

On the Head-Complement combination

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In the original HPSG treatment of the Head-Complement combination the head is a word that selects one or more complements and projects a phrase if the syntactic and semantic properties of the complement(s) match the requirements of the selecting word, as spelled out in (1), quoted from Abeillé and Borsley (2021, 22).

$$(1) \text{ head-comp-ph} \Rightarrow \left[\begin{array}{l} \text{HEAD-DTR } \boxed{1} \left[\begin{array}{l} \text{word} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{COMPS } \langle \boxed{2}, \dots, \boxed{n} \rangle \end{array} \right] \\ \text{DAUGHTERS } \langle \boxed{1}, [\text{SS } \boxed{2}], \dots, [\text{SS } \boxed{n}] \rangle \end{array} \right]$$

If there is more than one complement, the phrase has a flat structure, as in (2a), and if there is an adjunct it is adjoined to the left or the right of the phrase, as in (2b–2c). Placing the adjunct in between the complements, as in (2d–2e), is not an option.

- (2) a. He [put_v [the flowers]_{np} [in a vase]_{pp}]_{vp}
- b. He [often [put the flowers in a vase]_{vp}]_{vp}
- c. He [[put the flowers in a vase]_{vp} yesterday]_{vp}
- d. * He [put the flowers often in a vase]_{vp}
- e. * He [put the flowers yesterday in a vase]_{vp}

As remarked in Sag et al. (2003, 96), “this flat structure appears well motivated for English, but our general theory would allow us to write a Head-Complement Rule for some other language that allows some of the complements to be introduced higher in the tree structure.” This has been claimed to be useful for languages, such as German and Dutch. The Dutch equivalent of (2c), for instance, can have the adjunct before the VP, as in (3a), but also in between the complements, as in (3b).

- (3) a. Hij heeft [gisteren [de bloemen in een vaas gezet]_{vp}]_{vp}
 he has yesterday the flowers in a vase put
- b. Hij heeft [de bloemen gisteren in een vaas gezet]_{vp}
 he has the flowers yesterday in a vase put

To allow for this many authors adopt a variant of (1), in which the complements are added one at a time. In (3b), for instance, the verb is first combined with its PP complement, yielding a partially saturated VP, to which the adverb is adjoined, after which it is combined with the NP complement, yielding a saturated VP, as spelled out in (4).

- (4) Hij heeft [[de bloemen]_{np} [gisteren [[in een vaas]_{pp} gezet_v]_{vp}]_{vp}]

The co-existence of two ways to model the Head-Complement combination is commonly treated as an instance of parametric variation: While English adopts the flat structure version, German and Dutch adopt the binary branching one. The aim of this paper is to show that this is overly simplistic, since there are languages for which both versions are needed. To show this we focus on Dutch PPs.

1 Head-initial and head-final PPs in Dutch

In Dutch PPs the adposition may precede its complement, as in (5a), or follow it, as in (5b).

- (5) a. Hij heeft de bloemen [in die vaas]_{pp} gezet.
 he has the flowers in that vase put
 b. Ze is aan hoge snelheid [die tunnel in]_{pp} gereden.
 she is on high speed that tunnel in driven

In this case the difference coincides with a semantic one: While the head-initial PP in (5a) has a locative interpretation, the head-final PP in (5b) has a directional interpretation. The variation is not always semantically motivated. Pronominal complements, for instance, are normally preceded by the adposition, as in (6a), but for a number of neuter pronouns this is not the case. The impersonal *het* ‘it’ and the demonstrative *dat* ‘that’, for instance, are not combined with a head-initial adposition, as in **van het* ‘of it’ and **aan dat* ‘on that’. Instead, they are replaced by the corresponding R-pronoun, resp. *er* and *daar*, and this pronoun must precede the adposition, as in (6b). The head-initial order is ruled out: **van er* and **aan daar*.

- (6) a. We hebben nog vaak [aan hem]_{pp} gedacht.
 we have still often on him thought
 b. We hebben nog vaak [daar aan]_{pp} gedacht.
 we have still often that.R on thought

When the PP is combined with an adjunct, it turns out that the complement may not precede the adjunct in head-initial PPs, but in head-final PPs this is possible.

- (7) a. Ze wonen [vlak [naast de autostrade]_{pp}]
 they live right next.to the motorway
 b. *Ze wonen [de autostrade [vlak [naast --]]]
 they live the motorway right next.to
 (8) a. Ze hebben [vlak [daar naast]_{pp}] een bom gelegd.
 they have right that.R next.to a bomb put

- b. Ze hebben [daar [vlak [... naast]]] een bom gelegd.
 they have that.R right next.to a bomb put

In this respect the head-final Dutch PPs resemble the head-final VPs of Dutch and German: They both allow a (or the) complement of the XP to precede the XP adjunct. Conversely, the fact that this is not possible for head-initial Dutch PPs resembles the impossibility of that order in head-initial English VPs, see (2d). Confirmation for the similarity is provided by the phenomenon of complement raising.

2 Complement raising

We speak of complement raising when a complement of some given word A is realized in the phrasal projection of a word B that selects A as its complement. A well-known example concerns the realization of complements in clauses with a verb cluster, as in the Dutch (9).

- (9) ... dat hij [wat bloemen]_{np} heeft [... geplukt]
 ... that he some flowers has picked

The complement of the main verb *geplukt* ‘picked’ is not realized within the participial projection, but in the projection of the auxiliary that takes the participle as its complement. As illustrated by the ill-formedness of the gloss, English does not allow complement raising. Instead, it requires the complement of the participle to be realized within the participial projection, as in (10).

- (10) ... that he has [picked some flowers]

Returning to the Dutch PPs, it turns out that complement raising is possible for head-final PPs.

- (11) a. Ze is [die tunnel]_{np} aan hoge snelheid [... in] gereden.
 she is that tunnel at high speed in driven
 b. We hebben daar_{np} nog vaak [... aan] gedacht.
 we have that.R still often on thought

In (11a) the complement of the directional *in* is not realized in the PP, but in the phrasal projection of the selector of the PP, i.e. the participle *gereden* ‘driven’. In that projection it furthermore precedes the VP-adjunct *aan hoge snelheid* ‘at high speed’. Similarly, in (11b) the pronominal complement of *aan* is realized in the phrasal projection of the participle *gedacht* ‘thought’, where it precedes the VP adjuncts *nog* ‘still’ and *vaak* ‘often’. By contrast, for head-initial PPs this kind of raising is not allowed.

- (12) a. *Hij heeft [die vaas]_{np} de bloemen [in ...] gezet.
 he has that vase the flowers in put

- b. * We hebben hem_{np} nog vaak [aan --] gedacht.
 we have him still often on thought

Also in this respect the head-final Dutch PPs resemble the head-final VPs of German and Dutch, allowing complement raising, while the head-initial Dutch PPs resemble the English VPs, disallowing complement raising.

3 More evidence

So far we have used examples in which the complement of the adposition is an NP, but the same can be illustrated for adpositions whose complement is a PP. In that combination the adposition may precede the complement, as in (13a), or follow it, as in (13b).

- (13) a. Die huizen zijn nog [van [voor de oorlog]]
 those houses are still of before the war
 b. Ze zijn zonder aarzelen [[van dat dak] af] gesprongen.
 they are without hesitate.INF from that roof off jumped

Also here, complement raising is possible in the case of head-final PPs, but not in the case of head-initial PPs.

- (14) a. Ze zijn [van dat dak] zonder aarzelen [-- af] gesprongen.
 they are from that roof without hesitate.INF off jumped
 b. * Die huizen zijn [voor de oorlog] nog [van --]
 those houses are before the war still of

Moreover, if both the lower and the higher PP are head-final, it is possible to raise the NP complement out of the lower and the higher PP, as in (15a). This is not possible if the higher PP is head-initial, as in (15b).

- (15) a. Ze zijn [er] zonder aarzelen [-- van] af] gesprongen.
 they are it.R without hesitate.INF from off jumped
 b. * Die huizen zijn [daar] nog [van [-- voor]]
 those houses are that.R still of before

Confirming evidence is provided by the data in (16).

- (16) a. Die huizen zijn [van [vlak [daar voor]]]
 those houses are of right that.R before
 b. Die huizen zijn [van [daar [vlak [-- voor]]]]
 those houses are of that.R right before
 c. * Die huizen zijn daar [van [vlak [-- voor]]]
 those houses are that.R of right before

The R-pronoun can be raised out of the head-final PP[voor] and precede the PP adjunct, as in (16b), but it cannot be raised out of the head-initial PP[van].

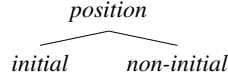


Figure 1: Hierarchy of POSITION values

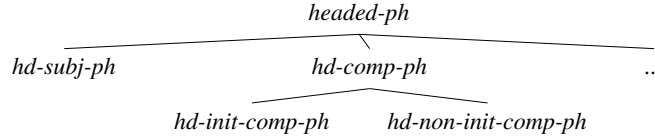


Figure 2: Part of the hierarchy of phrase types

4 Modelling

To model the data we obviously need to differentiate head-initial from head-final PPs. As a first step, we add the feature POSITION to the HEAD value of the adpositions. Its value is of type *position* and has two subsorts, i.e. *initial* and *non-initial*. In the lexicon most adpositions are assigned the underspecified value, since they can precede as well as follow their complement. *in* and *aan*, for instance, are initial in (5a) and (6a), but non-initial in (5b) and (6b). There are also adpositions, though, which invariably precede their complement, such as *als*, *per*, *sinds*, *te* and *tijdens*, or which invariably follow their complement, such as *af*, *heen* and *vandaan* (Broekhuis 2013). They are assigned the more specific values *initial* and *non-initial* respectively. Interestingly, two adpositions have different forms depending on their POSITION value: While *met* and *tot* are inherently initial, *mee* and *toe* are inherently non-initial.¹

As a second step, we assume that Dutch grammar employs two versions of the Head-Complement rule. More specifically, it employs the flat structure version for head-initial PPs and the binary branching version for head-final PPs. To model this we add two subtypes for *hd-comp-ph* in the hierarchy of headed phrases, see Figure 2. The head-initial type is defined by the constraint in (17).

$$(17) \quad hd-init-comp-ph \Rightarrow \left[\begin{array}{l} SS | LOC | CAT \left[\begin{array}{l} HEAD | POSITION \quad initial \\ COMPS \quad \langle \quad \rangle \end{array} \right] \\ HEAD-DTR \quad [1] \left[\begin{array}{l} word \\ SS | LOC | CAT | COMPS \quad \langle [2], \dots, [n] \rangle \end{array} \right] \\ DAUGHTERS \quad \langle [1], [SS \quad [2]], \dots, [SS \quad [n]] \rangle \end{array} \right]$$

The constraints on the daughters are identical to those in the *hd-comp-ph* type of Abeillé and Borsley (2021, 22). What differs is the addition of two constraints on the mother. For languages which are uniformly head-initial, the addition of the

¹The non-initial forms are also used when the adposition is used intransitively.

POSITION value is redundant, but for Dutch it is needed, since it has both head-initial and head-final XPs. Similarly, the addition of the COMPS value is redundant for languages which abide by the Empty COMPS Constraint, as defined in (18), quoted from Ginzburg and Sag (2000, 33) and Abeillé and Borsley (2021, 14).

$$(18) \text{ phrase} \Rightarrow \left[\text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{COMPS} \langle \rangle \right]$$

For Dutch, though, it is needed in (17), since it is not valid for its head-final counterpart in (19).

$$(19) \text{ hd-non-init-comp-ph} \Rightarrow \left[\begin{array}{l} \text{SS} \mid \text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD} \mid \text{POSITION } \textit{non-initial} \\ \text{COMPS } \boxed{A} \end{array} \right] \\ \text{HEAD-DTR } \boxed{1} \left[\text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{COMPS } \boxed{A} \oplus \langle \boxed{2} \rangle \right] \\ \text{DAUGHTERS } \langle [\text{SS } \boxed{2}], \boxed{1} \rangle \end{array} \right]$$

Since the COMPS value of the mother \boxed{A} may be non-empty, complements can be added after adjuncts, and be raised. To model the latter we use the phrasal constraint in (20) quoted from Van Eynde (2019, 1044).

$$(20) \text{ headed-phrase} \Rightarrow \left[\begin{array}{l} \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{COMPS } \boxed{A} \oplus \boxed{B} \\ \text{HEAD-DTR} \mid \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{COMPS } \boxed{A} \\ \text{NONHD-DTR} \mid \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{COMPS } \boxed{B} \end{array} \right]$$

It allows unsaturated COMPS requirements of the non-head daughter to be realized in the phrasal projection of the head-daughter.

For *hd-comp-ph*, which is the common supertype of *hd-init-comp-ph* and *hd-non-init-comp-ph*, we use the constraint in (21).

$$(21) \text{ hd-comp-ph} \Rightarrow \left[\begin{array}{l} \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{SUBJ } \boxed{A} \\ \text{HEAD-DTR} \mid \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{SUBJ } \boxed{A} \end{array} \right]$$

The sharing of the SUBJ value is simultaneously what the two subtypes have in common and what differentiates them from phrases of type *hd-subj-ph*.

5 Conclusion

To model the Head-Complement combination HPSG employs two different strategies. The original one involves instant saturation of all COMPS requirements, yielding a flat structure. The alternative involves piecemeal saturation, yielding a binary branching structure. The accepted wisdom is that the former is appropriate for head-initial languages, such as English, while the latter is appropriate for head-final languages, such as German and Dutch. This assumption has been shown to be too simple. Building on observations about Dutch PPs we have argued that Dutch grammar employs both variants of the Head-Complement combination. Besides, we have shown how that can be modeled.

The full paper will extend the proposal to Dutch VPs, arguing that their analysis also requires the use of both variants of the Head-Complement combination.

References

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