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THE TREATMENT OF PARENTHETICALS IN THE B8 FRAGMENT

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CONTENTS

In this paper I discuss the problem of extending a grammar of basic German sentence structure (as developed in the B8 project) to accommodate sentential parentheticals—i.e., parentheticals that have pragmatic force over an entire clause. I focus in particular on verb-first (V1) parenthetical elements as in the following examples (taken from Reis, 1995b, p. 29, 36):

(1) In Bonn wohnt sie [sagt Paul] seit der Trennung.
'Paul says she's been living in Bonn since the separation.'

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(2) Wo wohnt sie [glaubst du] seit der Trennung?
'Where do you think she's been living since the separation?'

(3) Wen [fragt Hans] wird der Chef entlassen?
'Who, asks Hans, will the boss fire?'

Contrast these examples with the "sub-clausal" parenthetical in the following sentence:

(4) Sicherlich ist dieser—[wenn man so will]—offizielle Rückblick nur ein Teil dessen, was 1992 für jeden von uns bedeutete. (Pittner, 1995, p. 87)
'To be sure, this—if you like—official look back was just part of what 1992 meant for each one of us.'

In this case, the parenthetical only has pragmatic scope over the immediately following adjective *offizielle*. Sentential parentheticals as in (1)–(3), however, have received more attention in existing studies, and they exhibit more interesting properties with respect to placement within the host clause.

In Section 1 I present some descriptive properties of V1 parentheticals, including their relation to the host clause and their internal structure. The remaining sections turn to questions of word order. Section 2 discusses the phrase structure approach adopted in the B8 fragment, while the final two sections point out some problems with this approach and examine the possibility of handling parenthetical placement with linearization constraints.

1. Parenthetical Properties

1.1. **Integration.** Many authors note that parentheticals are signalled by "comma intonation"—i.e., intonational breaks at the parenthetical-host boundaries (see for example Pittner, 1995). This is not a necessary characteristic of V1 parentheticals, however. They can appear as "integrated" parentheticals, which are not set off from the host clause by comma intonation, contain no stressed elements, and have no focus-background structure of their own. On the other hand, unintegrated parentheticals exhibit the opposite properties; the prosodic and pragmatic conditions always covary (Reis, 1995b, p. 30–31).

(5) a. In Bonn wohnt sie [sagt Paul] seit der Trennung. (integrated)
b. * In Bonn wohnt sie—[sagt Paul]—seit der Trennung. (comma intonation, but no focus/stress)

c. * In BONN wohnt sie [sagt PAUL] seit der Trennung. (focus/stress, but no comma intonation)

d. In BONN wohnt sie—[sagt PAUL]—seit der Trennung. (unintegrated)

Integrated use is completely natural in cases like (1)fragt above, but given the right context and with the appropriate intonation, any V1 parenthetical can also be unintegrated. Indeed, some V1 structures can only appear as unintegrated parentheticals:

(6) a. Martin ist—[wird der Lehrer nicht glauben]—tatsächlich krank.
'The teacher won't believe it, but Martin really is sick.'

b. * Martin ist [wird der Lehrer nicht glauben] tatsächlich krank.

I will discuss some of the conditions allowing integrated use of V1 parentheticals in the next section.

For most other types of parentheticals (i.e., non-V1 parentheticals), unintegrated use is the only possibility:

(7) a. In BONN wohnt sie—[wen WUNdert's]/[das sagt jedenfalls FRANZ]—seit der Trennung.
'She's been living in Bonn—no wonder/that's what Franz says, anyway—since the separation.'

b. * In Bonn wohnt sie [wen wundert's]/[das sagt jedenfalls Franz] seit der Trennung.

Exceptions to this are *wie*- and (possibly) *so*-parentheticals; like V1 parentheticals, these can sometimes be integrated (and can always be unintegrated):

(8) Hans hat [wie es scheint]/[so scheint es] dazu keine Zeit.
'Hans has, as/so it seems, no time for that.' (Reis, 1995b, fn. 32, 36)

In summary, then, the set of unintegrated parentheticals is a superset of the set of integrated ones (modulo prosodic and pragmatic differences). In our project we have taken the larger set as our target, because our (primarily syntactic) representations are not equipped to handle the [±integrated] distinction meaningfully.

1.2. **Parenthetical predicates.** V1 parentheticals contain predicates that normally select a propositional/question argument. For example, in non-parenthetical contexts, *glauben* takes a sentential complement (either a *dass*-clause or a V2 clause) and *fragen* combines with an embedded (i.e., V-final) question:

(9) a. Paul glaubt, dass sie in Bonn wohnt.
    b. Paul glaubt, sie wohnt in Bonn.

(10) a. Hans fragt, wen der Chef entlassen wird/ob der Chef jemanden entlassen wird.
    'Hans asks who the boss is going to fire/if the boss is going to fire someone.'
    b. * Hans fragt, wen wird der Chef entlassen/wird der Chef jemanden entlassen. (OK only as direct speech)

In a V1 parenthetical, the propositional argument is not expressed syntactically; instead, it is linked to the host clause. In this sense, V1 parentheticals are are "interpretationally dependent" on their hosts.

According to Reis (1995b, p. 61), the predicates found in *integrated* V1 parentheticals

(11) a. always select a propositional argument, which is
    - lexically specified as a finite sentential argument in structural object position,
    - also realizable by a V2-clause (in the declarative case);
    b. i. do not include
        - preference predicates,
        - factive and implicative predicates,
        - negative/negated predicates;
    ii. include (non-negative/unnegated)
        - verbs of saying (taking declarative as well as interrogative complements),
        - epistemic and attitudinal verbs (always declarative complements).

Examples of the various semantic classes are given below. Those in (12) can appear in integrated V1 parentheticals (unless they are negated), while those in (13) cannot:

(12) a. Verbs of saying: *sagen*, *fragen*, *behaupten* 'claim,' *erzählen* 'tell'

b. Epistemic/attitudinal verbs: *glauben*, *meinen* 'think,' *denken* 'think,' *finden* 'find,' *schätzen* 'suppose'

(13) a. Preference predicates: *besser/lieber sein* 'be better,' *vorziehen* 'prefer,' *wünschen* 'wish'

b. Factive predicates: *wissen* 'know,' *bedauern* 'regret'

c. Negative predicates: *bezweifeln* 'doubt,' *vergessen* 'forget,' *leugnen* 'deny,' *bestreiten* 'dispute'

A wider range of predicates is possible in unintegrated V1-parentheticals. Example (14a) below contains a factive verb, and example (14b) contains predicates whose propositional argument is realized in subject position:

(14) a. Das Treffen findet—[weißt du schon]—übermorgen statt.
'The meeting takes place—you know this already—the day after tomorrow.'

b. Das Treffen findet—[ist gut möglich]/[steht jetzt fest]—übermorgen statt.
'The meeting will—very possibly/it is now decided—take place the day after tomorrow.'

Unintegrated use is the only possibility here.

Parentheticals involving negative/negated predicates and preference predicates are uncommon. The propositional argument of these predicates refers to a hypothetical or unreal state of affairs (from the experiencer's point of view), so it normally cannot be linked to the proposition of the host clause, which has assertive force.

(15) a. Der Chef hat nicht gesagt, dass das Treffen übermorgen stattfindet.
'The boss didn't say that the meeting would take place the day after tomorrow.'

b. * Das Treffen findet—[hat der Chef nicht gesagt]—übermorgen statt.

Nonetheless, these predicates are sometimes found in unintegrated V1 parentheticals—e.g., in cases of explicit contrast:

(16) Das Treffen findet—[hat der Chef aber noch nicht gesagt]—übermorgen statt.
'The meeting will take place—although the boss hasn't said so yet—the day after tomorrow.'

Similarly, recall example (6a) above, where the actual state of affairs in the host clause is contrasted with the experiencer's (the teacher's) point of view. As noted above in (13), integrated use is not possible with such predicates.

Unintegrated V1 parentheticals, then, allow a wide range of predicates and quite complex internal structure, including negation and other modifiers. In this paper I will not focus on the internal structure of V1 parentheticals; as explained below in §2.2, any V1 phrase with an unexpressed propositional argument qualifies for parenthetical use.

1.3. **Placement.** A characteristic of V1 parentheticals (and other sentential parentheticals) is that they can be inserted in a variety of positions in the host clause. As a broad generalization, they can appear at constituent boundaries—i.e., peripheral to maximal projections (Espinal, 1991). More specifically, Altmann (1981, p. 64) gives the following list of "parenthetical niches": before and after the finite verb, between constituents in the Mittelfeld, and in final position. This descriptive generalization correctly rules out the ungrammatical cases in (17):

(17) a. * Wo wohnt sie seit [$_{\mathrm{NP}}$ der [fragt er] Trennung] ?
 b. * Wo wohnt sie [$_{\mathrm{PP}}$ seit [fragt er] der Trennung] ?
 c. ? Ob [fragt er] [$_{\mathrm{VP}}$ Maria seit der Trennung in Berlin wohnt] ?

The following cases are also excluded, although the parentheticals do occupy parenthetical niches according to Altmann's list:

(18) * Wo wohnt [fragt er] [$_{\mathrm{NP}}$ sie] seit der Trennung?

(19) a. * [Fragt er], wohnt sie seit der Trennung in Berlin?
 b. * das Buch, das du ihm geschenkt [glaube ich] hast

Altmann's characterization is therefore insufficiently restrictive.

In the following discussion, I assume that the following are allowable parenthetical positions:

(20) a. MF: between Mittelfeld items (complements and adjuncts)
 b. VF: between the Vorfeld constituent and the V2 verb
 c. POST-V: between the fronted (V1 or V2) verb and a non-pronominal Mittelfeld item
 d. FINAL: clause final position

These possibilities are illustrated in the following examples (the lowered triangle indicates a parenthetical insertion point):

(21) a. Maria △ möchte △ das Theorem △ heute △ beweisen △.
'Maria (he believes) wants to prove the theorem today.'

b. obwohl Maria △ das Theorem △ heute △ beweisen möchte △

All other positions are excluded. The following cases deserve particular emphasis:

(22) a. ¬INIT: clause initial position (possibly following a complementizer/conjunction)

b. ¬PPRO: directly preceding an unstressed Wackernagel pronoun

c. ¬VC: within the verbal cluster

Examples of ungrammatical parenthetical placement are given here:

(23) a. * △ Maria möchte △ es beweisen.

b. * obwohl △ Maria △ es beweisen △ möchte

There are no doubt exceptions and additions that one could make to the conditions in (20) and (22) to achieve greater descriptive accuracy. For example, there seems to be a tendency for parentheticals not to appear before the subject; this affects some cases of POST-V and a condition like ¬PRE-SUBJ might be more accurate than ¬INIT in the case of V-final CPs and relative clauses. I will stick with the seven conditions listed here, however, as a first approximation.

2. Implementation

2.1. **Sentence structure.** We have implemented a German grammar using HPSG representations, but with constituent structure and linear order encoded in traditional PS rules (in contrast to the ID/LP set-up assumed in standard HPSG). In this section I introduce the rules needed to account for German sentence structure. Note that in the following discussion I will use familiar descriptive terms like "movement" and "extraction," but our analysis is in fact non-transformational.

2.1.1. *Verb movement.* We adopt a verb trace analysis to relate V-final and fronted-verb (V1 and V2) structures (cf. Kiss and Wesche (1991)). Roughly speaking, the finite verb has a base position at the end of every clause, where it determines complement selection and receives modifiers, but then in V1 and V2 structures the finite verb is moved to the left of the Mittelfeld. The main advantage of this analysis is that the structure of the Mittelfeld and of the rechte Satzklammer (verb cluster) remains the same whether the finite verb appears in front or at the end. This approach predicts correctly that in both cases we should see the the same sequence (or sequences) of elements in the Mittelfeld and verb cluster, and the same grammatical relations holding between them (government, quantifier/modifier scope, binding, and so on).

More formally, the position of the finite verb is determined by the value of the VFORM attribute: finite verbs in final position are marked [VFORM: *f-incomp*] while fronted verbs are [VFORM: *f-comp*]. Functionally incomplete verbs can become functionally complete via the following lexical rule:

(24)

$$\left[\begin{array}{ll}\textsc{loc} & \boxed{1}\left[\begin{array}{ll}\textsc{vform} & \textit{f-incomp}\end{array}\right]\end{array}\right] \mapsto \left[\begin{array}{ll}\textsc{vform} & \textit{f-comp} \\ \textsc{comps} & \left\langle \left[\begin{array}{ll}\textsc{head} & \left[\begin{array}{l}\textit{v-trace} \\ \textsc{dsl}\ \boxed{1}\end{array}\right] \\ \textsc{comps} & \langle\ \rangle \\ \textsc{cont} & \boxed{2}\end{array}\right] \right\rangle \\ \textsc{cont} & \boxed{2}\end{array}\right]$$

The output of this rule is a functionally complete verb that subcategorizes for a saturated verbal complement headed by a verbal trace element. All of the relevant properties of the original input verb are copied into this complement's DSL ("double slash") value. This information is shared via the Head Feature Principle with the verbal trace itself, which takes its valence and content specifications from its DSL value:

(25) Lexical entry for verbal trace

$$\left[\begin{array}{ll}\textsc{head} & \left[\begin{array}{ll}\multicolumn{2}{l}{\textit{v-trace}} \\ \textsc{vform} & \textit{f-incomp} \\ \textsc{dsl} & \left[\begin{array}{ll}\textsc{valence} & \boxed{1} \\ \textsc{cont} & \boxed{2}\end{array}\right]\end{array}\right] \\ \textsc{valence} & \boxed{1} \\ \textsc{cont} & \boxed{2}\end{array}\right]$$

The verbal trace therefore serves as a "silent" version of the original V-final verb, with the same subcategorization frame and semantic content.

The output verb in (24) takes its CONTENT value from its complement. Given the DSL mechanism and the lexical entry in (25), this is more or less equivalent to directly inheriting the CONT value of the input verb. The difference is that the semantic contributions of adjuncts modifying the trace projection will also appear in the semantic representation of the whole clause. (See Figure 2 for an example: the finite verb *möchte* has [CONT: $\boxed{5}$] rather than [CONT: $\boxed{3}$].)

The difference between V1 and V2 clauses is accounted for by (traceless) extraction along the lines of Sag (1997). Any element of a verb's ARG-ST list can be instantiated as a *gap-synsem* rather than a *canonical-synsem*. In this case, the element is not mapped to the verb's COMPS list, meaning that it will not be realized in the Mittelfeld (or in the verbal cluster). Instead, it is stored in the SLASH set and carried up the tree until it is realized as a filler in the Vorfeld. Fronted-verb constructions with extraction therefore give rise to V2 structures; otherwise, the fronted verb surfaces in initial position.

The three clausal structures are compared below:

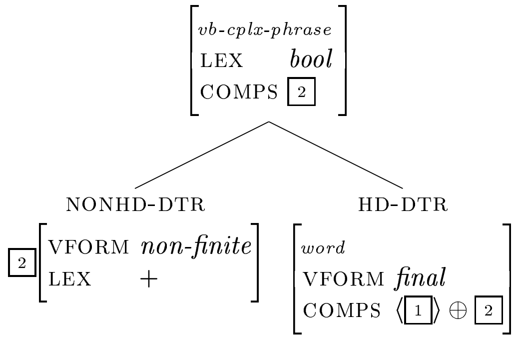
(26)	a.	(ob)	M	das Thm heute beweisen möchte.		(V-final)
	b.	Möchte	M	das Thm heute beweisen	t ?	(V1)
	c.	M_i möchte	$\_\_\__i$	das Thm heute beweisen	t .	(V2)

The different realizations give rise to main vs. embedded clause structures with declarative vs. interrogative interpretation (in interaction with lexical information).

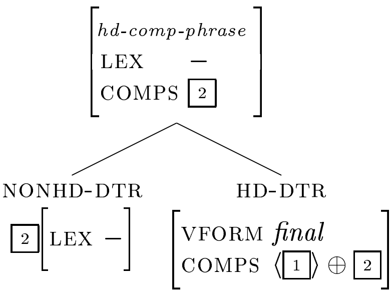
2.1.2. *Phrase structure rules.* Our analysis relies on a collection of binary PS rules, five of which are presented below.[1] Unless explicitly stated otherwise, HEAD, CONT, and SLASH information is structure-shared between the mother and the head daughter, in accordance with standard HPSG principles.

[1] I leave out rules that are relevant only for NP-internal structure—i.e., the specifier-head and relative clause formation rules.

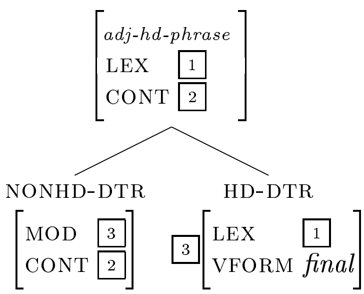
(27) Verbal complex rule: A [+LEX] non-finite verbal complement appears to the left of the governing verbal head.[2]



(28) Complement-head rule: A verbal head combines with one [−LEX] complement to its left.



(29) Adjunct-head rule: A modifier adjoins to the left of a verbal head projection.



[2]The type *final* subsumes *non-fin* and *f-incomp*. In other words, all verbs (including verbal traces) that take their complements to the left carry the feature [VFORM: *final*].

(30) Head-complement rule: A functionally complete verb, or a complementizer,[3] preposition, or noun takes a complement to the right.

$$
\begin{array}{cc}
\multicolumn{2}{c}{\begin{bmatrix} \textit{hd-comp-phrase} & \\ \text{LEX} & - \\ \text{COMPS} & \boxed{2} \end{bmatrix}} \\
\text{HD-DTR} & \text{NONHD-DTR} \\
\begin{bmatrix} \text{COMPS} & \langle \boxed{1} \rangle \oplus \boxed{2} \end{bmatrix} & \begin{bmatrix} \text{SYNSEM} & \boxed{1} \end{bmatrix}
\end{array}
$$

(31) Filler-head rule: The extracted element appears to the left of the gap-containing fronted verb projection.

$$
\begin{array}{cc}
\multicolumn{2}{c}{\begin{bmatrix} \textit{fill-hd-phrase} & \\ \text{LEX} & - \\ \text{SLASH} & \{\ \} \end{bmatrix}} \\
\text{NONHD-DTR} & \text{HD-DTR} \\
\begin{bmatrix} \text{LOC} \mid \boxed{1} & \text{LEX} & - \end{bmatrix} & \begin{bmatrix} \text{COMPS} & \langle\ \rangle \\ \text{SLASH} & \{\boxed{1}\} \end{bmatrix}
\end{array}
$$

Examples of a V-final and a V2 clause are given in Figures 1 and 2 at the end of this paper.

2.2. **Internal Structure.** V1 parentheticals include all phrases matching the following description:

(32)

$$
\begin{bmatrix}
\text{HEAD} & \textit{f-comp} \\
\text{VAL} & \begin{bmatrix} \text{SUBJ} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \\
\text{SLASH} & \left\langle \begin{bmatrix} \text{MOD} & \textit{none} \\ \text{CONT} & \textit{psoa} \end{bmatrix} \right\rangle
\end{bmatrix}
$$

[3]Note that unlike in standard HPSG, we treat complementizers like *dass* and *ob* as (prepositional) heads, and not as markers. In our analysis the marker-head schema is eliminated.

The item on the SLASH list corresponds to the sentential argument of the head verb. This follows from the specification [MOD: *none*], which ensures that the undischarged SLASH element is a complement, and not an extracted adjunct, and from the feature [CONT: *psoa*], which rules out the possibility of an NP or PP complement.[4]

V1 word order is ensured first of all by the *f-comp* specification, which is carried by all fronted (i.e., V1 and V2) verbs. The non-empty SLASH list forces a V1 structure because the potential Vorfeld constituent has not been realized yet (the SLASH list is maximally singleton). Furthermore, our PS rules do not allow adjuncts to the left of *f-comp* verbs (see the rule in (29) above).

As an example, a partial description for *sagt er* is given here:

(33)

$$\begin{bmatrix} \text{HEAD} & \textit{f-comp} \\ \text{COMPS} & \langle\ \rangle \\ \text{CONT} & \begin{bmatrix} \textit{say} & \\ \text{SAYER} & \textit{ref} \\ \text{SAID} & \boxed{1}\ \textit{psoa} \end{bmatrix} \\ \text{SLASH} & \left\{ \begin{bmatrix} \text{CONT} & \boxed{1} \end{bmatrix} \right\} \end{bmatrix}$$

The SLASH element is assigned the propositional SAID-role in the argument structure of the verb.

V1 parentheticals are built up internally just like all other sentences. In other words, no attempt is made to restrict the internal complexity of V1 parentheticals. All of the following, for example, satisfy the description in (32). They therefore qualify as V1 parentheticals, although realistically, they would be very unlikely to appear in this use.

(34) a. hat er nicht gesagt, es sei denn, ich habe ihn falsch verstanden
'he didn't say, unless I misunderstood him'

b. hätte er gestern sagen dürfen wollen
'he would have wanted to be allowed to say yesterday'

[4]The B8 fragment includes PP complements headed by semantically empty prepositions (e.g., *auf etw/jdn warten* 'to wait for sth/sb') but not predicative PP complements (e.g., with "put" verbs and verbs of motion). Therefore all PP complements have nominal, rather than relational, semantics.

c. sagt Paul, der schon seit Jahren neben uns wohnt und sowohl aus ästhetischen als auch aus ökonomischen Gründen kein Fleisch isst
'says Paul, who's lived next door to us for years and doesn't eat any meat, for both aesthetic and economic reasons'

In fact, there should be more restrictive conditions on the structure of V1 parentheticals; for example, parentheticals should not be allowed to contain other parentheticals. Consider the following case of "center embedding":

(35) * sagt glaubt meinen alle Maria Hans
'Hans thinks Maria believes everyone thinks'

This ungrammatical example cannot be blocked because V1 parentheticals are generally licensed immediately to the right of the finite verb:

(36) Der Vortrag war, [meinen alle], viel zu lang.
'The talk was, everyone thinks, much too long.'

The analysis we adopt therefore overgenerates, but the semantic and pragmatic components of the B8 grammar are currently not rich enough to accommodate an interesting treatment of this problem.

Note that successive (as opposed to nested) parentheticals are possible (Reis, 1995a, p. 50):

(37) Das Problem wurde damals [glaubt sie] [meinen alle] recht gut gelöst.
'The problem was at that time, she believes, everyone thinks, satisfactorily solved.'

A possible analysis of this example is to treat the second parenthetical *meinen alle* as embedded—i.e., hosted by the parenthetical *glaubt sie*. Then the single, complex V1 parenthetical *glaubt sie meinen alle* is hosted by the main clause. The fact that either parenthetical can take scope over the other, however, argues against such an analysis, and suggests that both parentheticals are inserted directly into the host sentence. Again, our account overgenerates, allowing the complex parenthetical analysis. As we will see in the next section, though, we also generate the desired iterated insertion analysis.

2.3. **Left Adjunction.** Most cases of parenthetical insertion are accounted for with the following left adjunction PS rule:

(38) Left parenthetical rule

$$\begin{bmatrix} \textit{hd-paren-phrase} \\ \text{LEX } - \end{bmatrix}$$

$$\begin{array}{cc} \text{NON-HD-DTR} & \text{HD-DTR} \\ \text{Y} & \text{X} \end{array}$$

The non-head daughter Y must match the description given above in (32). The head daughter X is disjunctively specified to match any of the following possible parenthetical hosts:

(39)

$$\begin{bmatrix} \textit{phrase} \\ \text{HEAD } \textit{v-trace} \end{bmatrix} \vee \begin{bmatrix} \textit{sign} \\ \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{VFORM } \textit{final} \end{bmatrix} \\ \text{COMPS } \textit{nelist} \end{bmatrix} \vee \begin{bmatrix} \textit{sign} \\ \text{VFORM } \textit{f-comp} \\ \text{COMPS } \langle\,\rangle \\ \text{SLASH } \textit{nelist} \end{bmatrix}$$

I will deal each disjunct in turn.

2.3.1. *Trace projections.* According to the first disjunct in (39), parentheticals can be hosted to the left of any phrasal verbal trace projection. Recall that a verbal trace appears in final position in every V1 or V2 clause. This part of the rule therefore licenses parenthetical insertion in the following positions (cf. (21a)):

(40) a. Maria möchte △ das Theorem △ heute △ beweisen *t*.

b. Möchte △ Maria △ das Theorem △ heute △ beweisen *t*?

These are all cases of the POST-V and MF niches (see (20)). As mentioned in §1.3, the post-finite position in (40b) should in fact be excluded because the verb and subject resist being split up (by non-pronominal elements). There is no elegant way of modifying (39) so that post-finite insertion is allowed in (40a) but blocked in (40b).

Note that a parenthetical adjoined immediately to the left of *t* is indistinguishable from a clause-final parenthetical, since the trace has no surface realization. There is no motivation for allowing both structures, so the verbal trace itself is not included as a possible host in (39). For clause-final parentheticals, see §2.4.

2.3.2. *"Final" verb projections.* The second disjunct in (39) allows all projections of non-finite and *f-incomp* verbs (see fn. 2) to serve as parenthetical hosts, as long as they are not COMPS-saturated.[5] This licenses the following cases:

(41) obwohl Maria $_\triangle$ das Theorem $_\triangle$ heute $_\triangle$ beweisen möchte

In this example, the host is always a projection of the *f-incomp* verb *möchte*. Nothing can be inserted between the complementizer *obwohl* and *Maria* (in accordance with ¬INIT) because at this point, the *f-comp* projection is COMPS-saturated.

The position immediately to the left of *möchte* in (41) is disallowed (¬VC), because then the verbal complex rule would not be able to apply. (According to the rule in (27), the head-daughter in a *vc-phrase* must be a *word*, not a *phrase*.) At first sight, the position to the left of *beweisen* will be doubly licensed, with the parenthetical hosted either by *beweisen* itself or by the entire verbal complex *beweisen möchte*. In fact, the first option is excluded, again because of the requirements of the verbal complex rule in (27) (the non-head daughter must be [+LEX]).

As we have seen, the COMPS-unsaturated requirement in the second disjunct of (39) helps to block clause-initial parenthetical insertion in V-final structures. The idea is that at least one complement will appear further to the left, ensuring that the parenthetical will not be clause-initial (¬INIT). This is not an ideal solution, however, as it leads to both under- and overgeneration. Consider the following relative clause construction:

(42) das Theorem, das noch heute [glaubt er] bewiesen wird
'the theorem that will yet be proven, he believes, sometime today'

This example is wrongly disallowed by the current analysis because the parenthetical is hosted by a COMPS-saturated projection of *wird*. The fact that the adjunct *noch heute* occurs further to the left of the parenthetical prevents a violation of ¬INIT, but the presence of this adjunct is not registered anywhere in the verbal projection when the parenthetical is adjoined.

On the other hand, COMPS-unsaturated requirement leads to overgeneration in interaction with argument raising:

(43) * [Glaubt er] beweisen möchte Maria das Theorem *t*.

[5]Verbal traces are not included in this description: traces are specified as [HEAD: *v-trace*] while non-trace verbs are [HEAD: *verb*]. The types *v-trace* and *verb* are subsumed by the *head* subtype *v-or-trace*.

Here, the infinitive *beweisen* is realized in the Vorfeld, not as part of the verbal complex. This verb is COMPS-unsaturated, because its direct object *das Theorem* has been raised to become a complement of the trace instead. Therefore, according to (39), *beweisen* should be a possible host. Furthermore, the combination *glaubt er beweisen* can (and must) be [−LEX] in the Vorfeld (whereas this is correctly disallowed within the verbal complex). In other words, under the current analysis, there is no way to block ungrammatical examples like (43).

But why are non-finite verbs allowed as hosts in (39) in the first place? We need this in order to accommodate examples like the following:

(44) Maria lernt [den Tango, sagt er, zu tanzen] *t*.
'Maria is learning to dance, he says, the tango.'

Here we have an instance of "incoherent" verbal complementation. The trace does not form a verbal complex with the [+LEX] *zu*-infinitive *zu tanzen*; instead, it takes the entire bracketed non-finite VP as a complement. Therefore, the only way to license the parenthetical placement in (44) is to allow non-finite verbs to be hosts. This is problematic, however, because the same VP in Vorfeld position cannot contain a parenthetical:

(44′) [den Tango (*sagt er) zu tanzen] lernt Maria *t*.

A constraint against parentheticals in the Vorfeld constituent seems to be needed for cases like this, and (43) above. This is difficult to state in the PS rules, however, without resorting to ad hoc representations (e.g., [±CONTAINS-PARENTHETICAL]). In our grammar we have simply left these as instances of overgeneration.

2.3.3. *Fronted verb projections.* Finally, the third disjunct in (39) allows *f-comp* verbal projections to host parentheticals to the left, thereby licensing the pre-finite position VF in (45a):

(45) a. Maria △ möchte das Theorem heute beweisen *t*.
b. * △ Maria möchte das Theorem heute beweisen *t*.
c. * △ Möchte Maria das Theorem heute beweisen *t*?

The SLASH-unsaturated specification on the host in (39) ensures that we are dealing with a V2 rather than a V1 structure, thus blocking (45c), and furthermore, the parenthetical must be adjoined before the Vorfeld filler has been realized, thus blocking (45b). The COMPS-saturated requirement prevents a second analysis for (45a) where the parenthetical is attached to the verb *möchte* before the trace projection is incorporated.

2.4. **Right adjunction.** A left-adjunction approach as described above will obviously run into problems accounting for clause final parentheticals, especially those that occur after a V-final verb:

(46) obwohl Maria heute krank ist [sagt er]
'although Maria is sick today, he says'

As discussed above in §2.3.1, we could allow left-adjunction to the verbal trace to account for clause-final parentheticals in some cases, but that solution could not apply in (46). There is nothing further to the right of *ist* that can serve as the host.

Another class of problematic examples is illustrated by the following:

(47) Maria ist krank geworden [sagt er] *t*.
'Maria got sick, he says.'

Here the parenthetical could left-adjoin to the verbal trace, but subsequently the resulting phrase could not form a verbal cluster with *geworden*, because the verbal complex rule (27) requires a *word* as its head-daughter.

One possible solution for these problematic cases is to assume that such parentheticals are moved into the Nachfeld via extraposition from some position in the Mittelfeld. This is a satisfactory solution as long as we care only about the correct word order (and assuming we have an analysis for extraposition[6]). On a deeper lever, however, it is highly debatable whether clause final parentheticals as in (46)krank2 really have the properties of extraposed elements. The possibility of prosodic integration, for example, seems to argue against such an analysis.

A simpler solution to the problem of clause-final parentheticals, is to assume a right-adjunction rule in addition to rule (38). This is what we have done in our implementation.

(48) Right parenthetical rule

$$\begin{array}{c} \begin{bmatrix} \textit{hd-paren-phrase} \\ \text{LEX} \; - \end{bmatrix} \\ \diagup \qquad \diagdown \\ \begin{array}{cc} \text{HD-DTR} & \text{NON-HD-DTR} \\ \text{X} & \text{Y} \end{array} \end{array}$$

[6]See Penka (in this volume). The extraposition analysis adopted in the B8 fragment applies to complements and adjuncts. Currently, extraposition of parentheticals is not possible.

The host X is specified as follows:

(49)

$$\begin{bmatrix} \text{VFORM} & \textit{f-incomp} \\ \text{VAL} & \begin{bmatrix} \text{SUBJ} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \\ \text{SLASH} & \langle\ \rangle \end{bmatrix}$$

In other words, parenthetical elements can adjoin to the right of saturated functionally incomplete projections. This includes projections of final finite verbs and verbal traces; infinitival projections cannot serve as hosts here because they are always SUBJ-unsaturated. The empty SLASH list specification reduces the number of analyses for parentheticals adjoined to the right of (V-final) relative clauses.[7]

It is unfortuntate that we have to rely on two new adjunction rules to account for all parenthetical niches. Perhaps a modified version of the right adjunction rule in (48) would be sufficient on its own. In fact, right adjunction is the more natural choice to begin with, since parentheticals can appear in clause-final, but not in clause-initial position. As I have discussed elsewhere, however, an expanded right adjunction analysis runs into serious problems of overgeneration, because parenthetical items are simply attached too low in the structure to be properly constrained (Tseng, 2000).

3. Drawbacks

The phrase structure rules presented in (38) and (48) above account for the placement possibilities of clausal parentheticals reasonably well, but not particularly elegantly. In this section I look at some other problematic aspects of the proposed analysis.

3.1. Pre-Wackernagel restriction.

Our approach is unable to ensure condition ¬PPRO, which disallows the insertion of parentheticals before Wackernagel pronouns:

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[7]In many of these cases, a left-adjunction analysis will also be available:

(1) Ein Mann, den wir alle kennen [sagt Hans] kommt morgen.
'A man who we all know, says Hans, is coming tomorrow.'

In this example, the parenthetical can be hosted either by the relative clause or by the fronted verb projection.

(50) * Möchte $_\triangle$ sie $_\triangle$ es beweisen t?

This is because at the level of adjunction, there is no indication on the host VP whether it has a pronoun at its left periphery or not. We could somehow encode this information in the VP, for example, by adding a feature [±LEFT-PERIPH-PPRO]. This feature would require its own percolation mechanism; it could not be a HEAD feature, for example. It seems unsatisfactory, however, to propose such ad hoc modifications to the formal apparatus when ¬PPRO can be better understood as a constraint on word order, and not as a syntactic restriction.

3.2. **Semantic incorporation.** As discussed earlier in §1.2, V1 parentheticals are interpretationally dependent on their host clauses, in that the unexpressed propositional argument of the parenthetical predicate is linked to the propositional content of the host clause. In general, parenthetical elements must have access to the semantics of their hosts.

3.2.1. *Illocutionary type.* The existence of this semantic link between parenthetical and host can be observed in the following data. Parentheticals containing the predicate *fragen* combine only with interrogative host clauses:

(51) a. * Hans, fragt Karl, hat Fritz getroffen.
b. —Wen, fragt Karl, hat Hans getroffen? —*Fritz.
'—Who, asks Karl, did Hans meet? —Fritz'

The two components interact to produce the overall interpretation of the combined structure. Parentheticals with *sagen*, in contrast to *fragen*, can be hosted by both declarative and interrogative clauses:

(52) a. Hans, sagt Karl, hat Fritz getroffen.
b. —Wen, sagt Karl, hat Hans getroffen? —Fritz.

The combination in (52a) gives rise to a declarative statement, while (52b) is a question (as confirmed by the acceptable continuation). In these cases, the illocutionary type is the same as the host clause. In example (51b), on the other hand, the host clause is interrogative but the whole sentence is not a question, but a statement of reported speech—hence the ungrammaticality of the "answer" in (51b) (Steinbach, 1999).

3.2.2. *Inaccessible adjuncts.* In fact, the B8 fragment includes no treatment of illocutionary types, so we have no way of enforcing restrictions like those in (51)–(52) above. If we assume that this information is propagated in head-driven way, like most semantic information in HPSG, then it should be accessible to the parenthetical daughter whenever the left- or right-adjunction rules in (38) and (48) apply. This is because the head daughter in those rules is always a projection of the main verb of the clause (or a verbal trace with the same semantics as the main verb).

More generally, however, if we make the reasonable assumption that parenthetical elements should have full access to the semantic content of the host clause, then our analysis runs into trouble in cases involving adjuncts. In our fragment, following standard HPSG, head-adjunct phrases require non-head-driven semantic percolation—i.e., the mother inherits the adjunct daughter's CONTENT value, not the head daughter's. This means that the full semantics of the host clause is not accessible at all points along the head projection, but only from the highest adjunct attachment site upwards.

Compare the following two examples:

(53) a. Maria möchte das Theorem heute [sagt er] beweisen *t*.
b. Maria möchte das Theorem [sagt er] heute beweisen *t*.

In (53a), the parenthetical is left-adjoined to the trace projection *beweisen t*, at which point the abverb *heute* 'today' has not yet made its semantic contribution. In (53b), on the other hand, the parenthetical is hosted by a phrase that already contains the adverb. This analysis predicts a semantic distinction between the two insertion points: in (53b), the adverb is in the scope of the parenthetical, but in (53a), it is not. In fact, this prediction is incorrect. In both cases, the parenthetical has scope over the entire host clause.

Given the rather simplistic treatment of semantics in our grammar, the problem of invisible adjuncts cannot be considered a strong argument against the syntactic analysis presented in §2.3 and §2.4. We might assume, for example, a mismatch between syntactic structure and semantic composition. With a more complicated mechanism of semantic percolation we could provide a suitable analysis for example (53a) without discarding the syntactic analysis.

3.3. **Syntactic incorporation.** A more serious problem with the left- and right-adjunction analysis we adopt is that the structures it generates are wrong for syntactic reasons as well. There is no evidence that parentheticals are in fact syntactically incorporated into their host clauses. McCawley (1982) considers this issue for English parentheticals, and concludes that all grammatical phenomena that are sensitive to the constituent structure of the host clause behave as if the parenthetical is not present.

McCawley's arguments carry over more or less directly to German. For example, consider the following example involving VP anaphora:

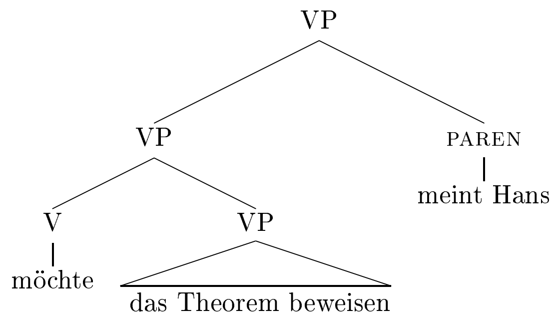
(54) Maria möchte das Theorem [meint Hans] beweisen. Das würde ich auch gerne machen.
'Maria, thinks Hans, would like to prove the theorem. I'd like to do that, too.

(55) a. Ich würde gerne das Theorem beweisen.
b. Ich würde gerne [meint Hans] das Theorem beweisen.

In (54), the underlined pronoun *das* refers to proving the theorem, but under normal assumptions, there is no phrase in the first sentence that includes *das Theorem* and *beweisen* without also including the parenthetical. This leads to the incorrect interpretation of the second sentence as (55b), instead of (55a).

Arguments like this suggest that the rules described above, which were meticulously designed to insert parentheticals in just the right places, actually lead to unmotivated and misleading structural analyses. McCawley argues instead in favor of an analysis where, at the level of constituent structure, parentheticals are adjoined to the entire clause, not to some sub-clausal constituent. For example, the VP in (54) would have the following syntactic structure:

(56)



A so-called "order-changing" transformation applies to the tree in (56) to insert the parenthetical between the NP and the non-finite verb. According to McCawley, this transformation has no effect on constituent structure. At the syntactic level, the parenthetical-free VP *das Theorem beweisen* is still intact, and available to serve as the antecedent of *das* in (54).

McCawley's proposal is presented in terms of input trees and order-changing transformations, but it is based fundamentally on the same idea that underlies linearization approaches to word order—the dissociation of syntactic constituency and surface word order.

4. Linearization

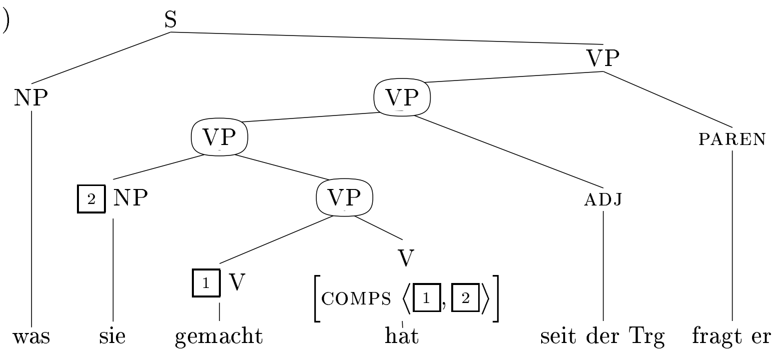
In this final section I offer some ideas for a linearization-based approach to parenthetical insertion. The move to a linearization grammar calls for a complete revision of the syntactic analysis for German clause structure given in §2. The proposals in this section are only preliminary, however, so I will illustrate them by sketching an example analysis.

The host clause I consider is the following question:

(57) Was hat sie seit der Trennung gemacht?
'What has she been doing since the separation?'

I assume the following syntactic structure for this clause plus the V1-parenthetical *fragt er*:

(58)



Briefly, this structure assumes a head-complement (or complement-head) rule, a head-adjunct rule, a prenthetical adjunction rule, and a head-filler rule. I will ignore NP- and PP-internal structure. Significantly, the finite verb *hat* is not specified as [VFORM: *f-comp*] or [VFORM: *f-incomp*], although these features continue to be important for word order.

Also note that the problems of semantic accessibility brought up in §3.2 are resolved here, because the parenthetical is adjoined high enough to have access to all of its host clause's content. Following standard HPSG, although the filler *was* appears outside of the host VP syntactically, its semantic contribution is still present in the VP. Also, syntactic processes can target the lower VP and ignore the parenthetical, even though the parenthetical may appear to be part of VP in the surface word order.

4.1. **Linearization constraints.** In a standard phrase structure approach, the surface word order would be read directly off the structure in (58), producing the following string:

(59) was sie gemacht hat seit der Trennung fragt er

This is clearly not the desired result. Under a linearization approach, word order is not necessarily dependent on syntactic structure. Instead, we can state a separate set of constraints to determine the possible surface realizations.

The following word order constraints hold within head-complement phrases and head-adjunct phrases (the circled nodes in (58)):

(60)
a. V[*f-comp*] appears first; V[*f-incomp*] appears last
b. pronouns occur before all other dependents and form an isolated (i.e., obligatorily continuous) cluster with V[*f-comp*] (if any)
c. verbal (and adjectival) complements occur after NP and PP dependents and form a cluster with the V[*f-incomp*] (if any)
d. NPs and PPs are always isolated

In head-parenthetical phrases, the following conditions must be satisfied:

(61)
a. the head daughter is COMPS-saturated
b. parentheticals are isolated
c. parentheticals cannot be clause-initial

And finally, in head-filler phrases:

(62) NON-HD-DTR $\ll$ HD-DTR

4.2. **Possible realizations.** Given the requirements in (60), there are two possible orderings for the host clause, depending whether the verb *hat* is instantiated (by the linearization constraints) as *f-incomp* or *f-comp*. In the following, isolated sequences (which are not necessarily syntactic constituents) are shown in brackets:

(63)

a. *f-comp*	b. *f-incomp*
hat gemacht	[gemacht hat]
[hat sie] gemacht	sie [gemacht hat]
[hat sie] [seit der Trg] gemacht	sie [seit der Trg] [gemacht hat]

The V-final order in (63b) is appropriate for an embedded question, but such clauses cannot combine with *fragen*-type parentheticals:

(64) * Ich wollte nur wissen, was sie [fragt er] seit der Trennung gemacht hat.
'I just wanted to know what she's been doing, he asks, since the separation.'

Instead, let us focus on the first ordering in (63). The parenthetical can be inserted anywhere, as long as it does not violate any of the existing linearization constraints. This means that the following insertion points are all possible:

(65) $\triangle$ [hat sie] $\triangle$ [seit der Trennung] $\triangle$ gemacht $\triangle$

Finally, the filler *was* is incorporated, and by (62) it must appear initially. Altogether, then, the word orders licensed by this analysis are all and only the correct ones:

(66) Was $\triangle$ [hat sie] $\triangle$ [seit der Trennung] $\triangle$ gemacht $\triangle$?

The constrast with the phrase-structure approach described in §2 is clear. In that analysis, parenthetical niches had to be explicitly and stipulatively declared in the left- and right-adjunction rules, and even after those ad hoc measures, there were still residual syntactic and semantic problems (§3). Under a linearization approach, after formulating the appropriate "core" word order constraints (which are needed to account for German clause structure in general) nothing further needs to be said to incorporate parentheticals correctly.

Naturally, this analysis is preliminary; the constraints in §4.1 have not yet been formalized or implemented. There are a number of proposals for handling LP constraints in HPSG, ranging from Pollard and Sag (1987) (which is too limited for our purposes) to Reape (1994) (which is perhaps too powerful). One of the goals during the remaining time of the B8 project is to develop a language for expressing the kind of constraints we need for German, and a computational platform for working with grammars that include such constraints.

The move to a linearization-based analysis of course increases the expressive power of the grammar framework, and from a computational perspective it requires a significantly different, and inevitably more complex parsing strategy. In the case of parentheticals, however, the advantages gained by abandoning traditional phrase structure in favor of linearization are striking, and provide strong justification for a linearization-based approach to the structure of German.

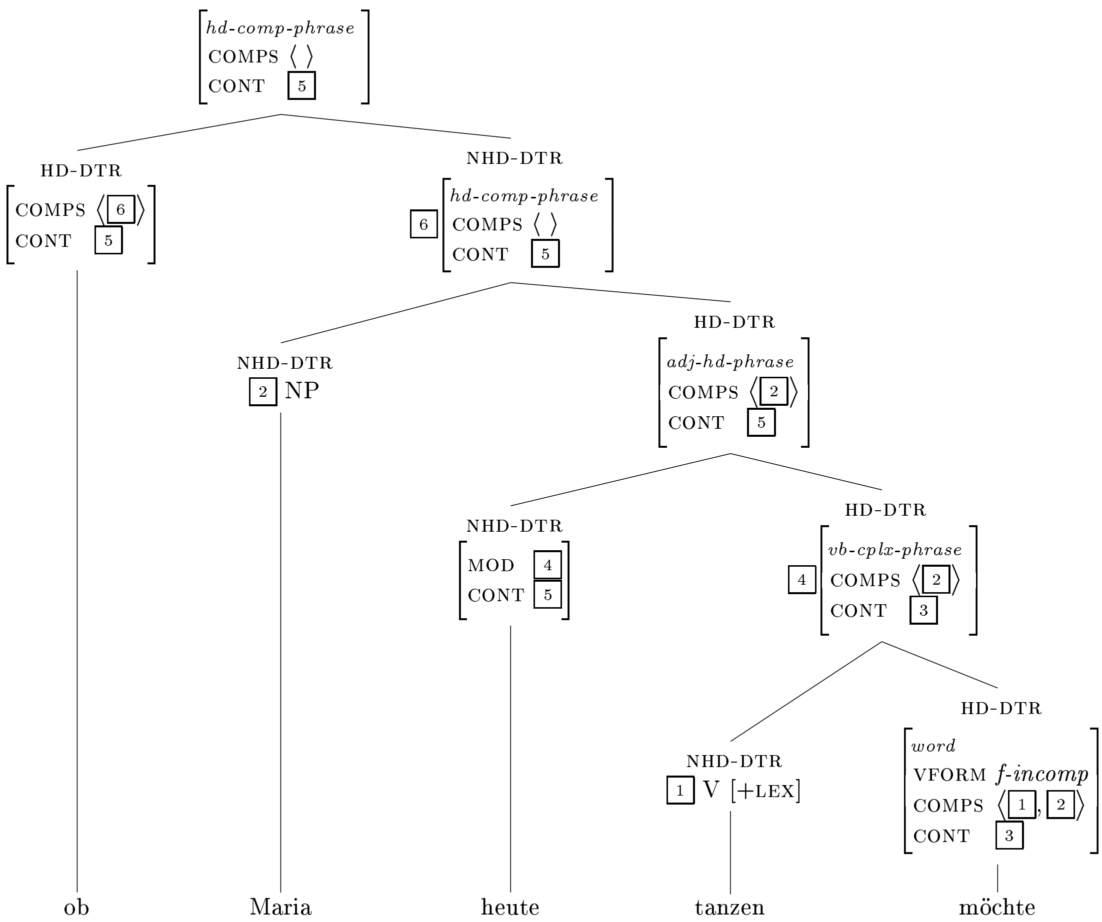


FIGURE 1. Analysis of a V-final clause

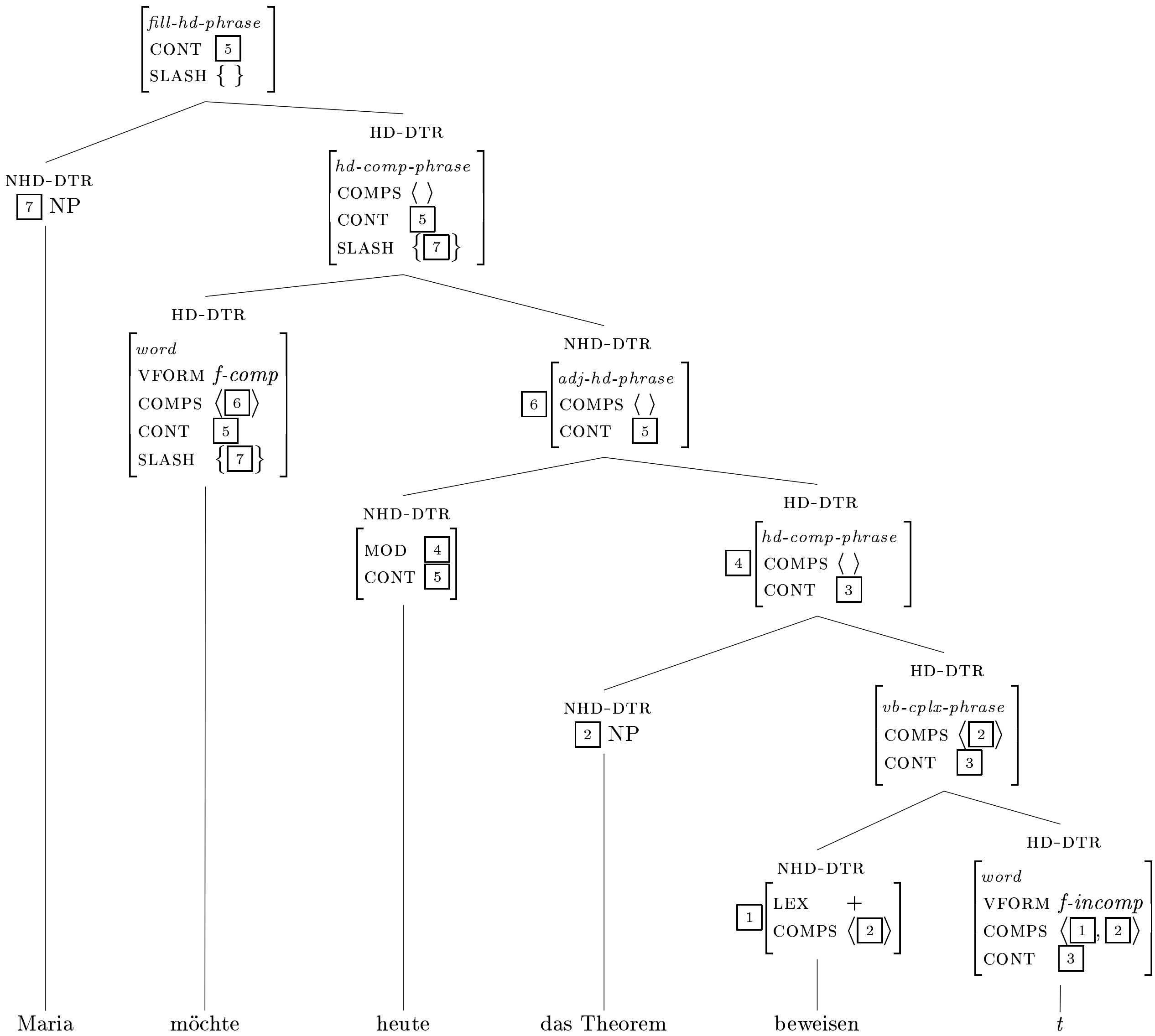


FIGURE 2. Analysis of a V2 clause

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