phrase takes its MARKING value from the marker daughter (in contrast to all other headed phrases, which share their head daughter's MARKING value). According to other general constraints (in particular, the Head Feature Principle, Semantics Principle, and the Valence Principle), all remaining relevant grammatical information is shared between the mother and the head daughter. The description of head-marker phrases in (4) can therefore be expanded as follows:

(5)

$$\textit{head-mark-ph} \Rightarrow \left[\begin{array}{l}\text{SYNSEM} \mid \text{LOC} \left[\begin{array}{ll}\text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \boxed{1}\\ \text{MARKING} & \boxed{2}\\ \text{VAL} & \boxed{3}\end{array}\right]\\ \text{CONT} & \boxed{4}\end{array}\right]\\ \text{DTRS} \left[\begin{array}{l}\textit{head-mark-struc}\\ \text{HEAD-DTR} \mid \text{SS} \; \boxed{5} \mid \text{LOC} \left[\begin{array}{ll}\text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \boxed{1}\\ \text{VAL} & \boxed{3}\end{array}\right]\\ \text{CONT} & \boxed{4}\end{array}\right]\\ \text{MARK-DTR} \mid \text{SS} \mid \text{LOC} \mid \text{CAT} \left[\begin{array}{ll}\text{HEAD} & \left[\begin{array}{ll}\textit{marker}\\ \text{SPEC} & \boxed{5}\end{array}\right]\\ \text{MARKING} & \boxed{2}\end{array}\right]\end{array}\right]\end{array}\right]$$

For the lexical entry of the marking element *that*, we can assume the following:

(6)

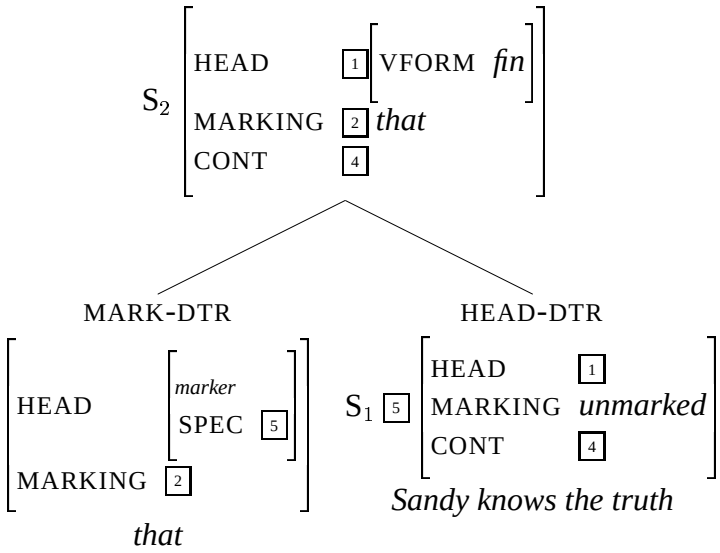


This description ensures that *that* combines with a tensed or subjunctive sentence with propositional (as opposed to, say, interrogative or imperative) content, which cannot be extracted. In versions of HPSG employing lexical traces, the value of SPEC must be explicitly specified as canonical to block extraction. In more recent HPSG grammars that assume traceless extraction, on the other hand, nothing needs to be stipulated, since there is no mechanism for head extraction (Bouma, Malouf, & Sag, 2001).

Given the description in (6), *that* is more or less restricted to appearing as the marker daughter in head-marker structures. It cannot appear as the head daughter in a head-valence or filler-head structure, since it has empty VAL and SLASH specifications. In principle, *that* could be the head daughter in a head-adjunct, head-specifier, or head-marker phrase, but presumably there are no suitable modifiers, specifiers, or markers in the lexicon that could serve as the non-head daughter.

Under this standard analysis, the structure of (1) can be represented as follows:

(7)



This approach satisfies the requirements discussed above. In particular, all of the ungrammatical examples in (3) can be accounted for. Examples (3a) and (3c) and most of the forms in example (3b) are excluded because they violate the SPEC selectional properties of *that*. The fact that the

subjunctive verb form in (3b) is disallowed is due to the verb *fears*, which requires a finite sentential complement, in contrast to a verb like *demands*:

(8) Kim demands that Sandy know/*knows the truth. (cf. Pollard and Sag (1994, p. 44))

This analysis is possible because, apart from the MARKING value, all of the syntactic and semantic features of the embedded sentence S_1 are also visible on S_2—to the exclusion, in fact, of any possible contribution from the marker daughter.

1.2 Update and evaluation

The standard HPSG treatment of marking functions correctly, but it must be said that it is a theory "made to order" in a somewhat heavy-handed fashion. It depends on several specialized pieces of formal machinery that are specific to the treatment of marking. First is the MARKING attribute, which of course must be present in some form, but in this case it also comes with a rather clumsy percolation mechanism, the MARKING Principle. MARKING is "almost" a HEAD feature, in that it is shared between the head daughter and the mother in all phrases except for head-marker phrases. Taking advantage of recent developments in HPSG, we can replace the original disjunctive formulation of the MARKING Principle as a default constraint on headed phrases:

(9) Default MARKING Principle

$$\textit{headed-ph} \Rightarrow \begin{bmatrix} \text{MARKING} \; / \boxed{1} \\ \text{DTRS} \mid \text{HD-DTR} \; \begin{bmatrix} \text{MARKING} \; / \boxed{1} \end{bmatrix} \end{bmatrix}$$

In fact, if we adopt the Generalized Head Feature Principle of Ginzburg and Sag (2001, p. 33), by which the entire SYNSEM value is shared by default between the head daughter and mother, we can dispense with the MARKING Principle in (9) altogether. We only need to specify that this default sharing is overridden in head-marker structures. With this reformulation, the Head-Marker Schema as originally described in (5) can be simplified (or at least abbreviated) as follows:

(10)

$$\textit{head-mark-ph} \Rightarrow \begin{bmatrix} \text{SYNSEM} \; \begin{bmatrix} \text{MARKING} \; \boxed{1} \end{bmatrix} / \boxed{0} \\ \text{DTRS} \; \begin{bmatrix} \textit{head-mark-struc} \\ \text{HEAD-DTR} \mid \text{SYNSEM} \; \boxed{2} / \boxed{0} \\ \text{MARK-DTR} \; \begin{bmatrix} \text{HEAD} \; \begin{bmatrix} \textit{marker} \\ \text{SPEC} \; \boxed{2} \end{bmatrix} \\ \text{MARKING} \; \boxed{1} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The marker daughter's SPEC value continues to be (strictly) identical to the head daughter's SYNSEM, and as required, the marker's MARKING value is strictly shared with the phrasal MARKING. Otherwise, the SYNSEM specifications of the head daughter and of the mother are shared, by the Generalized HFP. This formalization expresses more suggestively than (5) the idea behind the standard Marking Theory: a head-marker phrase is just like its head daughter, except its MARKING value comes from the marker daughter.

The reformulation in terms of default unification streamlines the Marking Theory somewhat (by eliminating the MARKING Principle), but it still relies on a dedicated ID schema, and a specialized syntactic category *marker*. As a result, marking elements and marked phrases are completely set apart from the rest of the grammar. This makes it very easy to construct an isolated analysis of the constructions in question with just the right properties, but such an unintegrated analysis is not very revealing.

What this approach suggests is that markers as a group are more like each other than they are, taken individually, to any other class of lexical items. Similarly, head-marker phrases should form a unified class of constructions, sharing a significant number of interesting grammatical properties. This is a difficult claim to evaluate, since the analysis is only really applied to a single construction. Pollard and Sag mention a number of other situations where the Marking Theory could be relevant: comparatives with *than* and *as*, Japanese and Korean case particles, non-predicative prepositions in languages with no preposition stranding. It is not obvious that these constructions, along with *that*-clauses, form a natural class, apart from the fact that they can be adequately dealt with using the marking apparatus. More importantly, it is not clear that these constructions are so exceptional that they cannot be related to and integrated with more familiar constructions. We should explore this possibility before accepting the convenient (but theoretically costly) head-marker approach.

We can note that the standard Head-Marker Schema is "marker-driven" in the sense that the marker daughter selects the head, and not vice versa. Here again, a specialized piece of formalism is required—the SPEC Principle. This principle is primarily useful in specifier-head constructions, where it is needed to account for mutual selection between the two daughters. In head-marker structures, on the other hand, there is selection in only one direction, so there are alternatives to selection via SPEC. As far as I know, the use of the SPEC Principle for head-marker phrases is not motivated by significant linguistic similarities between markers and specifiers. There is nothing necessarily objectionable about reusing features and principles just in order to avoid a proliferation of formalism.[2] If this is the main motivation, however, it should not prevent us from exploring other, equally economical solutions.

Finally, given the marker-driven nature of the standard analysis, a lot depends on the lexical entries of marking elements. As usual in HPSG analyses, we can fill in most of the features of a lexical entry based on the properties of the phrases that the item appears in; see for example the discussion of the entry for *that* in (6). One feature, however, remains completely undetermined: the value of CONTENT. No matter how we fill in this value, it will never have any effect, since *that* never serves as a semantic head. According to Pollard and Sag (1994, p. 45), markers have "purely logical" or "perhaps even vacuous" semantic content. In fact, given the standard set-up, anything other than vacuous content (however this should be represented) would be a little strange, since the effect would be lost anyway. The only way a marker could make a semantic contribution is by "instantiating in" some property on the head via SPEC, but rather than pursuing this roundabout path, most authors simply assume that markers always have empty content.

In summary, the standard HPSG Marking Theory is a collection of custom-built features and constraints that make it possible for a marking element to "change" exactly one piece of information on its sister. This goes well beyond the basic pre-theoretical requirements of a theory of marking, and as a result the standard analysis can only be exploited for a very limited number of perhaps totally unrelated constructions. Unsurprisingly, in revisions of the HPSG framework since 1994, notably Sag (1997) and (Ginzburg & Sag, 2001), marking-based analyses have been

[2] By this logic, the attribute MODIFIED which allows adjuncts to select the heads they modify could also be replaced by, or merged into SPEC. See Van Eynde (1998) for a proposal along these lines, collapsing the original Head-Specifier, Head-Adjunct, and Head-Marker Schemata.

altogether eliminated, but many authors continue to make use of them, particularly in the treatment of languages other than English (Heinz & Matiasek, 1994; Badia, 1996; Abeillé & Godard, 2000).

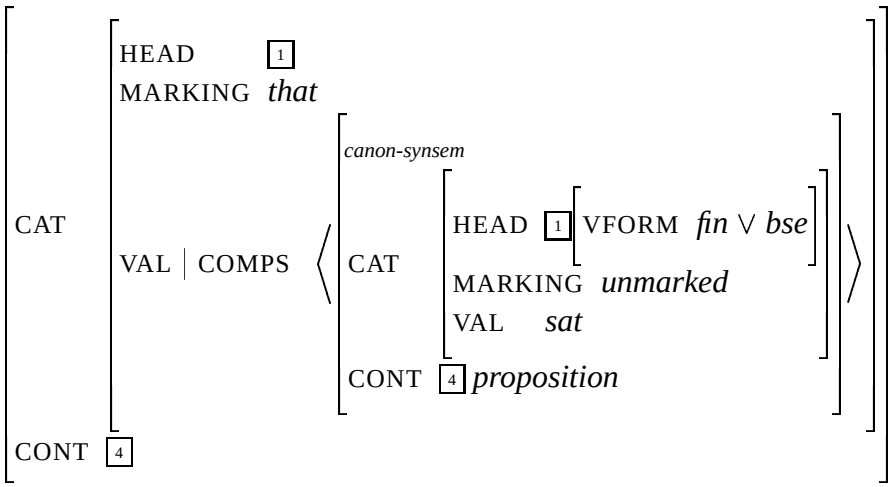
2 Marking Elements as Heads

My principal claim in this paper is that any head-marker structure can be reformulated with the marking element analyzed as the syntactic head, allowing the elimination of nearly all marking-specific formal apparatus. From a purely technical point of view, the resulting phrase can be made to resemble the standard head-marker structure in all relevant respects, although as we will see, the advantage of this approach is that we are no longer restricted by the assumptions of the standard Marking Theory.

2.1 Reformulation

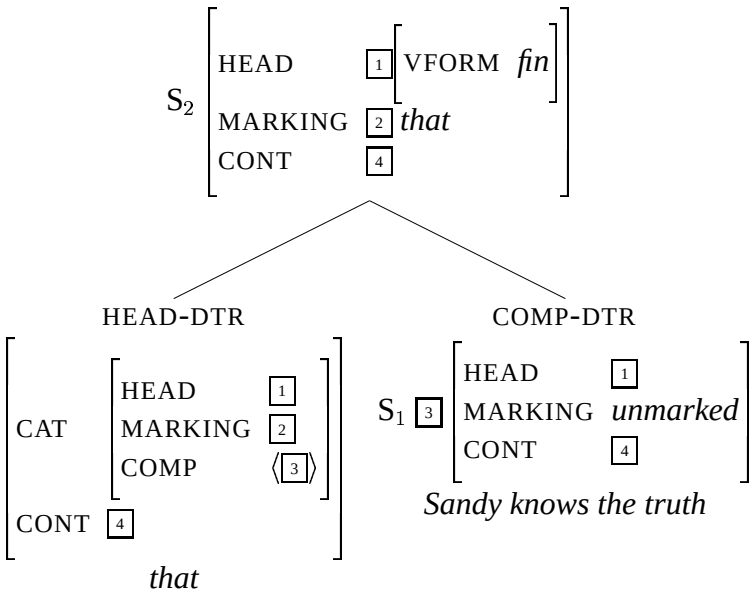
Consider first the following lexical entry for *that* treated as a head:

(11)



This lexical item has the same selectional properties as the marker version of *that* in (6), except that it relies on selection via COMPS rather than via SPEC. It gives rise to a head-complement phrase that is very similar to the head-marker structure in (7):

(12)



In particular, the phrase S_2 shares all of its syntactic and semantic properties with the complement daughter S_1, apart from MARKING, which is shared with the head daughter. As it stands, this analysis has essentially the same properties as the standard one in (7).

Notice, however, that the analysis in (12) relies much less on marking-specific apparatus, and instead uses more straightforward (or at least more general) constraints: the Head Feature Principle, Valence Principle, Semantics Principle. (Recall that all of these are also required to make the standard head-marker analysis work.) The syntactic category *marker* is no longer necessary, and the Head-Marker Schema can be eliminated. For the percolation of MARKING, for the moment I continue to assume a special MARKING Principle, but now there is no need to rely on defaults, as in (9) above (or in the GHFP), since phrasal MARKING specifications are now uniformly shared with the syntactic head daughter:

(13) Strict MARKING Principle

$$\textit{headed-ph} \Rightarrow \begin{bmatrix} \text{MARKING} & \boxed{1} \\ \text{DTRS} \mid \text{HD-DTR} & \begin{bmatrix} \text{MARKING} & \boxed{1} \end{bmatrix} \end{bmatrix}$$

2.2 Lexical entries

The theoretical cost of adopting the markers-as-heads analysis introduced here is the assumption of somewhat unorthodox lexical entries for marking elements. In general, if we insist on mimicking as closely as possible the behavior of the original marker analysis, we have to assign the following lexical representation to the head daughter:

(14)

$$\begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \boxed{1} \\ \text{MARKING} & \textit{marked} \\ \text{VAL} & \begin{bmatrix} \text{SUBJ} & \boxed{2} \\ \text{SPR} & \boxed{3} \\ \text{COMPS} & \left\langle \begin{bmatrix} \textit{canon-synsem} \\ \text{CAT} & \begin{bmatrix} \text{HEAD} & \boxed{1} \\ \text{VAL} & \begin{bmatrix} \text{SUBJ} & \boxed{2} \\ \text{SPR} & \boxed{3} \\ \text{COMPS} & \boxed{4} \end{bmatrix} \end{bmatrix} \\ \text{CONT} & \boxed{5} \\ \text{SLASH} & \boxed{6} \end{bmatrix} \right\rangle \oplus \boxed{4} \end{bmatrix} \end{bmatrix} \\ \text{CONT} & \boxed{5} \\ \text{SLASH} & \boxed{6} \end{bmatrix}$$

From a technical point of view, such a description presents no difficulties, and in fact, most of the properties of this lexical entry are already familiar from other HPSG analyses. For example, the inheritance of valence requirements is used to account for subject raising in English and other kinds of argument raising in French and German (Abeillé, Godard, & Sag, 1998; Hinrichs & Nakazawa,

1994). And furthermore, in practice the inherited lists are usually empty—the marking element combines with a saturated phrase—and in this case the structure-sharing indicated in (14) is not absolutely necessary (see (11), for example, where the SUBJ and SPR list of *that* are simply empty).

The sharing of CONTENT values is also standard HPSG practice for representing semantically empty heads. Note that this sidesteps the problem discussed at the end of §1.2 involving the indeterminacy of the marker's CONTENT value in the standard analysis. Moreover, the proposed analysis allows a departure from the standard account, in that it is straightforward to assign non-vacuous semantic content to the marking element, whether of a "purely logical" or of a more substantive nature. For example, even the complementizer *that* which is assumed to be vacuous in examples like (1) could be argued to have contentful (e.g., exclamative and resultative) uses. Given standard HPSG assumptions, contentful *that* would have to be analyzed as a head, although it has the same syntactic properties as the vacuous marker *that*. In contrast, my proposal is flexible enough to avoid this fragmented analysis, since marking elements are always heads, and heads can be semantically vacuous or contentful. This allows some aspects of the analysis of grammatical marking to be extended to a wider variety of constructions (e.g., English auxiliary constructions) which were excluded before on semantic grounds.

Extraction of the complement in (14) is disallowed; this has to be stipulated, something that was not necessary in the standard HPSG analysis (recall the discussion of the lexical entry in (6)). On closer inspection, however, it is not clear that this was really an advantage or a limitation of the original theory. In most cases, the non-extractability of the sister of the marking element is not a property particular to the marking construction. For example, it is true that a sentence introduced by *that* cannot be extracted, leaving the *that* behind. But we do not need to invoke a special property of *that* or of *that*-constructions, because in fact, (finite) clauses cannot be extracted from *any* context, even when an extraction mechanism is available.

Similarly, there are a number of proposals in the literature that apply a marker analysis to non-predicative prepositions (e.g., Heinz and Matiasek (1994) for German, Badia (1996) for Catalan). One of the facts that apparently follows "for free" is the impossibility of stranding these marker prepositions. But in these languages, stranding is excluded for all prepositions, so any explanation accounting only for the non-predicative cases is incomplete. We still have to "stipulate" somewhere in the grammar that objects of prepositions in such languages are always canonically realized.

Finally, the generalization that marking elements cannot be stranded could simply be false. After all, infinitival *to* and non-predicative prepositions in English can be said to provide a grammatical marking in descriptive terms, and yet both allow stranding. Under the analysis proposed here, the extractability of the phrase to be marked becomes a lexical property of the marking element—a more empirically adequate solution.

The one bizarre part of the representation in (14) is the sharing of HEAD features between the marking element and its complement. But again, this was only done to approximate the effect of the original head-marker analysis as closely as possible. If we want the whole marked phrase to have the same HEAD specifications as the unmarked phrase "downstairs," this information must pass through the marking element, the head daughter. But this goes beyond the pre-theoretical requirements of the analysis and we can ask whether total HEAD identity between the complement daughter and the mother is actually necessary.

For example, in the *that*-clause in (1), the only feature of the embedded sentence S_1 that absolutely must be encoded on S_2 is [VFORM: *fin*] (or some equivalent representation), because we need to be able to block the subjunctive, which is compatible with *that*, but not with *fears*. This means that the total HEAD sharing in (11) is excessive, and in general a marking element can provide its own HEAD specifications, sharing or re-encoding information from its complement as needed.

Relaxing the requirement of total HEAD-sharing permits a further simplification of the Marking Theory apparatus. The attribute MARKING can now be moved into the HEAD value, and to be percolated along with other HEAD information, by the (strict) Head Feature Principle. In other words, instead of just simplifying the original marking Principle as in (13), we can discard it altogether. This option was unavailable before, with the assumption of HEAD sharing, because the marking element and its complement would not have been able to share HEAD | MARKING values.[3]

3 Motivation and Implications

In the previous section I demonstrated that we can dispense with the entire Marking Theory of standard HPSG (the type *marker*, the Head-Marker Schema, the MARKING Principle), preserving just the attribute MARKING as a HEAD feature. There is also no need for default mechanisms. In terms of formal economy, the advantages of the proposed reanalysis are unmistakable. We have also seen some reasons for preferring the treatment of marking elements as syntactic heads on linguistic grounds, since it allows a wider application of the notion of grammatical marking to elements that were previously excluded (e.g., semantically contentful or syntactically strandable elements).

3.1 Head properties

From a conceptual point of view, however, many linguists are reluctant to grant head status to grammatical markers. It was no doubt in this spirit that the Marking Theory was originally devised in HPSG (and also in order to suggest an alternative to the prevailing GB analysis of *that*-phrases as CPs). But in fact, in *that*-constructions, and in other constructions for which head-marker structures have been proposed, neither daughter can be conclusively identified as the head. Whereas the noun in an adjective-noun combination or the verb in a verb-complement combination is obviously the head, here we are dealing with constructions where both daughters exhibit properties traditionally associated with the head.

In his discussion of these head-like properties, (Zwicky, 1993) identifies four such "split" constructions: Det+N, Comp+S, Aux+V, P+NP (the non-predicative case). I will not discuss the topic of determiners here; although the NP vs. DP controversy has come up in HPSG (see Netter (1994), for example), the idea of a head-marker analysis has never been suggested, as far as I know. For the other three constructions, only Comp+S has received a head-marker treatment in standard HPSG analyses of English, and even this has since been replaced by a CP treatment in more recent work (Sag, 1997; Ginzburg & Sag, 2001). Linguists working on other languages, however, have generally adopted the original marker analysis for complementizers (e.g., Richter (1997) for German), and here I would argue for a reformulation along the lines of the previous section. Similarly, Aux+V and P+NP are both treated as head-complement structures in standard HPSG analyses of English, but as mentioned already, head-marker proposals have been made for other languages, particularly for non-predicative PPs.

The reluctance to treat complementizers like *that* or non-predicative prepositions as heads is often rooted in the semantics, or the lack of semantics of these elements. It is true that syntactic heads usually make a clear semantic contribution, but this a prototypical property, not a necessary one. And marking elements do exhibit a number of other prototypical head properties: they are

[3] As discussed at the conference in Trondheim, a marking element could inherit its complement's HEAD features by default, while overriding its HEAD | MARKING value. This approach brings up some interesting technical issues, but it is not really worth pursuing since we are abandoning the notion of HEAD-sharing in any case.

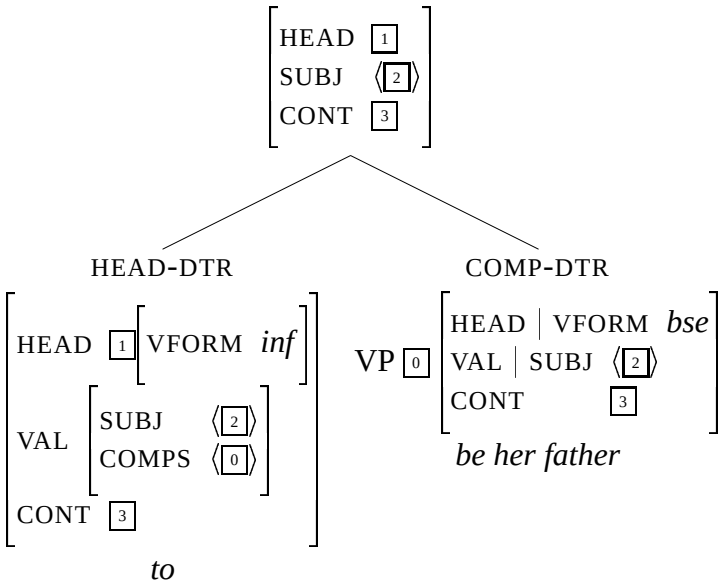
required[4], they are words that combine with phrases, and they are the "external representatives" of the constructions they appear in—in other words, when an external head selects the construction, it looks for some syntactic feature supplied by the marking element (i.e., the MARKING value) (Zwicky, 1985). We can also mention the fact that, in terms of linear order, marking elements appear in the same position as heads.

One could also argue for the head status of the other daughter; after all, these are "split" constructions and both daughters have a number of head-like properties. From a traditional point of view, we can say that both daughters are equally disappointing choices for the syntactic head. In such situations, we should keep in mind that in HPSG, the notion of head is not only a matter of intuition—it is also a technical matter. In the absence of a clear intuitive or descriptive preference, we should choose the daughter that "drives" the construction of the phrase and that serves as a better mediator of information between the daughters and the mother. The foregoing discussion points clearly to the marking element as the right choice.

3.2 Examples

From a descriptive point of view, infinitival *to* can be considered to be a grammatical marker much like *that*. They both have the same "complementizing" function, allowing certain phrases to appear in syntactic positions that are otherwise prohibited. The major difference between the two is that *to* can be stranded. In standard HPSG, this means that *to* and *that* have to be analyzed in totally different ways, and the solution adopted for *to*-VPs is in fact nearly identical to the head-complement formulation I argue for in §2, except the feature VFORM is used instead of MARKING.

(15)



Now, on the one hand, it would make sense to refer to MARKING here, since we would like to say that *to* contributes a grammatical marking. On the other hand, VFORM is already doing the job adequately. In fact, in standard HPSG, VFORM already encodes a kind of lexically-specified verbal marking. In the meantime, the attribute MARKING does no useful work at the lexical level: all verbs are specified without exception as [MARKING: *unmarked*]. In my proposal, where MARKING also percolates as a HEAD feature, the redundancy of these two attributes is even more evident, and it

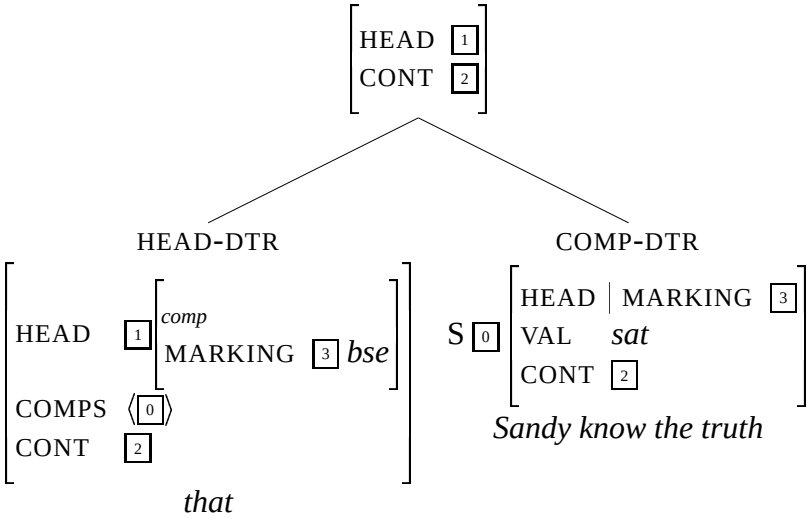
[4]Here the optionality of English *that* comes to mind as a counterexample, but there are contexts where it is required (e.g., with sentences in subject position, or topicalized sentential complements).

seems like an attractive idea to merge the two. In particular, I eliminate VFORM and make *vform* a subtype of *marking*.

This modification predicts crucially that there are no situations where both VFORM and MARKING are needed at the same time. Therefore something must be said for example (8), because the standard HPSG account is that the verb *demands* subcategorizes for a sentential complement that is both [MARKING: *that*] and [VFORM: *bse*]. This standard explanation is unsatisfying, however, because it seems incorrect, to allow verbs to select these two features independently. No verb can select the combination [MARKING: *that*] and [VFORM: *pastp*], for example.

One alternative is to adopt the analysis of Sag (1997), modified here to reflect the proposed merging of VFORM into MARKING:[5]

(16)

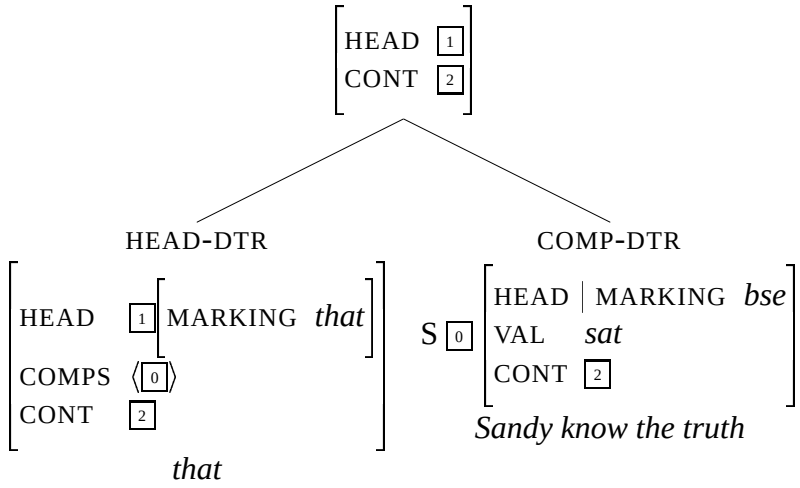


Here the MARKING value of the embedded sentence is inherited by the complementizer head and passed up unchanged to the mother. In this analysis the presence of the marking element is signaled by a change in syntactic category, from *verb* to *comp*. The marking element does not actually contribute a new MARKING specification, which goes against the spirit of my proposals. And in fact this may lead to problems because the identity of the complementizer is not encoded. This means, for example, that *that*, *if*, and *whether* are syntactically indistinguishable (as markers of finite clauses), although they are arguably distinct semantically. As Van Eynde (1998) points out in his discussion of the Dutch *aan het* construction, this proposal fails to block iterated marking in certain cases.

A second alternative, more in line with my proposals in §2, is to assume that the complementizer introduces a change in MARKING values:

[5]The attribute MARKING is not used at all by Sag (1997), so in fact I have simply *renamed* his VFORM attribute.

(17)



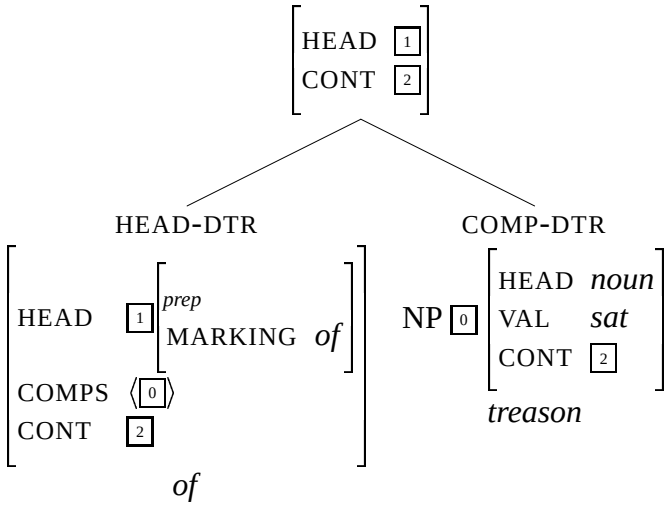
In this case, the exact identity of the complementizer is available for syntactic selection, but the MARKING (former VFORM) value of the embedded subjunctive clause is not visible at the CP level. I believe that the difference in the semantics associated with subjunctive vs. indicative clauses provides the explanation for data like (8), and we do not need to assume (mildly) non-local syntactic verb form selection. And in any case, allowing verbs like *demands* to select the feature [MARKING: *bse*] syntactically cannot be the whole story, since "analytic" subjunctives with *should* are also possible:

(18) Kim demands that Sandy should know the truth.

The modal *should* cannot be a base form (**to should*, **will should*). The generalization linking (8) and (18) must be of a semantic nature.

In the structure in (17) I did not specify a *head* subtype for the complementizer (and by implication for the whole CP). Unlike in Sag's (1997) analysis (the unmodified version), it is not necessary to make the counterintuitive assumption that complementizers are *verbal* elements. I assume, following Emonds (1985), that complementizers and subordinating conjunctions (e.g., *before*, *when*, *since*) are prepositions, subcategorizing (typically) for a non-extractable sentential complement. The complementizer *that* is therefore treated much like a non-predicative preposition, as in *(smacks) of treason*:

(19)



Note that the functions of the standard HPSG attribute PFORM are also merged into MARKING. In fact, I also assume that *case* is encoded as a subtype of *marking*, so in all MARKING is expanded

to encode four interrelated types of grammatical marking: verb form and complementizer form, nominal case and prepositional form.[6]

Turning briefly to the interaction of case and prepositional form, we can find examples similar to the subjunctive selection problem in (8), but for the nominal domain. For example, in German the preposition *auf* can combine with dative or accusative NPs, but in non-predicative uses, only one case (accusative) is possible:

(20) auf mich/*mir warten 'wait for me'

This is the principal motivation behind the proposal by Heinz and Matiasek (1994) to treat non-predicative prepositions as markers in German. Given this analysis, the verb *warten* can select an NP complement with the features [MARKING: *auf*] and [CASE: *acc*]. But as in the *that*-clause examples discussed above, it is undesirable to allow two kinds of marking to be "active" at the same time, because this leaves no room to account for missing combinations like [MARKING: *auf*, CASE: *gen*], or the fact that no verbs require, for example, an NP [MARKING: *marked*, CASE: *dat*] without specifying a particular prepositional form. The head-complement structure in (19) is more accurate, since only the "outermost" marking is visible. The presence of a prepositional marking blocks direct access to the original case marking.

The apparent non-local case selection in German can be analyzed either semantically (*auf*+DAT always has semantic content and therefore cannot be used non-predicatively) or by encoding the case assignment properties in the preposition's MARKING value (for example, assuming two subtypes *an-dat* and *an-acc* for distinguishing the two prepositions *an*). The first solution is empirically questionable: in principle even a semantically contentful preposition can be syntactically selected at the same time. The second solution is less attractive but it should be kept in mind that the selection of a prepositional form is a syntactic phenomenon, not a phonological one. Two prepositions with the same phonology will not necessarily have the same MARKING (formerly PFORM) value. In fact, I would argue that we even need a third subtype *an-prt* for picking out the separable verbal prefix *an* (Tseng, 2000).

4 Markers in French

I mentioned above in §1.2 that constructions that have been given head-marker analyses in the literature do not appear to share significant linguistic properties that would motivate the exceptional formal treatment assumed in the original HPSG Marking Theory. In this section I examine some data from French that seem at first glance to argue in favor of a type *head-marker-phrase*.[7]

French has a handful of elements that are traditionally thought of as markers, for a combination of syntactic, semantic, and phonological reasons: the prepositions *à* and *de*, the complementizers *que* and *si*, weak pronominal forms (clitics), the articles and possessive pronouns, and so on. These elements clearly have very diverse grammatical properties, but they are all subject to an interesting restriction: they cannot take wide scope over a coordination, and must normally be repeated on each conjunct:

(21) a. Il faut éviter la pollution de l'eau et *(de) l'air.
'We must avoid water- and air pollution.'

b. Tu seras sage et *(tu) finiras ton assiette.
'You will be a good boy and finish your plate.'

[6] I discuss the expanded functions of the MARKING attribute more fully in my thesis (Tseng, 2000).

[7] I am grateful to Anne Abeillé and (to) Danièle Godard for helpful discussions concerning this section.

c. Il semble que Marie comprenne l'importance de la réunion et *(qu')elle y assistera.
It seems that Marie understands the importance of the meeting and she will attend.'

Supposing that at least some of these elements are analyzed formally as HPSG markers, we could formulate the following constraint on the type *head-marker-phrase*:

(22)
$$\textit{hd-marker-ph} \Rightarrow \left[\text{DTRS} \left[\begin{array}{l}\textit{hd-marker-struc}\\ \text{HD-DTR} \ \neg\ \textit{coord-ph}\end{array}\right]\right]$$

According to this constraint, the head daughter in a head-marker phrase cannot be a coordinate structure. For sentence (21c), for example, the only option for the sentential complement of *semble* is a coordination of two head-marker structures, not a single complementizer *que* marking a conjunction of two sentences.

On the other hand, if we instead analyze the marking element *que* as a head, it is more difficult to formulate a constraint with the effect of (22). In this case, *que* selects the sentence it marks as its complement, but valence selection only involves *synsem* objects, and this means that the type of phrase and the constituent structure of the sentential complementy are inaccessible. In other words, there is no obvious way to express something like "¬ *coord-ph*" at the *synsem* level. Note that for similar reasons, in the marker analysis, we could not state the necessary constraint by referring to the SPEC value in the lexical entry of *que*, because this is again a *synsem* object. This is why the data in (21) seems to motivate a separate phrasal subtype for head-marker structures.

On closer inspection, though, the argument is not compelling. First, because the restriction against wide scope over coordination is weaker for some putative markers. In particular, the prepositions *à* and *de* can combine with coordinate NPs, generally with a group reading, or an exhaustive list interpretation: *J'ai parlé à Jean et Marie*. Moreover, the restriction against wide scope is not a property exclusive to the marking elements mentioned above. For example, subordinating conjunctions in general behave like the complementizer *que*:

(23) Même quand j'étais gosse, et *(que) je vivais à la campagne, je ne jouais pas dehors.
'Even when I was a kid and I lived in the country, I didn't play outdoors.'

The standard HPSG marker analysis is unavailable for conjunctions like *quand*, given their clear semantic contribution, so in any case we need to allow a mechanism blocking certain heads from selecting coordinate structures as complements.

Two possible solutions are outlined below. First, we could introduce a feature, say [+NARROW], carried by all lexical items exhibiting the property under consideration, obligatory narrow scope over coordination. We can then propose a disjunctive constraint on the type *head-comp-struc* (i.e., the type of the DTRS value of a head-complement phrase):

(24)
$$\textit{hd-comp-struc} \Rightarrow \left[\begin{array}{l}\text{HD-DTR} \left[\text{NARROW} \ +\right]\\ \text{COMP-DTR} \ \neg\ \textit{coord-ph}\end{array}\right] \vee \left[\text{HD-DTR} \left[\text{NARROW} \ -\right]\right]$$

Alternatively, we could adopt an account in which the presence of coordination is somehow visible for selection at the *synsem* level. Then the appropriate constraint can be stated in the lexical entries of the heads in question—for example, for the conjunction *quand*:

(25)

$$\begin{bmatrix} \textit{quand} \\ \text{COMPS} \ \langle \neg \ \textit{coord-synsem} \rangle \end{bmatrix}$$

This second alternative is perhaps the more attractive, since it avoids the evidently ad hoc feature [±NARROW], but the issue cannot be discussed meaningfully until we have a fuller treatment of coordination in HPSG.

The relevant point here is that a constraints like (24) or (25) provide an alternative to (22). In other words, the type *head-marker-phrase* is no longer the only available place to formulate the desired constraint. This weakens considerably the argument in favor of a standard Marking Theory approach for the data in (21).

It should be said, however, that neither a head-marker nor a head-complement analysis can account for all coordination data like (21). For example, subject and object clitic pronouns are cannot be plausibly treated as markers or heads—they are dependents of the verb. Instead, they must be analyzed as syntactic complements, or more satisfactorily as lexical affixes (Miller & Sag, 1997). In either case, examples like (21b) are the result of constraints on the coordination of verbs or VPs. Similarly, Miller (1992) suggests treating a handful of elements, such as *de* and *à* and articles, as phrasal prefixes—again, neither markers nor heads. It turns out, then, that the examples in (21) reveal something interesting about coordination in French in general, but they shed little light on the head vs. marker controversy discussed in this paper.

5 Conclusion

This paper is a proposal for the elimination of the Marking Theory of standard HPSG, demonstrating that marker analyses can always be reformulated in a technically and linguistically adequate way as head-complement structures, with the marking element taken as the syntactic head. For the analysis of English, in fact, the Marking Theory has never been the focus of much attention. From the beginning, most constructions involving the notion of grammatical marking (e.g., *to*-VPs, non-predicative PPs) have been treated as head-complement structures. In more recent presentations of the framework, *that*-clauses have also been reanalyzed as CPs, and the Marking Theory has been quietly abandoned.

The proposals in this paper may be of interest, however, to linguists who continue to make use of the HPSG marking apparatus in the analysis of other languages. Here, the idea of reformulating marker analyses as head-complement analyses must be considered on a case-by-case basis. For example, it is straightforward (and I believe desirable) to treat non-predicative prepositions as heads, discussed for German in §3.2. On the other hand, more creative applications of the Marking Theory, such as the account of German finite verb "movement" and Oberfeld phenomena in Meurers (2000), demand closer scrutiny.

Van Eynde (1998) also argues for a reexamination of the Marking Theory, motivated by many of the same considerations discussed in this paper. He proposes a streamlined and unified treatment of head-marker, head-specifier, and head-adjunct structures as instances of "head-functor" phrases. This allows a reduction in formalism, but in the end, complementizers continue to be analyzed as non-heads. This means that there is still a need for a special *head* subtype to introduce the attribute SELECT (which replaces SPEC and MOD), a Functor Principle (replacing the SPEC Principle and MOD selection), plus the original MARKING Principle. It is suggested that the necessary formal machinery is considerably more general than the marking-specific features and principles of the standard account, but whether this is simply feature re-use or a deeper linguistic generalization is

not yet clear.

This paper also points out the need for a more general discussion of the notion of head in HPSG, which is obviously a crucial technical and theoretical issue. Once we move beyond clear-cut cases like Verb+Object, we soon find constructions that might be considered non-headed, or multiply-headed. These cases are good candidates for constructional treatments, which are becoming more and more popular in HPSG. I have ignored the constructional option in this paper, however, in order to concentrate on truly lexically-driven—or more precisely, head-driven—alternatives.

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