**Arbeitspapiere des SFB 340**
Bericht Nr. 156, December 2000

# THE WAS-W CONSTRUCTION IN GERMAN: A CASE STUDY IN TYPE COERCION

ERHARD W. HINRICHS AND TSUNEKO NAKAZAWA

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## 1. Introduction

Partial-wh-movement constructions have received a fair amount of attention in recent syntactic theorizing. The so-called *was-w construction* in German is an instance of such a construction. (1) shows some typical examples.

(1) a. Was glaubst Du, wer angerufen hat?
What believe you who called has
'Who do you believe called?'

The research reported in this paper is part of the Sonderforschungsbereich 340 *Theoretical Foundations of Computational Linguistics* funded by the Deutsche Forschungsgemeinschaft. We wish to thank Werner Abraham, Gosse Bouma, Ger de Haan, Andreas Kathol, Ivan Sag, and two anonymous referees of the 7th International Conference on Head-Driven Phrase Structure Grammar for their comments on earlier versions of this paper. Special thanks also to Detmar Meurers, who helped us enormously with many LaTeX formatting issues.

ISSN 0947-6954/00

b. Was glaubst Du, was Hans gesagt hat?
What believe you what Hans said has
'What do you believe that Hans has said?'

c. Was glaubst Du, von wo Hans angerufen hat?
What believe you from where Hans called has
'From where do you believe that Hans has called?'

The was-w construction owes its name to the initial wh-word *was* and the clause-initial wh-phrase (German: *w-Phrase*) of the embedded clause. The wh-phrase can either be a complement of the embedded verb, i.e. a subject, as in (1a), or an object, as in (1b), or it can be a modifier, as in (1c). Regardless of what the embedded wh-phrase is, the sentence-initial wh-word is always *was*.

There is a related construction in German, commonly referred to as the *copy-construction*, where instead of the invariant *was*, the sentence-initial position is occupied by a copy of the embedded wh-word. Examples are given in (2).

(2) a. Wer glaubst Du, wer angerufen hat?
Who believe you who called has
'Who do you believe called?'

b. Was glaubst Du, was Hans gesagt hat?
What believe you what Hans said has
'What do you believe that Hans has said?'

c. Wo glaubst Du, wo Hans wohnt?
What believe you where Hans resides
'Where do you believe that Hans resides?'

Most investigators who have studied these two constructions have focused on the properties of *was*. One line of research maintains that the *was* in this construction is a scope marker that indicates the semantic scope of the wh-phrase in the embedded interrogative clause.[1] Analyses like these treat the was-w construction as a variant of wh-extraction out of *dass* clauses as shown in (3).

(3) Wen glaubst Du, dass Hans angerufen hat?
Who believe you that Hans called has
'Who do you believe that Hans has called?'

[1]For reasons that will become apparent, we distinguish between the term *interrogative* (to refer to a family of syntactic clause types) and the term *question* (to refer to particular classes of denotations as semantic objects).

Both constructions denote wh-questions. But they differ with respect to the syntactic position of the extracted wh-phrase. While in (3) the wh-phrase appears in the matrix clause, this phrase is only partially extracted in (1) and is associated with a scope marker in the matrix clause. Hence, in this line of research, the was-w construction is often characterized as *partial* wh-extraction.

The copy construction seems to lend additional support for the view that the sentence-initial wh-phrase is a scope marker. After all, the initial constituent in this construction is a mere copy of the embedded wh-phrase.

Such scope marking analyses have not only been put forward for the relevant constructions in German, but they have also been entertained for related constructions in a variety of languages, including Frisian, Hindi, Hungarian, and Romani. Examples of the respective constructions are shown in (4)–(7).

(4) wat tinke jo wêr't Jan wennet?
what think you where-that Jan resides
'Where do you think Jan resides?'

(5) jaun kyaa soctaa hai merii kis-se baat karegi.
John what thinking that Mary who-with talk will-do
'Who is John thinking that Mary will talk with?'

(6) Mit kérdeztek, hogy kivel találkoztam-e?
what asked-3pl that who-with met-1sg-Q-prt
'With whom did they ask whether I had met?'

(7) so o Demìri mislinol kas i Arìfa dikhol?
what the Demir thinks whom the Arifa sees
'Who does Demir think that Arifa sees.'

Starting with Vaneeta Dayal's 1994 thesis (Dayal, 1994), an alternative line of analysis was initiated that challenges the view that cross-linguistically these constructions are scope-marking constructions. This alternative view, usually referred to as the *indirect analysis*, was first developed with respect to Hindi and then generalized to German (Dayal, 1994, 1996). It holds that the *was* of the was-w construction is associated not with the embedded wh-phrase, but rather with the embedded clause as a whole. Hindi provides strong evidence in favor of this view.

(8) har bacaa kyaa soctaa hai ki vo jaayegaa yaa nahiiN.
every child what think-PR that he go-F or not
'What does every child think: will he go or not?'

The significance of examples like (8) lies in the fact that the embedded clause does not contain a wh-phrase for which the word *kyaa* could act as a scope marker. Rather *kyaa* seems to refer to the embedded clause as a whole. Under this view the was-w construction resembles sequential questions, as in (9):

(9) Was glaubst Du: wen hat Hans angerufen?
What believe you: who has Hans called
'What do you believe: who did Hans call?'

Note, however, that the subordinate clause in the was-w construction differs from the second clause in (9): the former exhibits verb-final, the latter verb-second word order.

For German clear evidence in favor of the indirect analysis of the was-w construction is harder to come by than in the case of related constructions in Hungarian and Hindi. Examples like (10), which is parallel to the Hindi example in (8), are ungrammatical in German.

(10) * Was glaubst Du, ob Fritz angekommen ist oder
What believe you, whether Fritz arrived has or
nicht?
not?

But even for the was-w construction there is mounting evidence that the indirect analysis is the correct one for German as well.[2] Dayal (1996) and Fanselow and Mahajan (1996) cite the data in (11):

(11) Was hat er, ohne wirklich zu wissen, behauptet, wen sie
What has he, without really to know, claimed who she
liebt?
loves
'Who did he claim that she loves without him really knowing it?'

Since *wissen* cannot take a direct object that refers to a person, but can combine with a proposition-denoting argument, the acceptability of (11) seems consistent only with the indirect analysis.

[2]For an excellent survey of the relative merits of the two positions see Höhle (1996) and Reis (1996). Kathol (1998) presents the first indirect analysis of the was-w construction in the framework of HPSG.

## 2. New Evidence for the Indirect Analysis

The data in (12), which thus far seem to have escaped notice, provide independent evidence.[3]

(12) Was Hans sagt, wen er verdächtigt, das/*den habe ich
What Hans says who he suspects that/him have I
überprüft.
evaluated

'I evaluated what Hans says about the person whom he suspects.'

(12) is an instance of a free relative construction. Since the scope-marking analysis would assume index-sharing between *was* and *wen*, which under standard HPSG assumptions includes sharing of the index restrictions introduced by *wen*, one would expect the reversed grammaticality judgments. The indirect analysis, however, correctly predicts the judgments since, according to Dayal, it assumes that *was* refers to something like the answer to a proposition.

It is worth noting that the grammaticality judgments are reversed in the case of the so-called copy-construction, which some, but not all speakers of German accept.

(13) Wen Hans sagt, wen er verdächtigt, *das/den habe ich
What Hans says who he suspects that/him have I
überprüft.
evaluated

'What Hans says whom he suspects that I evaluated.'

This seems to shed serious doubt on the received wisdom (cf. e.g. Höhle, 1996) that the copy-construction is a variant of the was-w construction. Rather, the contrast between (12) and (13) seems to be suggestive evidence that the former is a scope-marking construction, while the latter is not.

Based on the conclusions to be drawn from examples like (11) and (12), the HPSG analysis of the was-w construction that will be presented in the final section of this paper will be an indirect analysis in the spirit of Dayal.

[3]In addition, Beck (1996), Dayal (1996), and Kathol (1998) have argued that the negative island properties of the was-w construction have a natural explanation under the indirect analysis.

While past research has focused on the properties of *was* and the semantic properties of the construction, two questions have by comparison received little attention, namely:

(14) a. What is the set of matrix predicates that can enter into this construction?

b. How can one account for the curious fact that predicates that ordinarily do not license wh-complements (cf. 15) allow such complements in the was-w construction?

(15) * Peter glaubt, wen Hans angerufen hat.

These questions will be addressed in the following two sections.

## 3. Licensing Verbs for the was-w construction

The class of verbs that appear most frequently in the was-w construction are verbs of saying, thinking, and believing (e.g. *behaupten, glauben, denken, meinen, schätzen*). These are verbs that outside the was-w construction allow only −WH complements, as (16) shows.

(16) a. * Hans hat gesagt/geglaubt, wer kommt.
Hans has said/believed, who comes.

b. Hans hat gesagt/geglaubt, dass Peter kommt.
Hans has said/believed, that Peter comes

c. Was hat Hans gesagt/geglaubt, wer kommt?
What has Hans said/believed, who comes

By contrast, verbs which only allow +WH complements (cf. the contrast between 17a and 17b), are not was-w licensing predicates, as (17c) illustrates.

(17) a. Hans hat nachgeforscht/gefragt, wer kommt.
Hans has investigated/asked, who comes.

b. * Hans hat nachgeforscht/gefragt, dass Peter kommt.
Hans has investigated/asked, that Peter comes

c. * Was hat Hans nachgeforscht/gefragt, wer kommt?
What has Hans investigated/asked, who comes

A reasonable descriptive generalization seems to be that the possible matrix verbs for this construction are restricted to predicates that ordinarily disallow +WH complements.

However, as Stechow and Sternefeld (1988) were the first to point out, the set of was-w licensing predicates also includes some (cf. 18), but not all (cf. 19) verbs that outside of this construction allow both +WH and −WH complements.

(18) a. Hans hat entschieden/berichtet/sich vorgestellt, wer
Hans has decided/reported/imagined who
kommen soll.
come should

b. Hans hat entschieden/berichtet/sich vorgestellt, dass
Hans has decided/reported/imagined that
Peter kommen soll.
Peter come should

c. Was hat Hans entschieden/berichtet/sich vorgestellt,
What has Hans decided/reported/imagined
wer kommen soll?
who come should

(19) a. Hans hat gewusst/vergessen/sich erinnert/erraten, wer
Hans has known/forgotten/remembered/guessed who
kommen soll.
come should

b. Hans hat gewusst/vergessen/sich erinnert/erraten, dass
Hans has known/forgotten/remembered/guessed that
Peter kommen soll.
Peter come should

c. * Was hat Hans gewusst/vergessen/sich erinnert/erraten,
What has Hans known/forgotten/remembered/guessed
wer kommen soll.
who come should

Considering the data in (15)–(19) no clear generalization regarding the class of was-w licensing predicates seems to emerge—at least not on the basis of syntactic properties alone, as Stechow and Sternefeld are themselves forced to conclude.

A much clearer picture emerges if one takes into account a recent verb classification proposed by Ginzburg and Sag (in preparation). In their forthcoming monograph, Ginzburg and Sag distinguish four classes of predicates that take either +WH or −WH sentential complements. They call these predicates *TF predicates* ("true/false predicates"), *QE predicates* ("question predicates"), *factive predicates* and *resolutive predicates*.[4] Some sample verbs of English for each class of predicates are shown in (20):

(20) Verb classification of Ginzburg and Sag (in preparation)

| Resolutive Preds | Factive Preds | QE Preds | TF Preds |
|---|---|---|---|
| tell | reveal | ask | believe |
| guess | know | wonder | deny |
| predict | discover | investigate | prove |

The last two classes, QE predicates and TF predicates, are easy to distinguish. QE predicates allow only +WH complements, and TF predicates allow only −WH complements. The relevant contrast for the German verbs *sagen* and *glauben* versus *fragen* and *nachforschen* is shown in (16) and (17).

Resolutive predicates and factive predicates allow both +WH and −WH complements. That is, these two classes of predicates share some properties of QE predicates and TF predicates. They have in common with QE predicates that they allow +WH complements. But the semantic properties of such +WH embedded complements are characteristically different. As Ginzburg and Sag demonstrate, one of the ways in which this difference manifests itself is with respect to embedded exclamatives.

(21) a. # Jo wondered/asked what a runner Billie is.
b. # Jo wondered/asked how incredibly well Merle did in the elections.

QE predicates do not allow embedded exclamatives. The # marking in (21) indicates semantic anomaly. Resolutive and factive predicates, on the other hand, **do** allow embedded exclamatives, as in (22).

(22) a. Jo finally discovered what a runner Billie is.
b. Jo told us how incredibly well Merle did in the elections.

There is additional evidence involving distinct inference patterns for nominal arguments that helps distinguish QE predicates from resolutive and factive predicates.

[4]In the present study we only focus on those classes of predicates that are most relevant to the was-w construction. The class of predicates exemplified in table (20) is, therefore, not an exhaustive list of the verb classes that Ginzburg and Sag (in preparation) distinguish. Additional verb classes that they propose include *mandative* and *decidative* predicates, to mention just a few.

(23) a. Jean asked/wondered/investigated an interesting question/issue.

b. # Jan told me/forgot/guessed an interesting question/issue.

Not surprisingly, QE predicates allow nominals that denote questions, as in (23a), but many resolutive and factive predicates do not.

Those resolutive and factive predicates that **are** compatible with question-denoting nominals, as in (25), show distinct inference patterns from QE predicates. Nominal object of verbs like *ask* and *wonder* constitutes a referential object that allows substitution *salva veritate* by the content of the question (24). This test of substitutivity fails for resolutive and factive predicates. Discovering a question does not entail discovering the answer to the question, as (25) shows.

(24) Jean asked/wondered/investigated an interesting question.
The question was who left yesterday.
Hence: Jean asked/wondered/investigated who left yesterday.

(25) Jean discovered/revealed an interesting question.
The question was who left yesterday.
It does *not* follow that: Jean discovered/revealed who left yesterday.

Ginzburg and Sag conclude from these data that +WH complements play different roles in the lexical semantics of QE predicates and in the lexical semantics of resolutive and factive predicates. The authors assume that all interrogative clauses denote semantic objects of type *question*. For QE predicates this question-denoting complement enters directly as a thematic role argument into the lexical semantics of such predicates. Resolutive and factive predicates, on the other hand, do not have question-denoting thematic role arguments, but have fact-denoting arguments instead. This fact-denoting argument is taken to provide the answer to the question denoted by the embedded +WH complement. In order to mediate between the question denoted by the wh-interrogative and this fact-denoting argument position, Ginzburg and Sag assume a mechanism of *type coercion*: the question is "coerced" into a fact that resolves that question. This ontological difference is shown in table (26).

(26)

| | Resolutive Preds | Factive Preds | QE Preds | TF Preds |
|---|---|---|---|---|
| −WH | proposition | fact | | proposition |
| +WH | question_coerced_to_fact | question_coerced_to_fact | question | |

With respect to +WH complements, resolutive and factive predicates pattern alike. What distinguishes the two classes of predicates are declarative *that* complements. Here resolutive predicates have no factive entailment as (27a) shows. Factive predicates such as *know*, on the other hand, do exhibit such factive entailments, as the semantic anomaly in (27b) shows.

(27) a. Bill predicted, falsely as it turns out, that Mary would never agree to Jill's terms.

b. # Bill knows, falsely as it turns out, that Mary would never agree to Jill's terms.

Ginzburg and Sag therefore propose an ontological distinction between *facts* and *propositions* as the denotational difference between declarative complements of factive and resolutive predicates. As a consequence, with respect to declarative complements, resolutive predicates pattern with TF predicates in the sense that both classes embed proposition-denoting *that*-complements.

If we reconsider the class of predicates illustrated in (15)–(19) in light of Ginzburg and Sag's classification, a clear generalization emerges: the set of was-w licensing predicates includes TF predicates (e.g. *glauben* in 15) and resolutive predicates (e.g. *entscheiden* in 18). What are excluded are QE and factive predicates. Even though TF predicates and resolutive predicates differ with respect to the syntactic type of possible embedded complements, they form a natural class in that their declarative complements denote propositions. It is important to point out that it is precisely this property that carries over to the was-w construction: even though the embedded complement in a was-w construction is syntactically an interrogative, its semantic contribution is that of a proposition (not a question or a fact).[5] Rather, it is the sentence as a whole that denotes a (direct) question.

Now one might wonder whether the class of TF predicates and resolutive predicates somehow form a natural class as matrix verbs for the was-w construction. To be sure, Ginzburg and Sag provide good arguments for the fact that both classes of predicates have in common that they embed declarative, proposition-denoting complements. But is there any deeper reason why such proposition-denoting complements should be natural candidates as matrix predicates for the was-w construction? We believe that there **is** good reason to attribute explanatory value to

[5]The importance of distinguishing between syntactic form and semantic contribution in the case of the was-w construction was also observed by Kathol (1998).

the descriptive generalization that embedded complements of the was-w construction are proposition-denoting.

This explanation can best be given in terms of Stalnaker's theory of conversation (Stalnaker, 1974). This theory provides a pragmatic account of the notion of presupposition and centers around the notion of *common ground*. The common ground is taken to be the set of propositions that are taken for granted by the participants in a dialogue. According to Stalnaker, one of the main purposes of exchanging information in a dialogue is to increase the set of propositions that constitute the common ground among the interlocutors. Privileged among the set of propositions in the common ground are those which the interlocutors consider to be true, or to use Ginzburg and Sag's terminology, the set of facts shared by the discourse participants. Factive predicates play a central role in this respect. If we say to you

(28) Kohl knew that the CDU had illegal bank accounts in Switzerland.

we assert something about Kohl, but at the same time we convey the pragmatic presupposition that we consider the fact that the CDU had illegal bank accounts in Switzerland as part of the common ground. Unless this presupposition of the speaker of (28) is explicitly challenged by the hearer, this fact about the CDU is considered shared knowledge, i.e. part of the common ground.

What role do questions play in such a theory? Questions have the role of explicitly inquiring about what is the case. That is, questions introduce issues that are not yet part of the common ground. A putative was-w construction with a factive matrix predicate would signal that the proposition denoted by the embedded clause is unresolved, and hence not part of the common ground, since the was-w construction as a whole denotes a question. At the same time the factive predicate would signal that the proposition denoted by the embedded clause **is** part of the common ground, due to the pragmatic presupposition signalled by the factive predicate. It is this inherent contradiction between the pragmatics of questions and the pragmatic presupposition of factive predicates that prevents such predicates from being good licensers of the was-w construction.

TF predicates and resolutive predicates, unlike factive predicates, do not wear on their sleeves whether the embedded proposition is taken to be true or false. Such predicates only signal an attitude of the subject of the matrix predicate toward the embedded proposition. But crucially, they carry no pragmatic presupposition about the embedded proposition that can be attributed the speaker of the utterance. In this sense they are compatible with the meaning of a question and hence they provide good matrix predicates for the was-w construction.

## 4. Lexical Idiosyncrasies

In the previous section we linked the was-w construction to two lexical classes of host predicates: TF predicates and resolutive predicates. We also motivated why these two predicates form a natural class in view of the pragmatic function of questions in discourse.

Since the construction is restricted to the two subclasses of predicates, this points to a lexical treatment of the construction, rather than a syntactic one. The lexical nature of the was-w construction is further highlighted by lexical idiosyncrasies already noted by Stechow and Sternefeld (1988) and Reis (1996). The verb *zustimmen* ('agree'), for example, is a TF predicate, yet it does not license the was-w construction, as shown in (29).[6]

(29) * Was hast du zugestimmt, wen wir einladen sollen?
What have you agreed who we invite should
'Who did you agree that we should invite?'

Hence, while membership in the class of TF predicates or resolutive predicates provides a necessary condition and a natural class, it is not a sufficient condition. It seems, therefore, that the licensing of the was-w construction must be characterized as a lexical phenomenon.

## 5. Type-Coercing the Denotation of the Embedded Interrogative

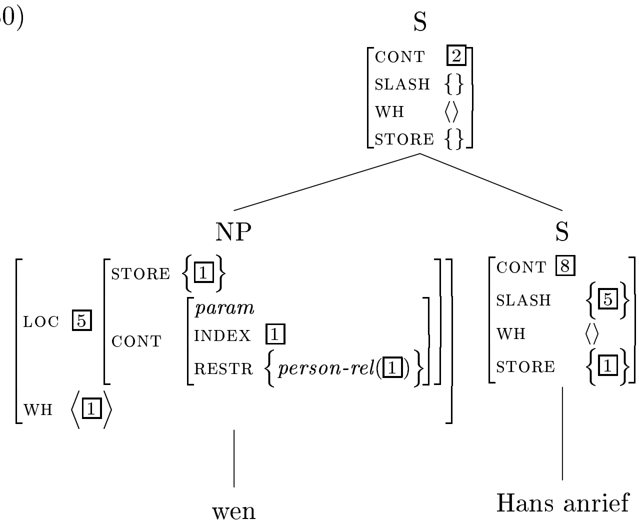
Now that we have characterized the class of was-w licensing predicates in German, we can turn to the was-w construction as a whole. Once again, it turns out that the analytical tools put in place by Ginzburg and Sag (in preparation) provide an excellent foundation. Ginzburg and Sag assume that the semantics of constituent questions is to be characterized in terms of abstracting over one or more (in the case of multiple wh-questions) indices. Accordingly, the sort *question* takes as appropriate

[6] Stechow and Sternefeld also show that the sets of licensing verbs for the was-w construction and for the long extraction construction, exemplified in (3), are not identical. While *zustimmen* ('agree') licenses long extraction, but not the was-w construction, the resolutive predicate *entscheiden* ('decide') shows the opposite behavior. The fact that the sets of licensing verbs for the two constructions are different might be interpreted as further suggestive evidence that the was-w construction is not a mere variant of long extraction.

features INDICES and PROP (for the embedded proposition that contains the indices abstracted over).[7] The indices themselves are introduced by wh-phrases and are percolated as the value of STORE. The feature STORE is responsible for assigning the correct scope of WH indices. Scope is assigned to a wh-phrase once an index is taken out of STORE and is introduced as the value of INDICES into a CONT value of type *question*.

If we generalize Ginzburg and Sag's analysis to German, the embedded interrogative *wen Hans anrief* ('whom Hans called') can be derived syntactically as in (30).[8] The semantic representation corresponding to the interrogative is as in (31).[9]

(30)




As shown in (31), embedded interrogatives are assigned denotations of type *question*. The puzzling fact about the was-w construction is that the embedded complement syntactically has all the properties of an embedded interrogative, while semantically it seems to have the properties of a proposition. Or to put it differently: the semantic type normally assigned

[7]Ginzburg and Sag's analysis utilizes the following additional features: as in Pollard and Sag (1994), SLASH mediates between the gap and the filler, and WH percolates the index values inside a possibly complex (e.g. pied-piped) wh-phrase.
[8]The CONT value of *wen* imposes the desired restriction on the INDEX value.
[9]The common index $\boxed{2}$ in (30) and (31) is supposed to indicate that the CONT value shown in (31) is the CONT value of the mother in (30).

(31)
$$\left[\begin{array}{ll}\textsc{cont}\ \boxed{2} & \left[\begin{array}{ll}\multicolumn{2}{l}{\textit{question}}\\ \textsc{indices} & \left\{\boxed{1}\right\}\\ \textsc{prop}\ \boxed{8} & \left[\begin{array}{ll}\multicolumn{2}{l}{\textit{proposition}}\\ \textsc{sit} & s\\ \textsc{soa} & \left[\begin{array}{ll}\textsc{nucl} & \left[\begin{array}{ll}\multicolumn{2}{l}{\textit{call-rel}}\\ \textsc{caller} & \textit{hans}\\ \textsc{called} & \boxed{1}\end{array}\right]\end{array}\right]\end{array}\right]\end{array}\right]\end{array}\right]$$

to the mother in (30) seems to be the wrong semantic type to enter into the semantic composition of a was-w construction. The lexical entry for *glauben* in (32) shows how this apparently paradoxical situation can be resolved.

(32)
$$\boxed{7}\left[\begin{array}{ll}\textsc{phon} & \textit{glauben}\\ \textsc{synsem} & \left[\begin{array}{ll}\textsc{loc} & \left[\begin{array}{ll}\textsc{cat} & \left[\begin{array}{ll}\textsc{subj} & \left\langle \mathrm{NP}_{\boxed{3}}\right\rangle\\ \textsc{comps} & \left\langle \mathrm{S}\left[\mathrm{CONT}\ \boxed{2}\ \textit{question}\right]\right\rangle\end{array}\right]\\ \textsc{cont}\ \boxed{6} & \left[\begin{array}{ll}\multicolumn{2}{l}{\textit{soa}}\\ \textsc{nucl} & \left[\begin{array}{ll}\multicolumn{2}{l}{\textit{believe-rel}}\\ \textsc{believer} & \boxed{3}\\ \textsc{belief} & \left[\begin{array}{ll}\multicolumn{2}{l}{\textit{qa\_proposition}}\\ \textsc{answer} & \left\{\boxed{4}\right\}\\ \textsc{question} & \boxed{2}\end{array}\right]\end{array}\right]\end{array}\right]\\ \textsc{store} & \left\{\boxed{4}\right\}\end{array}\right]\\ \textsc{slash} & \left\{\textit{np\_was}_{\boxed{4}}\right\}\end{array}\right]\end{array}\right]$$

The CONT value of the embedded interrogative is coerced from a *question* to the sort *qa_proposition* (short for *question-answer proposition*) by introducing attributes ANSWER and QUESTION. The coerced representation is modelled after the semantics proposed for the indirect analysis of the was-w construction first proposed by Dayal (1994) and also adopted by Kathol (1998).[10] The intuition behind this representation is that the corresponding *was* provides the index that abstracts over the answers to the embedded proposition. Hence, ANSWER takes an index as a value which is structure-shared with the index of the local value introduced into the SLASH set.

[10]Formally, we consider the existing type *proposition* with appropriate attributes SOA and SIT and the newly introduced type *qa_proposition* as subtypes of a common propositional supertype.

The other feature of the lexical entry in (32) that requires an explanation is the special SLASH value *np_was*. This specification ensures that the filler will be realized as the wh-word *was*. That is, we are assuming that the wh-word *was* that appears in the was-w construction has a special type of local value *np_was* which occurs only in this one lexical entry, shown in (33), and whose CONT | INDEX value is restricted to be an answer.

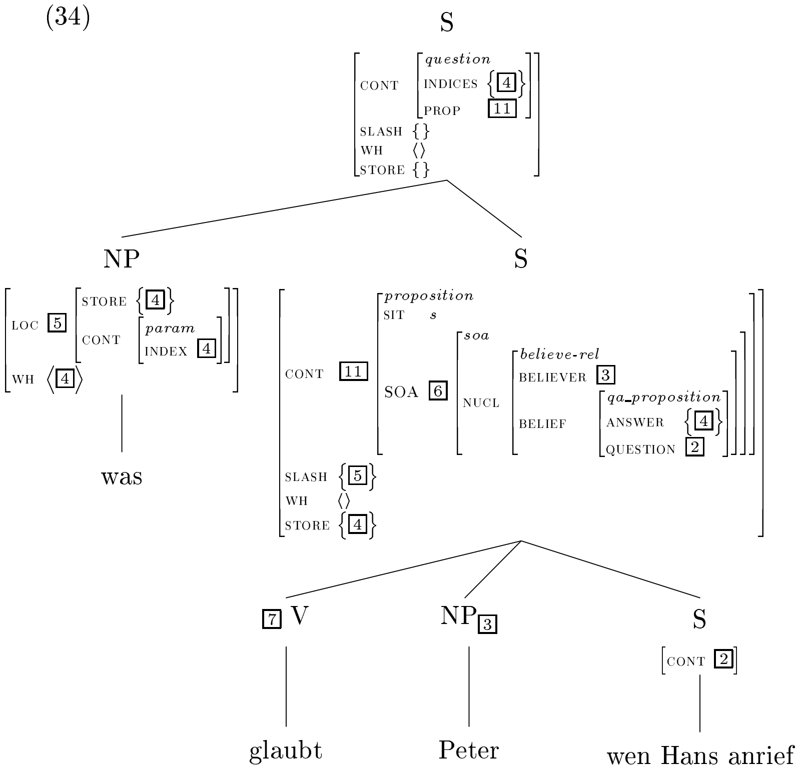
(33)
$$\begin{bmatrix} \text{PHON} & \textit{was} \\ \text{SYNSEM} & \begin{bmatrix} \text{LOC} & \begin{bmatrix} \textit{np\_was} & \\ \text{CAT} & \textit{np} \\ \text{CONT} & \begin{bmatrix} \textit{param} & \\ \text{INDEX} & \boxed{1} \\ \text{RESTR} & \left\{ \textit{answer-rel}(\boxed{1}) \right\} \end{bmatrix} \\ \text{STORE} & \left\{ \boxed{1} \right\} \end{bmatrix} \\ \text{WH} & \left\langle \boxed{3} \right\rangle \end{bmatrix} \end{bmatrix}$$

It is worth noting that the need for type coercion to overcome a mismatch between syntactic form and semantic denotation is not limited to the interrogative complements of the was-w construction. As discussed in section 3 above, a similar mismatch exists for factive predicates whose question-denoting interrogative complements need to be coerced into question-resolving facts.

In most cases in which type coercion has been proposed in the literature, its application has been lexically conditioned. By specifying a construction-specific class of lexical entries, exemplified for *glauben* in (32), the proposed type coercing for the was-w construction is in keeping with this lexical approach to type coercion.[11] However, more recently, Ginzburg and Sag have applied the notion of type coercion to head-only phrases in the syntax as well. They propose to analyze *reprise interrogative clauses* and *direct in-situ interrogative clauses* as coerced *declarative head-subject clauses* in terms of a unary syntactic rule. The question naturally arises then whether one could treat the type coercion necessary for the was-w construction also by a unary syntactic rule. However, the lexically idiosyncratic licensing of the construction discussed in the previous section makes lexical characterization of type coercion unavoidable.

[11]For yet another instance of lexically conditioned type coercion see Pollard and Sag (1994)'s lexical rule for shifting controller assignment for certain classes of control verbs.

(34)



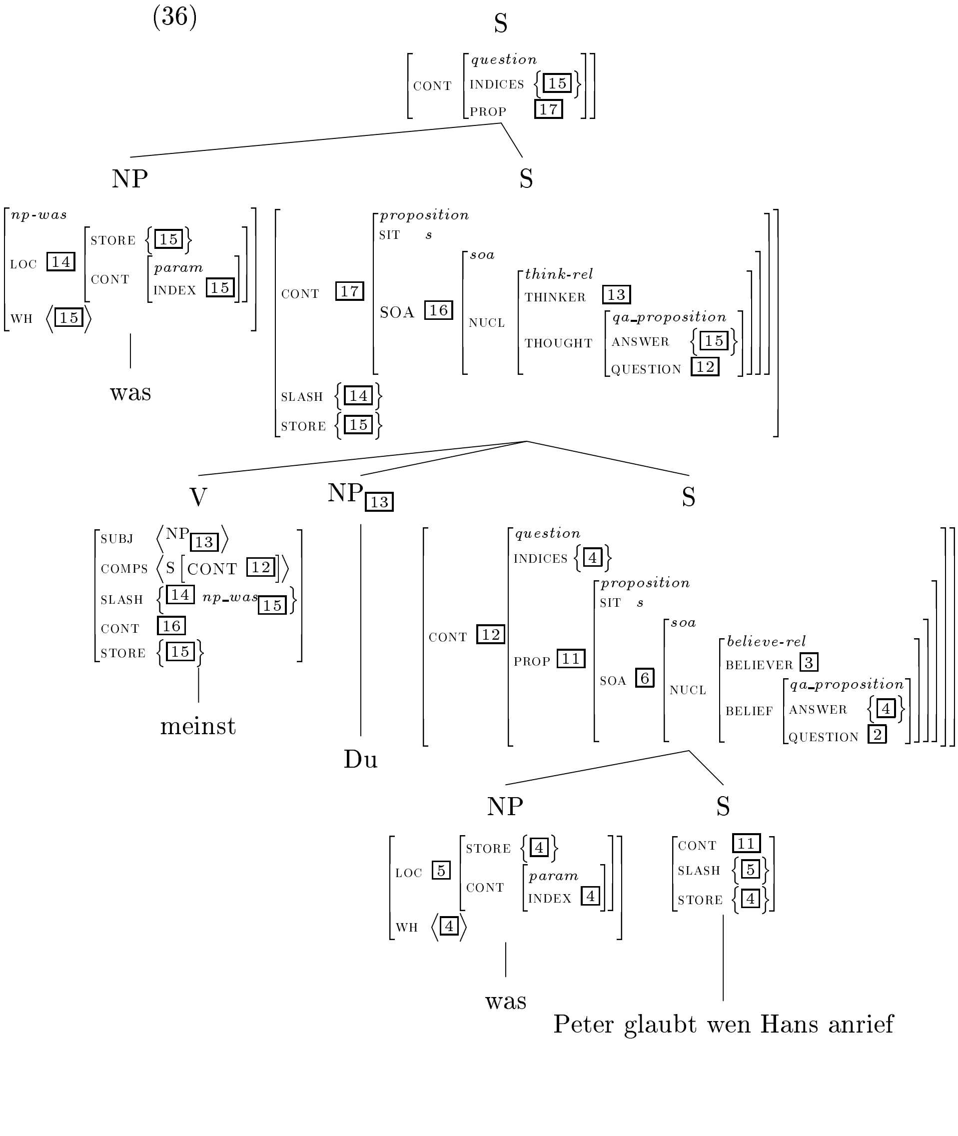

Finally, it is time to consider the was-w construction as a whole and discuss how the construction is compositionally derived as shown in (34). The top local tree in (34) is a head-filler construction that discharges the local value from SLASH. This local value is introduced into the SLASH set by the construction-specific lexical entry shown in (32). The mother node in (34) has a CONT value of type *question* in keeping with the property that the was-w construction as a whole denotes a direct question. The index abstracted over is supplied by the filler *was*. It is passed along the head projection of the tree by the value of STORE, and is coindexed via the lexical entry for the matrix predicate *glauben* with the index of the value of ANSWER in the embedded *qa_proposition*. Hence, the question abstracts over the set of answers to the question denoted by the embedded interrogative.

As noted by Höhle and others, the was-w construction can be iterated:

(35) Was meinst Du was Peter glaubt wen Hans anrief.
What think you what Peter believes whom Hans called
'What do you think that Peter believes whom Hans called.'

This iterability is predicted by our analysis as shown in (36).

(36)



(36) shows the structure for the outermost clause; the structure for the embedded was-w question *was Peter glaubt wen Hans anrief* is the same as in (34), modulo word order. The most interesting aspect of such iterated cases concerns the semantic representation. The index value $\boxed{15}$ of the topmost *was* is co-indexed with the answer to a question $\boxed{12}$. This embedded question $\boxed{12}$ is itself complex in that its index value $\boxed{4}$ provides the answer to yet another question $\boxed{2}$, namely whom Hans has called. Thus, the indirect analysis and its associated compositional semantics allow for the possibility of iteration by associating the index for each *was* with the answer to a question and by performing type coercion from a question to a proposition for each of the triggering verbs contained in such a sentence.

Another complex set of data concerns the interaction between the was-w construction and so-called long extraction.

(37) Was meinst Du, dass Peter glaubt wen Hans anrief.
What think you what Peter believes whom Hans called
'What do you think that Peter believes whom Hans called.'

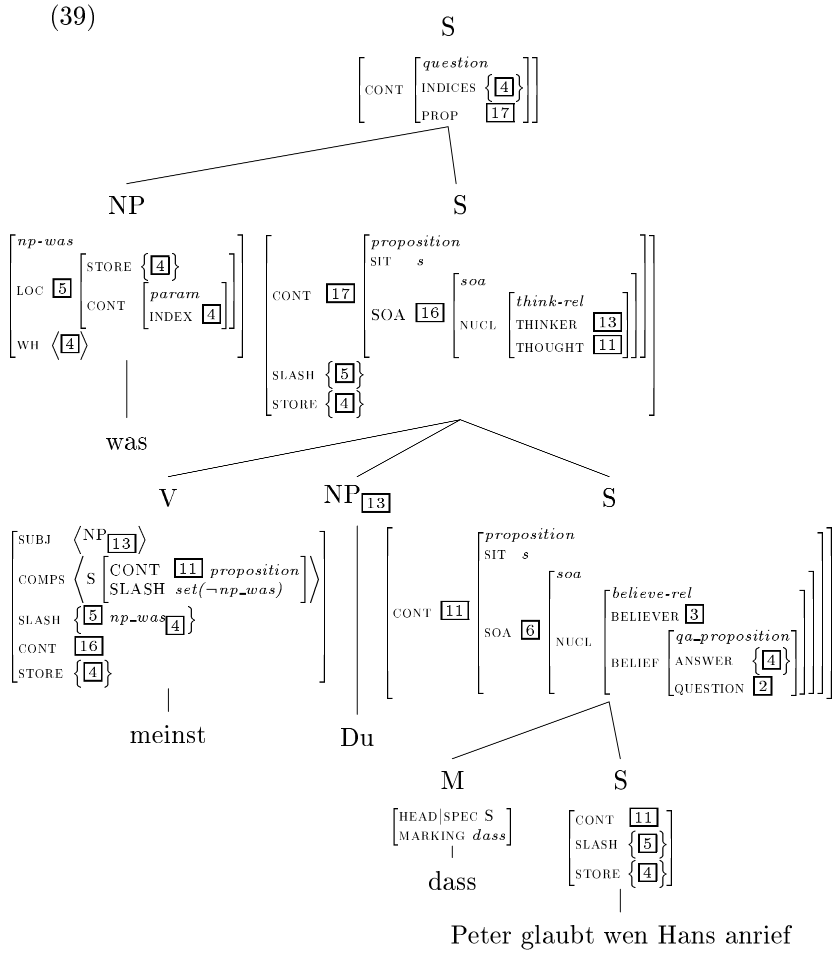
As Höhle notes, the judgments concerning such examples vary. While most speakers consider them ungrammatical, there is a minority of speakers and investigators who judge them to be acceptable.

Our analysis can be parameterized in two ways to account for the difference between the two groups of speakers. For speakers who allow this interaction, nothing special needs to be said. The structure assigned to (37) is shown in (39).

The tree for the embedded string *Peter glaubt wen Hans anrief* is the same as in tree (36). That is, *glauben* triggers the was-w construction and licenses *was*. The higher verb *meinen* subcategorizes for a *dass*-complement which denotes on ordinary proposition. Thus, the lexical entry for *meinen* is not the one that triggers a was-w construction, but rather the other lexical entry for the same verb that permits long extraction. This entry is shown in (38).

(38)
$$\boxed{7}\begin{bmatrix} \text{SUBJ} & \langle \text{NP}_{\boxed{3}} \rangle \\ \text{COMPS} & \left\langle \text{S}\left[\text{CONT }\ \boxed{2}\ \textit{proposition}\right] \right\rangle \\ \text{CONT} & \boxed{6}\begin{bmatrix} \textit{soa} & \\ \text{NUCL} & \begin{bmatrix} \textit{think-rel} & \\ \text{THINKER} & \boxed{3} \\ \text{THOUGHT} & \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

(39)




In general, then, verbs that trigger both the was-w construction and long extraction will be associated with two types of lexical entries: the kind shown in (32), which licenses the was-w construction, and the kind shown in (38) which is compatible with long extraction.

For speakers that do not allow interactions between long extraction and the was-w construction, we need to introduce one additional constraint into the lexical entry of the kind shown in (38), namely that the SLASH value is a set of non-*np_was* elements. In other words, the slash value may not contain a local value of type *np_was*. This restriction has the desired consequence that the *was* of a was-w construction cannot be long-extracted over a *dass*-clause. Thus, the structure in (39) cannot be licensed since the SLASH value on *meinst* contains a local value of type *np_was*.

## 6. QE Predicates and Factive Predicates

So far, we have concentrated on the set of predicates that license the was-w construction. To complete the picture, we will now consider the two classes of predicates that do not: QE predicates and factive predicates. For QE predicates such as *sich fragen* we assume the type of lexical entry shown in (40):

(40) $$\begin{bmatrix} \text{SUBJ} & \langle \text{NP} \rangle \\ \text{COMPS} & \langle \text{S} \begin{bmatrix} \text{CONT} & \textit{question} \end{bmatrix} \rangle \end{bmatrix}$$

By requiring complements of type *question*, we correctly rule out declarative complements for QE predicates.

Factive predicates allow both declaratives and wh-interrogatives as complements, as (41) shows:

(41) a. Fritz weiß, dass Eike angerufen hat.
Fritz knows that Eike called has
'Fritz knows that Eike called.'

b. Fritz weiß, wer angerufen hat.
Fritz knows who called has
'Fritz knows who called.'

However, factive predicates license neither the was-w construction, nor are they bridge verbs for long extraction. This range of facts can be accounted for by the type of lexical entry shown in (42) which requires the SLASH value to be the empty set.

(42) $$\begin{bmatrix} \text{LOC}|\text{VAL} \begin{bmatrix} \text{SUBJ} & \langle \text{NP} \rangle \\ \text{COMPS} & \langle \text{S} \rangle \end{bmatrix} \\ \text{SLASH} \; \{\} \end{bmatrix}$$

## 7. Comparison with Kathol (1998) and Kathol (2000)

Kathol (1998) presents the first HPSG analysis of the was-w construction and, like our present proposal, argues for an indirect analysis and for the semantic representations proposed by Dayal. While we have been inspired by Kathol's proposal and share some of its basic assumptions, there are a number of crucial differences between his analysis and ours. Kathol assumes that the construction is licensed by a special filler-head ID rule, i.e. a syntactic schema. It is unclear how such a syntactic solution can account for the lexically idiosyncratic character of the construction.[12]

Moreover, his filler-head ID rule seems to suggest that the embedded interrogative does not denote a question, as its form suggests, but a proposition. While we agree with Kathol that the embedded question needs to be coerced into a *qa_proposition*, we have argued that the coercion needs to be regarded as a lexical property of the set of was-w-licensing predicates.

After this paper was completed, we became aware of a more recent study (Kathol, 2000) in which Kathol discusses the was-w construction. It is interesting to note that Kathol (2000), completely independently from the research reported here, now also favors a lexical treatment of the construction, instead of a purely syntactic one.

## 8. Conclusion

In this paper we presented some novel evidence in favor of an indirect analysis of the was-w construction in German. We identified a natural class of predicates that license this construction and utilized the notion of type coercion to account for the apparent mismatch between the syntactic form of the embedded interrogative and its semantic function. Since membership in the class of TF and resolutive predicates provides only a necessary condition for licensing the construction, we argued (contrary to

[12] Kathol fails to identify clearly the range of predicates that can license the construction. In the first part of his paper, Kathol entertains the possibility of analyzing the was-w construction as a scope-marking construction. For such an analysis, he proposes as the appropriate restriction on the set of was-w-licensing predicates that the subcategorized complements may not contain any wh-expressions as the value of QUANTS. However, this requirement would presumably also be satisfiable by factive predicates. Yet, as shown in section 3, factive verbs are not among the set of licensing predicates. The above requirement is also inconsistent with the semantic representation that Kathol later in the same paper proposes for his own indirect analysis of the was-w construction.

Kathol 1998) for a lexical analysis. Consequently, the construction necessitates no additional syntactic rules. In keeping with the lexical character of construction, the only additional mechanism needed is a construction-specific class of lexical entries.

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Seminar für Sprachwissenschaft, Wilhelmstr. 113, 72074 Tübingen, Germany
*E-mail address*: eh@sfs.nphil.uni-tuebingen.de

University of Tokyo, Tokyo, Japan
*E-mail address*: tsuneko@boz.c.u-tokyo.ac.jp