Abstract:
Extraposed relative clauses pose certain problems for movement-based analyses. Among them is the fact that extraposed relative clauses seem to be insensitive to island constraints. In addition, relative clause extraposition shows intricate interactions with variable binding. The present analysis is based on data from German. It refrains from a movement-based approach to relative clause extraposition and instead suggests that the extraposition of intersective modifiers should be handled by adjunction syntactically and by an anaphoric constraint termed generalized modification semantically. Such an analysis does not only cope with the insensitivity to island constraints, and variable binding data but also explains the behavior of extraposed modifiers in partial VPs. The analysis is compared to a wide variety of competing analyses.

1. Introduction

An extraposed phrase does not appear adjacent to the element that is subcategorized for or modified by the extraposed phrase. This is illustrated in (1) and (2).

(1) a. Mary mentioned the claim yesterday that John is intelligent.
   b. Mary mentioned the claim that John is intelligent yesterday.

(2) a. Mary mentioned a claim yesterday that had been issued quite often before.
   b. Mary mentioned a claim that had been issued quite often before yesterday.

The discontinuity of antecedent and extraposed phrase has led to a treatment of extraposition akin to the treatment of other discontinuous phrases, i.e. a treatment in terms of movement operations or simulations thereof. Such a treatment has been motivated by the observation that certain cases of extraposition obey constraints on movement, as can be illustrated with complement extraposition in German. Extraposition of a finite clause embedded in complement position is almost obligatory (3a), and extraposition from within complement position is generally possible (3b). Extraposition from configurations of the form \([\text{DP} \ldots [\text{DP} \ldots t \ldots]]\) in (4) leads to ungrammaticality. The same holds for adjuncts (5). Judgments are less stable with extraposition from subjects, reflecting the uncertain status of German subjects as is-
lands: certain cases are fully grammatical while other cases are generally considered ungrammatical (6).

(3) a. Er hatte gefragt, ob ich kommen dürfte.
   He had asked whether I come could.
   ‘He had asked whether I would be allowed to come.’

   b. Er hatte dem Versprechen vertraut daß sie kommen würde.
   He has the promise believed that she come would
   ‘He believed in the promise that she would come.’

(4) *Man hat den Überbringer der Mitteilung beschimpft, daß die Erde rund ist.
   One has the messenger of-the message insulted that the Earth round is
   ‘The messenger was insulted who delivered the message that the earth is a sphere.’

(5) *Hier habe ich bei den Beobachtungen faul auf der Wiese gelegen, daß die Erde rund ist.
   here have I during the observations lazy on the lawn laid that the earth round is
   ‘I was lying here lazily on the lawn during the observations that the earth is a sphere.’

(6) ?Der Gruppe hat das Versprechen geholfen, daß die Schwerkraft überwunden wird.
   The team has the promise helped that the gravity overcome
   ‘The promise that gravity will be overcome is useful for the team.’

The same pattern applies to nonfinite complements: extraposition from complement position as well as from within complement position is grammatical (7a, b), but extraposition from complex DPs (8) or adjuncts (9) is ungrammatical. As with finite clauses, judgments vary with extraposition of nonfinite clauses from subjects. This is illustrated in (10).

(7) a. Er hatte versprochen, zu dem Fest zu kommen.
   he had promised to the party to come.
   ‘He had promised to come to the party.’

   b. Er hatte den Versuch vergessen, zu dem Fest zu kommen.
   he had the attempt forgot to the party to get
   ‘He had forgotten about the attempt to get to the party.’


5 Similar ungrammatical cases of complement clause extraposition from complex NPs and adjunct phrases are discussed in Haider (1996, p. 259); the grammaticality of relative clause extraposition from complex noun phrases (i.e. CNPC violations) is also noted in Büring and Hartmann (1996, p. 198). S. Müller (1999, pp. 206-207) neglects the ungrammaticality of complement extrapositions from complex DPs and claims that complement extraposition may occur from deeply embedded DPs. It is interesting, however, that he does provide corpus examples to support his claim.

6 Example (10) is surely worse than example (6), but still accepted as well-formed by some speakers of German. This might have to do with a second reading of (10), where the nonfinite extraposited phrase is construed as correlative construction. The example is perfectly grammatical if we assume the second reading. This reading can be made explicit by inserting a correlate dabei, as in (i):

(i) Der Gruppe hilft der Versuch dabei, die Schwerkraft zu überwinden.
   the team helps the attempt corr. the gravity to overcome
   ‘The attempt is useful in trying to overcome gravity.’

one has the messenger of-the command insulted the place to leave
‘The messenger was insulted who delivered the command to leave the place.’

(9) *Hier habe ich bei den Versuchen faul auf der Wiese gelegen, die
here have I during the experiments lazy on the lawn laid the
Schwerkraft zu überwinden.
gravity to overcome
‘I was lying here lazily on the lawn during many attempts to overcome gravity.’

(10) ??Der Gruppe hat der Versuch geholfen, die Schwerkraft zu überwinden.
the team has the promise helped the gravity to overcome
‘The attempt to overcome gravity has been useful for the team.’

Somewhat surprisingly, then, relative clauses, i.e. nominal modifiers, may be extraposed
freely not only from within complement position (11), but also from complex noun phrases
(12), adjuncts (13), and subjects (14).7

(11) Man hatte den Boten beschimpft, der den Befehl überbrachte
one has the messenger insulted who the command delivered
‘The messenger was insulted who delivered the command.’

(12) Man hat die Frau des Boten beschimpft, der den Befehl überbrachte.
one has the wife the messenger insulted who the command delivered
‘The wife of the messenger was insulted who delivered the command.’

(13) Hier habe ich bei vielen Versuchen faul auf der Wiese gelegen,
here have I during many experiments lazy on the lawn laid
bei denen die Schwerkraft überwunden wurde.
at which the gravity overcome was
‘I was lying here lazily on the lawn during many attempts at which gravity was over-
come.’

(14) Der Gruppe hat der Versuch geholfen, bei dem die Schwerkraft
the team has the attempt helped at which the gravity
überwunden wurde.
overcome pass-aux
‘The attempt at which gravity was overcome was useful for the group.’

These contrasts cannot be derived from the corresponding non-extraposed cases: if nonfinite
complements and relative clauses remain in-situ, they are equally grammatical (15).8

(15) a. Man hat die Frau des Boten, der den Befehl überbrachte
one has the wife of-the messenger who the command delivered
beschimpft.
insulted
‘The wife of the messenger was insulted who delivered the command.’

7 Surprising, for instance, for G. Müller (1996, p. 213), who notes that “[his] approach crucially presupposes that
extraposition leaves a trace and hence provides independent corroboration of the hypothesis that extraposition
is in fact an ordinary movement type.”

8 Finite sentential complements differ from relative clauses and nonfinite complements in that extraposition is
optional with the latter but – for many speakers of German – obligatory with the former. Various reasons have
been suggested for this contrast, cf. Stowell (1981) and Büring and Hartmann (1996).
b. Man hatte den Überbringer des Befehls, den Platz zu verlassen, one has the messenger of-the command the place to leave beschimpft. insulted

‘The messenger was insulted who delivered the command to leave the place.’

c. Hier habe ich bei vielen Versuchen, bei denen die Schwerkraft here have I during many attempts at which the gravity überwunden wurde, faul auf der Wiese gelegen overcome pass-aux lazy on the lawn laid

‘I was lying here lazily on the lawn during many attempts at which gravity was overcome.’

d. Hier habe ich bei vielen Versuchen, die Schwerkraft zu überwinden, here have I during many attempts the gravity to overcome faul auf der Wiese gelegen. lazy on the lawn laid

‘I was lying here lazily on the lawn during many attempts to overcome gravity.’

e. Der Gruppe hat der Versuch, bei dem die Schwerkraft überwunden the team has the attempt at which the gravity overcome wurde, geholfen. helped.

‘The attempt at which gravity was overcome has been useful for the team.’

f. Der Gruppe hilft der Versuch, die Schwerkraft zu überwinden the team helps the attempt the gravity to overcome

‘The attempt to overcome gravity is useful for the team.’

Given that modifier extraposition differs from complement extraposition in that the latter but not the former obeys island constraints, it seems worthwhile to ask why modifier extraposition has been recognized as an extraction of the modifier in the first place. It seems that modifier extraposition is recognized as a displacement operation just because of the interpretation of the extraposed phrase. The modifier receives the interpretation it would acquire if it remained adjacent to its antecedent.

Different mechanisms are at work with complement extraposition: the link established between the extraposed phrase and its antecedent is not one of interpretation. Instead, formal matters are at stake, the link being established as a syntactic one, guided by subcategorization requirements of the antecedent and made visible in the form of the extraposed complement. It is natural to assume, however, that an established syntactic link must obey syntactic constraints, which might be expressed in terms of movement, movement simulation or other means.

Taking the semantic link between the antecedent and an extraposed modifier seriously, we propose a semantic analysis of modifier extraposition. At its center, the analysis assumes that modifier extraposition is governed by principles of interpretation. While most analyses of extraposition take a uniform syntactic stance towards extraposition, the present proposal stands in the tradition of attempts which either provide a semantic analysis of extraposition or at least try to relate a syntactic analysis to semantic conditions. Wiltschko (1994) has suggested that a phrase must be adjoined to the next maximal projection for reasons of interpretation. With Wittenburg (1987) we share the assumption that extraposition is a kind of anaphoric relation (cf. section 3.1).9

9 Culicover and Rochemont (1990) as well as Haider (1996) refer to semantic effects of extraposition but do not make the interpretation requirements of extraposition explicit.
It is our basic hypothesis that certain intersective modifiers semantically select the modified element even if modifier and modified element are not adjacent. Among them are restrictive relative clauses as well as several kinds of PPs, depending on the interpretation of the heading P as an intersective modifier. Various movement accounts have established the hypothesis that the relation between modifier and modified element is basically nonlocal in nature. We accept this premise. However, we eschew the conclusion that the source of the nonlocality is to be sought in terms of movement operations. Syntactically, modifier extraposition is treated as ordinary adjunction, but subject to the following condition on interpretation, which will be made more precise in section 2.4:

(16) **Generalized Modification:**

The index of a modifying phrase has to be identified with a suitable index contained in the phrase to which the modifier is adjoined.

The index of a relative clause is actually identical to the index of the relative pronoun, as will become clear in section 2.2. Pollard and Sag (1994, p.25) assume that indices play a role analogous to the role of NP indices in Chomsky (1981, 1986). They are constrained by relations that are imposed on them. In particular, we assume that if a noun is used referentially, its index must be anchored to an entity that renders each relation in the set of conditions imposed on that index as factual. For a relative clause, this means that the content of the relative clause must be true for the individual denoted by the relative pronoun (still assuming that the relative pronoun receives a referential interpretation). In the following, XP, stands for a phrase XP whose index is y.

For the moment, a suitable index can be characterized as an index of a nominal projection contained in the phrase to which the modifier is adjoined. If the index of a nominal projection is identified with the index of the relative clause, the content of the relative clause is combined with the content of the nominal projection, resulting in an intersective interpretation. It is an obvious consequence of (16) that if the modified phrase does not contain a suitable index, the combination cannot be interpreted and hence the resulting phrase becomes ungrammatical.

(17) *Etwas neut zugeflüstert, der masc dort steht, hat sie dem Mann.

This is exactly what is happening in an example like (17), where the extraposed relative clause is searching for an index to be identified with that index which in its turn has been issued by the relative pronoun. The only available variable in the relevant domain, viz. the one introduced by *etwas*, is neuter and thus differs in its agreement specification from the relative pronoun, which is masculine. Here, we see a syntactic corollary to the identification process: in accord with many hypotheses in generative grammar about the nature of indices, most explicitly stated in Pollard and Sag (1992, 1994), we assume that indices are not monadic but are instead composed of a bundle of *φ*-features. A semantic identification thus corresponds to a morphological and syntactic agreement pattern, which is violated in (17).

It might be objected that the price for the exclusion of (17) is a severe weakening of the constraints imposed on modification. In particular, we have to abandon two standard assumptions: first, that relative clauses have to be adjoined to projections of N at some level of syntactic representation; second, that modification is local in the sense that the modifier and

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10 We follow Quine (1960) and others in assuming that non-restrictive relative clauses must not be handled as intersective modifiers. Consequently, non-restrictive relative clauses will not be addressed here.

11 If a movement theory makes use of different levels of representation, the level at which a relative clause is actually adjoined to a nominal projection is usually D-Structure (cf. Chomsky 1981, 1986). In a purely deriva-
the modified phrase have to be adjacent. However, data presented by Schachtl (1992) and G. Müller (1996) strongly suggest that neither assumption can be maintained. This issue will be taken up in detail in section 2.3.

Interestingly, German differs from English in that the former allows an extraposed relative clause to take its antecedent in a topicalized VP, as can be witnessed in (18a). For English, Culicover and Rochemont (1990, p. 28) have shown that an extraposed relative clause cannot take an antecedent that is contained in a topicalized VP. Hence, example (18b) is ungrammatical.

(18) a. Mit dem Mann gesprochen hat sie der dort steht.
    with the man spoken has she who there stands
    ‘She spoke with the man who stood there.’

    b. *The governor said he would meet a man at the party who was from Philadelphia, and meet a man at the party he did who was from Philadelphia.

Although in the present paper we are mainly concerned with German, the contrast between (18a) and (18b) will be dealt with in section 3.2. In the present approach, it follows from the interaction of a constraint that blocks the projection of indices together with the assumption that traces must not be treated as antecedents for modifier extraposition.

In assuming that modifier extraposition is governed by a condition on interpretation, while complement extraposition is constrained by purely structural conditions, the contrasts between complement extraposition and modifier extraposition shown in (3) to (14), and (17) are explained. Being subject to condition (16), the grammatical cases require only that the phrase to which the relative clause is adjoined contains a suitable index for identification. The ungrammatical cases are presumably excluded due to the assumption that they are actually the result of a dislocation operation.

What is more, we are also able to cope with the contrast in (19), which is discussed in Büring und Hartmann (1996) and Haider (1996, 1997). The examples in (19) differ in the way they realize their dative and accusative objects. In (19a), the dative quantifier niemandem (no one) may bind a variable contained in an extraposed phrase which is dependent on the accusative object. This is no longer possible if the order of complements has been reversed, as in (19b).

(19) a. Wir haben niemandem die Frage gestellt, auf die er sich vorbereitet hatte.
    we have no-one the question asked for which he refl. prepared had
    ‘No one was asked the question that he expected.’

    b. *Wir haben die Frage niemandem gestellt, auf die er sich vorbereitet hatte.
    we have the question no-one asked for which he refl. prepared had

We cannot assume that the scope domain of the embedded quantifier is too narrow to include the relative clause. As has been discussed in Frey (1993), the quantifier may in principle be construed broad enough to scope over the relative clause. But a potential scope domain is insufficient for the determination of variable binding, which seems to be exclusively con-

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12 As will become clear in section 2.4, even modifier extraposition cannot be reduced to purely semantic requirements since both modifier and complement extraposition have to obey upward bounding (Ross 1967/86) and thus must not cross a sentential node.
strained by configurational properties. For this reason, the quantifier must not bind the variable in (19b) independent of its scope.

Assuming that the relationship between \textit{die Frage} and \textit{auf die er sich vorbereitet hatte} is determined by generalized modification (16), the relative clause has to adjoin to a projection that contains the direct object. The indirect object quantifier, however, can only bind variables that are configurationally inferior to the quantifier. As (20a) illustrates, the quantifier is not superior to the variable if generalized modification between the direct object and the relative clause is respected. In (20a), where condition (16) is met, the quantifier is syntactically inferior to the variable, while in (20b) the quantifier is in fact superior to the variable, but condition (16) is violated.

\begin{enumerate}[\alph*)]
\item a. 
\item b.
\end{enumerate}

To conclude, there is no structure available for (19b) that simultaneously satisfies both conditions. Finally, the present proposal handles genuinely ambiguous examples like (21) by the same mechanism.

\begin{enumerate}[\alph*)]
\item weil er den Termin verschoben hatte im Januar because he the appointment re-scheduled had in January
\item ‘because he had re-scheduled the appointment in January’/ ‘because in January, he had re-scheduled the appointment
\end{enumerate}

The extraposed PP \textit{im Januar} may either modify the verb \textit{verschoben} or the noun \textit{Termin}. If we assume a formal rendering of the condition (16), it will turn out that both elements are appropriate as modified elements in the required sense. There is hence no need to stipulate two different syntactic structures for this example.

Modifier extraposition is analyzed as an instance of adjunction. The modifying phrase is joined to a projection that contains the modified element; the limiting case of that containment would be that the projection itself is the modified element. Extraposition is thus not attributed to movement mechanisms or rules that dislocate the modifier. It seems, then, that the present approach falls short of an explanation for the fact that extraposed modifiers appear at the right periphery of the modified phrase. Prima facie, there does not seem to be a reason for excluding nonlocal modifiers in the left periphery as well. But relative clauses must not be realized to the left of their antecedents in German.\footnote{As will be discussed in section 3.1.2.4, this is by no means a universal. Lehmann (1984) shows that relative clauses may appear pre- and post-nominal, as well as circumnominal in the languages of the world.}
Examples like (22) – which should be compared to (12) – are ungrammatical in German because modifiers tend to modify in a uniform direction, just like heads tend to select their complements in the same way. Relative clauses in German select a modified element to their left, leading to post-nominal and right-extraposed realizations. As will be further discussed in section 3.1.2.4, this conclusion is corroborated by relative clauses in other languages: if a relative clause is uniformly realized prenominally, extraposition to the right seems to be excluded.

That extraposition ends up in the right periphery of a clause is thus not the consequence of a special operation, but of a general property of these modifiers: just as prepositions (as opposed to postpositions) may not realize their complement to their left, relative clauses must not modify an element to their right, be the element in adjacent or non-adjacent position. Moreover, condition (16) requires a modifying phrase to occupy a prominent position in configurational terms. Taken together these conditions lead to the realization of the extraposed modifier in the right periphery. With a few exceptions – which are problematic in their own right – the question whether an extraposed element might appear in the left periphery has not been discussed in movement-based approaches. We will take up this question again in section 3.1.

The remainder of the paper is structured as follows:

Section 2 is concerned with the syntax and semantics of restrictive relative clauses in adjacent and non-adjacent, i.e. extraposed position. In section 2.1 and 2.2, we shall introduce a syntactic and semantic analysis of relative clauses in-situ, based on proposals presented in Pollard and Sag (1994) and Copestake et al. (1997). In section 2.3, we shall argue for loosening the categorial restriction on relative clause adjunction, thus allowing relative clauses to adjoin to any major category. Section 2.4 offers a formal representation of condition (16) to select a modified phrase without the modifier being adjacent to it.

Section 3 discusses the problematic data presented in the introduction, offers an analysis in terms of condition (16) and compares the analysis to alternative approaches. Section 3.1 focuses on apparent violations of island conditions, and also discusses Culicover and Rochemont’s (1990) and G. Müller’s (1996) analysis of extraposition in terms of barriers (cf. Chomsky (1986)). Section 3.2 will discuss modifier extraposition and VP topicalization. The analysis will be compared to competing approaches by Haider (1996) and, and will also discuss the contrast between German and English illustrated in (18). Section 3.3 will discuss the interaction of condition (16) with a condition on variable binding. Section 4 will then summarize the results of the present paper.
2. The Syntax and Semantics of Restrictive Relative Clauses

2.1 Adjacent and Non-Adjacent Modification

The syntactic analysis of relative clauses (RP) presented in Pollard and Sag (1994, pp. 213-220) will be our starting point. The analysis is sketched in (23).\(^{14}\)

(23) Schematic Analysis of Relative Clauses in Pollard and Sag (1994):

\[
\begin{array}{c}
\text{XP} \\
\text{LOCAL} \\
\text{REL} \\
\text{COMPS} \\
\end{array}
\rightarrow
\begin{array}{c}
\text{RP} \\
\text{MOD} \\
\text{REL} \\
\text{SPR} \\
\text{COMPS} \\
\end{array}
\rightarrow
\begin{array}{c}
\text{R'} \\
\text{SPR} \\
\text{LOCAL} \\
\text{COMPS} \\
\end{array}
\rightarrow
\begin{array}{c}
\text{S'} \\
\text{SLASH} \\
\text{...} \\
\end{array}
\]

The relative clause (RP) in (23) is an endocentric phrase: it is headed by an empty relativizer (R\(^{°}\)) that introduces three crucial syntactic dependencies: First, it is subcategorized for a sentence with one element missing, as indicated through the SLASH value of the sentence. This dependency is represented in the COMPS (for COMplementS) feature.

Second, through its SPR (for SPrecifier) feature, it is subcategorized for the phrase that is missing from its sentential complement. In other words, the specifier of R\(^{°}\) is identical (in its relevant attributes\(^{15}\)) to the constituent missing in the clausal complement. In addition, the specifier is required to introduce a REL dependency, the value of REL being the index of the relative pronoun.

The third crucial dependency is introduced through the MOD (= MODified) value of R\(^{°}\). The combination of the RP with a nominal projection is treated as an instance of the head-modifier-schema given in (24). According to (24), a phrase (XP) consists of a head daughter (HD) and an adjunct daughter (AD). The adjunct daughter selects certain properties of the head daughter through the MOD attribute. The MOD attribute of the empty relativizer requires that the relative clause is adjoined to a nominal projection, since it selects an N\(^{1}\), i.e. a nominal projection whose index is \(\Pi\).

(24) Head Modifier Schema\(^{16}\)

\[XP \rightarrow AD[MOD[,],][HD]\]

\(^{14}\) There are some differences between Pollard and Sag’s (1994, pp. 216-218) analysis and the one advocated here. Most notably, Pollard and Sag (1994, p. 38) assume that an RP is built up by Schema 1 and Schema 2. Hence both the relativized phrase and the clause in which the phrase is missing can be found on the COMPS list of R\(^{°}\). We have simplified the representation in several respects: In particular, both REL and SLASH are assumed to take a single value instead of a set. Nothing hinges on these simplifications, which have been carried out for expository purposes.

\(^{15}\) For a detailed account of the SLASH attribute in HPSG, the reader is referred to Pollard and Sag (1994, pp. 161-165). The SLASH attribute is identical with the so-called LOCAL attributes of a missing constituent only.

\(^{16}\) In (24), \([MOD[,]\) indicates that the feature specification of the adjunct daughter (AD) contains a MOD attribute whose value is compliant with the feature specification of the head daughter (HD). Moreover, schema (24) is a dominance schema and hence does not constrain the linear order of the daughter constituents.
Since none of the syntactic arguments of a head are realized in a head modifier schema, the *Valence Principle* – which constrains the realization of syntactic arguments i.e. specifiers and complements – requires that the arguments of the head daughter are identical to the arguments of the phrase. Within RP, the *Head Feature Principle* guarantees that the MOD information of R° – which belongs to the head features – is projected to RP. In a combination of N’ and RP, N’ is the head daughter, and thus the resulting phrase is a nominal projection as well.

If the RP given in (23) is inserted as adjunct daughter into schema (24), the index of the head daughter has to be identical to the index of the relative pronoun. This requirement is met in (25a) but violated in (25b). Indices are not monadic, but consist of a set of \( \phi \)-features, i.e. of number, person, and gender (cf. Pollard and Sag (1994, p. 26); Copestake et al. (1997, p. 25)). If two indices are identified, their \( \phi \)-features must be compliant. This is the case in (25a), whereas in (25b) the index of the relative pronoun is *feminine* while that of the modified noun is *masculine*.

(25) a. der Mann, der schlief
    the man masc who masc slept

b. *der Mann, die schlief
    the man masc whofem slept

However, the identification of indices does not only have a morphosyntactic reflex: an index is actually part of the semantic make-up of signs. Assuming that the content of nominal projections and RPs consists of the index together with a restriction set on that index, the former will be introduced through the feature INDEX, while the latter is introduced through the set-valued attribute CONDS (for CONDITIONS). The content of the noun *man* is given in (26), where the sole relation introduced by the lexical item consists of a relation name and its associated argument slot. In general relations consist of a *relation type* and a number of *argument slots* corresponding to the arity of the relation.

(26) a. *man
    \[
    \begin{array}{|c|}
    \hline
    \text{INDEX} [\text{man}] \\
    \hline
    \end{array}
    \]

b. *man
    \[
    \begin{array}{|c|}
    \hline
    \text{INDEX} [\text{man}] \\
    \hline
    \end{array}
    \]

\[
\text{CONDS} \left[ \begin{array}{c}
\text{ARG} [\text{man}] \\
\end{array} \right] \]

\[
x | \{\text{man}(x)\}
\]

In (26b), the same information is given in a more lucid linear representation. Here and in the following \( x | \{\ldots\} \) is a CONT value whose INDEX value is \( x \) and whose CONDS value is \( \{\ldots\} \). Relations are presented in linear notation, where the relation name is given as a predicate. As we said before, the MOD value of the RP requires that the element to which it is adjoined is an N’ whose index is identical to the index of the relative pronoun. As will become clearer in the next section, the index of the relative pronoun is identical to the index of R° and as such will eventually become the index of the whole RP. Since the index of the RP equals the index of the modified N’, the restriction sets of both RP and N’ are taken as restrictions on the same index, giving rise to the intersective interpretation of the combination, as is illustrated in (27).
We do not employ the semantic representations used in Pollard and Sag (1994). Instead, the semantics of signs is represented in terms of a Neo-Davidsonian event semantics, where both nouns and verbs introduce an index and a restriction set on that index, a verbal index essentially being a Davidsonian event variable.¹⁷ The restriction set contains basic semantic relations that must be true of the individual (be it an ‘ordinary’ individual or an event) if the phrase that introduced the index is used referentially. The reasons for preferring event-based representations to the representations found in Pollard and Sag (1994) will be discussed in section 2.2.

The operation of conjoining relations in event semantics is modeled by a set-union of the CONDS values of the head daughter and the adjunct daughter in (27). In addition, the indices of head and adjunct daughter are identified, as required by the MOD specification of the adjunct daughter indicated in (23). The index of the relative pronoun does not have to be identical with the index of the relativized phrase, but it has to be identical with the REL value of the specifier of RP. The REL value of the specifier of RP is identical to the index of the modified phrase. Hence the index of the relative pronoun is eventually identified with the index of the modified phrase as well, resulting in the semantic representation given in (27).¹⁸

A more lucid representation of (27) is given in (28).

(28)  \[[N, \text{Mann, der schläft}]\]

Before we discuss the semantic effects in more detail, let us make some terminological distinctions: First, we distinguish adjunction from modification. Adjunction is a syntactic operation, where a modifying phrase is attached to a given projection. Modification is the semantic effect of this syntactic operation. Second, we distinguish intersective modifiers from modify-

¹⁷ The approach is Neo-Davidsonian because verbal indices are introduced by all kinds of verbs and not only by activities. For recent discussions cf. Parsons (1990) and Landman (2000). Since the representation of thematic roles does not play a role in the following, we have used Davidsonian representations of verbs where the roles of the verb form part of the relation introduced by the verb.

¹⁸ Since this index does not necessarily have to be identical to the index of the specifier itself, the analysis accounts for cases of pied-piping as well.
ing operators. While an intersective modifier adds restrictions to a given index, a modifying operator embeds the semantic contribution of its semantic argument. Relative clauses, in this sense, are intersective modifiers.

The Semantics Principle of Pollard and Sag (1994, p. 56, p. 323) treats adjunct daughters uniformly as semantic heads, i.e. as elements that project their index in case of combination. Informally, we can characterize the semantic head of a phrase as being the semantic functor, while the remaining daughters of a phrase provide semantic arguments for this functor. But in the present case of intersective modification it does not actually matter whether the adjunct daughter or the head daughter projects its index: following the MOD requirement of the RP, both indices are forced to be identical. Strictly speaking, then, an RP – although being an adjunct – should not be treated as a semantic head, since it does not take the semantic contribution of the head daughter as its argument.

Although it is technically possible to treat adjacent intersective modifiers as semantic heads, such an assumption cannot be maintained in the case of extraposed modifiers. As can be witnessed in (29), the index of the modifier might – and actually in most cases under consideration must – differ from the index of the phrase to which the modifier is adjoined. The notation \[x \neq e\] indicates that the index of the RP and the index of the S to which the RP is adjoined cannot be identical.

(29) weil [[DP jeder Mann] schläft, der schnarcht]
    because [[DP every man] sleeps who snores]

There are two options available to handle cases like (29): First – and this is the standard assumption – we may assume that (29) is actually not a case of modification at all. Instead, the modifying relative clause has been dislocated, i.e. has been extraposed. Both the morphosyntactic and the semantic reflexes of the modification are derived from ‘undoing’ this dislocation somehow. However, such a treatment of extraposed modifiers is problematic syntactically and semantically. Some of the syntactic problems have been mentioned in section 1, and further arguments against such a move will be presented below. From the semantic point of view a problem arises since the semantic rules for combination that interact with this process of ‘undoing’ the extraposition are not made explicit. This is not a trivial matter: semantic combination rules have to account for the well-known fact that combinations of extraposed relative clauses with non-adjacent N’ may yield the same truth-conditional interpretations as the local, adjacent combination of RP and N’ (cf. Culicover and Rochemont (1990, p. 23)).

The second option – and this is the option advocated here – assumes that (29) is in fact a case of modification, and not a case of dislocation. Obviously, if this position is taken, a number of technical, conceptual and empirical requirements must be fulfilled.

To begin with, the Semantics Principle must be reshaped so that it does not render the RP into a semantic head in either (28) or (29). In addition, the semantic modes of combination must be made explicit. The combination of an RP in (29) should have the same semantic effects as the combination in (28). The semantic modes of combination are the subject matter of section 2.2.

Second, the syntactic requirement of the RP’s MOD attribute must be loosened to allow for an adjunction to nominal and non-nominal projections alike. We present syntactic arguments for such a treatment in section 2.3.

Third, the identification requirement for the index of the relative pronoun must be reformulated to allow for an identification of the relative pronoun’s index with an index contained in
the phrase to which the RP is adjoined. Section 2.4 thus offers an analysis of generalized, non-local modification.

2.2 Semantic Background

The semantic representations used in Pollard and Sag (1994) are not employed here. This is mainly so because such an approach models semantic relationships in terms of (representational) subordination. Representational subordination leads to several problems, particularly the problem of spurious ambiguities, and the problem of logical form equivalence. Let us illustrate what this means with the example in (30), where two intersective modifiers are combined with a noun.

(30) a. a red brick that was found in Brixton
   b. a [[red brick] that was found in Brixton]
   c. a [red [brick that was found in Brixton]]

Given the syntactic analyses of pre- and post-nominal modification in Pollard and Sag (1994, pp. 55-57., pp. 216-218.) example (30a) receives two different syntactic structures, as is indicated through the bracketing in (30b) and (30c). The crucial point is not that two different syntactic structures can be offered for (30a), but that Pollard and Sag (1994) have to assign two different semantic representations to (30a) as well. These two representations – which correspond to the two different syntactic subordinations indicated in (30b) and (30c) – are truth-conditionally equivalent.

The problems are not restricted to modification in DP: certain types of local or temporal PPs, which modify V, are intersective as well. As a consequence of this, Pollard and Sag (1994) would assign two different semantic representations to examples like (31a), as illustrated in (31b) and (31c), despite the fact that they are unambiguous.

   b. on_Monday(in_Foothills_Park(run(e, k)))
   c. in_Foothills_Park(on_Monday(run(e, k)))

A second problem concerns the problem of logical form equivalence. Given that the two different semantic representations for (30a) in (30b) and (30c) actually lead to the same interpretation, it remains unclear how this equivalence can be derived.19 A related problem concerns entailments with intersective modifiers: Given a phrase \( x \) that is modified by intersective modifiers \( A \) and \( B \), \( A(B(x)) \) entails \( A(x) \) and \( B(x) \). If Kim ran on Monday in Foothills Park, Kim ran on Monday and Kim ran in Foothills Park. Again, it remains unclear how this entailment can be derived from the subordinating representations used in Pollard and Sag (1994).20 Both problems emerge from Pollard and Sag’s assumption that intersective modifiers receive the same treatment as modifying functors.

If we follow the tradition of event semantics (Parsons 1990; Landman 2000) and assume instead that semantic representations are flat, as illustrated in (32) for (30a), the aforementioned problems disappear entirely.

(32) \( x \mid \{\text{red}(x), \text{brick}(x), \text{found in Brixton}(x)\} \)

Since the conditions on the index \( x \) are represented as a set, the ordering becomes irrelevant, and it does not matter any longer which modifier is attached first in (30a) and (31a). The difference between (30b) and (30c) is hence eliminated, and with it the problem of logical form equivalence, which is reduced to set identity. Finally, the entailment patterns illustrated

19 Copestake et al. (1997) discuss this problem in the domain of machine translation.
20 A detailed discussion of entailment patterns with intersective modifiers is given in Landman (2000).
above can be defined in terms of subset inclusion: if a set of conditions applies to $x$, then each subset of the conditions applies to $x$ as well.

These considerations have led Copestake et al. (1997) to eliminate the semantic representations used in Pollard and Sag (1994) in favor of flat, event based semantic representations, the so-called Minimal Recursion Semantics (MRS). In MRS, semantic composition consists of two operations. The first operation concerns the determination of the index of the phrase. The value of the INDEX attribute is either a nominal index or a verbal event variable. The second operation concerns the combination of the CONDS sets of the daughters. These two operations are modeled in the Semantics Principle given in (33), which is derived from the version provided by Copestake et al. (1997, p. 14).

\begin{align}
(33) \text{Semantics Principle} \\
&\text{a. The value of INDEX for a phrase XP is identified with the index of the semantic head of XP. The semantic head of a phrase is the adjunct daughter if the adjunct daughter takes the semantic contribution of the head daughter as its semantic argument.}\quad 22
\text{In all other cases, the syntactic head is the semantic head.} \\
&\text{b. The value of CONDS for a phrase XP is given by the set-union of the values of CONDS of each daughter of XP.}
\end{align}

According to the first clause of the Semantics Principle one of the daughters – the semantic head – projects its index. The second clause of the Semantics Principle guarantees that the semantic contribution of each daughter is retained.

The Semantics Principle in (33) does not uniformly treat modifiers as semantic heads. In a case of intersective modification, neither adjunct nor head daughter act as functors. Consequently, intersective modifiers such as RPs or APs are not handled as semantic heads. Instead, the index of the syntactic head and the index of the adjunct daughter are identified. This has already been illustrated in the combination of N’ and RP in (27). Matters, however, become a bit more complicated if true functors such as quantifiers are considered.

\begin{align}
(34) \text{a. Every old man is sleeping.} \\
&\text{b. Every sleeping man is old.}
\end{align}

Any sensible semantic theory must allow a representational distinction between the restriction of the quantifier and its scope in the examples in (34). The approach presented in Copestake et al. (1997) differs from other event-based semantic frameworks – e.g. from the one in Landman (2000) – in that subordination is fully eliminated from the semantic representations. Instead, all predicates are set-unioned into a ‘flat’ restriction set. In a completely flat representation, however, where a distinction between restriction and scope is blurred, the semantic representation of (34a) turns out to be equivalent to the one of (34b), which is clearly an unwarranted result (cf. Copestake et al. (1997, p. 4)).

Copestake et al. (1997) suggest introducing additional variables, so-called handles, to make semantic subordination explicit while still retaining a flat semantic representation. Handles are introduced as additional arguments in the following way: any n-place relation introduces an additional argument slot. This slot is filled by a variable whose sole purpose is to indicate the level of subordination for a particular relation. So, if man is normally considered a 1-place

---

21 We assume that events and individuals are sortally distinct. This distinction will be employed in the analysis presented in section 2.4.

22 As will become clear presently, the adjunct daughter selects the handle of the syntactic head daughter and identifies the handle of the syntactic head daughter with one of its argument slots.

23 In this sense, the Semantics Principle in (33) differs from the versions of the Semantics Principle given in Pollard and Sag (1994, p. 402) and Copestake et al. (1997, p. 14).
relation, while *every* is a three-place relation,\(^2^1\) these are turned into 2-place and 4-place relations, respectively. As is illustrated in (35), every relation *bears* a handle since the handle is the only indicator of the semantic embedding of the relation.

(35) *every* *man*

As can be witnessed in (35), the quantifier *every* does not directly select its *restriction*, i.e. *man(x)*, but instead selects the *handle* \(2\) of this relation as value of its `RESTR` (= `RESTriction`) attribute. Hence, the semantic embedding of the relations introduced by \(N'\) is achieved by identifying the handle of these relations with the value of the quantifier’s `RESTR` (= `RESTriction`) attribute. In the same vein, the quantifier would select a handle as value of its `SCOPE` attribute (cf. below).\(^2^5\)

Extending the linear representation given in the last section, the `CONTENT` values given in (35) are represented as in (36). Here, handles are represented as numbers and indices as letters. In general, \(x_n\{\ldots\}\) is an index \(x\) whose handle is \(n\) and whose restriction set is \{\ldots\}. The handle of a relation is prefixed to the relation.

---

\(^{2^4}\) Generalized quantifiers should not be considered as three-place relations. But in MRS the arity of a relation depends on the argument slots introduced by it. Since a generalized quantifier introduces three argument slots – one for the bound variable, one for its restriction, and one for its scope – we will call it a three-place relation here.

\(^{2^5}\) During the projection of indices and handles, the handle associated with an index may change. This is actually the case in (35), where the resulting phrase bears the index of \(N'\) but the handle of the quantificational determiner.
(36) *every man*

\[
\begin{align*}
\text{DP} & \quad \{4: \text{every}(x, 2, 3), 2: \text{man}(x)\} \\
\text{Det} & \quad \{4: \text{every}(x, 2, 3)\} \\
\text{N'} & \quad \{2: \text{man}(x)\} \\
\text{every} & \quad \text{man}
\end{align*}
\]

Semantic subordination is thus modeled through handles. Semantic functors do not embed relations directly, but instead take handles as their arguments. If the argument slot of a functor contains a handle and if this handle is identical to the handle of a relation, the interpretation is that the latter relation is semantically subordinated to the former.

In (35) and (36), the RESTR and SCOPE attributes of the quantifier take the respective handles 2 and 3 as their values. These handles point to the relations which, in the case of the handle 2, either form part of the quantifier’s restriction, or, in the case of the handle 3, of the quantifier’s scope. The RESTR and SCOPE values are hence properly separated through their respective handle values. Still, the collection of conditions in CONDS is entirely flat. The CONTENT attribute of an example like (34a) hence receives the representation in (37). Here, the handle of the quantifier itself is 4.

\[
\begin{align*}
\text{CONT BV} & \quad 1 \\
\text{CONDS RESTR} & \quad 2, \text{ARG 1}, \text{ARG 1} \\
\text{EVENT 5} & \quad \text{SCOPE 3 HANDLE 2 HANDLE 2 HANDLE 3 HANDLE 4}
\end{align*}
\]

Note that the lexical entry of the quantifying determiner *every* requires that the handle of its syntactic argument (N’) is identified with the value of its RESTR value. In general, we may assume that identification requirements for handles originate in the lexical entries of semantic functors.\(^{26}\) It remains to be shown how the projection of handles is constrained in the general case. We assume the following constraint on handle projection, which ties the projection of a handle to the projection of its corresponding index, except if quantifiers are involved:

(38) **Handle Projection Constraint:**

The handle of a phrase XP is identical to the handle of the semantic head of XP, except if the non-head daughter of XP is a quantifier that is applied to the head daughter. In that case, the handle of a phrase XP is identical to the handle of the quantifier.

In the case of a quantifying DP being the syntactic argument of a verb, the index of the verb, but the handle of the quantifier is projected. As an illustration of the application of principles of semantic composition given in (33) and (38), consider the following analysis of the DP *jeder Mann, der einen Rivalen mag* (*every man who likes a rival*).\(^{27}\) In (39) and (40),

---

\(^{26}\) Copestake et al (1997) do not share this assumption. Here, the SCOPE value is determined in the syntax and in general can even be left open, resulting in underspecified representations. We have refrained from presenting their treatment of underspecified quantifier scope, since we do not employ handles to determine quantifier scope in the present paper.

\(^{27}\) Cf. also Pollard and Sag (1994, pp. 331-332) where an analysis of the DP *every man who likes a rival* is presented and discussed.
the syntactic and semantic analysis of the relative clause is given. In (41) and (42), the relative clause is adjoined to N’ within the DP.28

(39) *der einen Rivalen mag*

\[
\text{der einen Rivalen mag}
\]

\[
\text{RP[MOD N']}
\]

\[
x_4 \mid \{4:\text{exists}(y, 5, 1), 5:\text{rival}(y), 1:\text{like}(e, x, y)\}
\]

\[
\text{DP}[z = x]
\]

\[
z_8 \mid \{\}
\]

\[
x_4 \mid \{4:\text{exists}(y, 5, 1), 5:\text{rival}(y), 1:\text{like}(e, x, y)\}
\]

\[
\text{der R}°[\text{MOD N’}]
\]

\[
x_4 \mid \{\}
\]

\[
e_4\{4:\text{exists}(y, 5, 1), 5:\text{rival}(y), 1:\text{like}(e, x, y)\}
\]

\[
e \quad t \text{ einen Rivalen mag}
\]

---

28 In (39) to (42) we assume an implicit existential closure of the event variable embedded in RP. For the present purposes, it seems reasonable to assume that such a closure takes place in the most local environment possible. For a detailed treatment of existential closure, the reader is referred to Landman (2000, pp. 50-52).
As was already illustrated in (23), the empty relativizer is subcategorized for its clausal complement and the relativized phrase. Semantically it relates the semantic contribution of its complement to the semantic contribution of the phrase that is modified by the RP. This is achieved by identifying the handle of its clausal complement with its own handle, and – eventually – with the handle of the phrase to which the relative clause is adjoined. The consequence of this identification operation is that the clausal complement of the empty relativizer and the phrase that is modified by RP are semantically treated as conjuncts, i.e. as elements that are on the same level of subordination.29

In (40), the handle of the clausal complement is the handle of the quantifier *einen Rivalen*, since the quantifier is the highest functor in the clausal complement. This quantifier takes the semantic contribution of the verb as its *scope* and hence projects its handle, but crucially,

---

29 In contrast to Copestake et al. (1997, p. 26), we follow Pollard and Sag (1994, p. 210) and assume that pronouns – including relative pronouns – do not introduce relations under \text{CONT|CONDS}.
the verb still projects its index, as required by the Semantics Principle. Since the handle of the clausal complement is identical to the handle of the whole RP, it is the handle of the quantifier that provides the handle of the RP. Semantically, the quantifier will thus be taken on a par with the conditions set introduced by the N’ to which the relative clause is adjoined. Moreover, the empty relativizer does not only care for the identification of handles, but for the identification of indices as well. The empty relativizer introduces a new index that is, however, identical with the REL value of the specifier of RP. Since the empty relativizer is the head of RP, the Semantics Principle requires that it is the index of the empty relativizer that is projected. This index being identical with the REL value of the specifier of RP, it turns out to be identical with the index of the relative pronoun. The respective values 2 and 7 are thus identified. Since the REL value of the specifier of RP is identical to its own index, the index of the RP has to be identical to the index of the specifier of RP.30

In sum, the semantic contribution of RP provides a nominal index, and a CONDS value that contains the relations introduced in the relative clause. This nominal index is identified with the index of the modified phrase, thus yielding the required intersective interpretation. This is further illustrated in (41).

(41) jeder Mann, der einen Rivalen mag

30 The effect of introducing a new index and identifying this index with the index of the relative pronoun, yields the same consequences as λ-abstracting over the index of the relative pronoun. In particular, the relative clause provides a nominal semantic contribution.
2.3 Syntactic Conditions on Modification

The MOD value of the RP specifies that the modified phrase has to be a nominal projection. Hence, the MOD attribute of a relative clause, as given in (23), precludes any realization of a relative clause in a position which is non-adjacent to a nominal projection. Once this restriction has been given up, a relative clause could modify any major category. In the light of the present analysis, it is a natural move to assume that the element modified by a relative clause is not specified categorically, but solely semantically.31 We may ask then whether relinquishing the categorial restriction will not lead to conceptual or empirical problems. Interestingly, empirical evidence can be given in support of the view that relative clauses have to adjoin to phrases that are not the elements modified by the relative clause. We will illustrate our claim with the following cases:32

a) relative clauses adjoining to postpositional phrases illustrated in (43) and (44), and

b) relative clauses adjoined to nominal phrases that modify a non-adjacent contained nominal projection illustrated in (45) to (47).

In (43), we find examples cited in Schachtl (1992, p. 444) where a relative clause is adjoined to a postposition.

\[0.3\text{It is a well-known fact that relative clauses can only attach to nominal projections after a post-nominal argument (introduced by of in English and realized in the genitive case in German) has been realized. At first sight, this fact seems to contradict our claim that categorial specifications are not required for relative clauses. We assume, however, that the ungrammaticality of examples like (i) and (ii) is not due to a specification of the relative clause but to an adjacency requirement for post-nominal complements (of-DP-phrases in English, genitive-marked DPs in German).}

(i) *each destruction which took more than two battalions of a city

(ii) *jede Zerstörung, an der mehr als zwei Bataillone beteiligt waren

\[0.3\text{einer Stadt}

\[0.3\text{a city}

\[0.3\text{32 So-called hydras, as discussed in Link (1984, pp. 246-248) present a further argument for our assumption: If combinations of D and N' are to be treated as DPs instead of NPs, examples (i) and (ii) indicate that relative clauses in some cases must attach to DPs and not only to N's. This is so because the interpretation of the relative clause as a modifier of a sum object requires that the relative clause is not adjoined to one of the nominal conjuncts, but to the coordinated DP as a whole. Example (iii) from Ross and Perlmutter (1970) shows that relative clauses sometimes have to be adjoined to conjoined S-nodes. I would like to thank an anonymous reviewer for drawing my attention to this example.}

(i) The boyij and the girlij whoij dated each other are friends of mine.

(ii) The landlordij and the tenantsij whoij are fighting each other will all come together tomorrow in an attempt to find a compromise.

(iii) [S John saw a manij] and [S Mary saw a womanij] whoij were wanted by the police.
(43) a. [Aus der Stadt heraus, die den Belagerern schon verlassen schien,] ‘A small crowd of people came out of the town that was already considered abandoned by its besiegers.’

b. Man muß nicht gleich [eines Sachverständigen wegen, der seinen Mund nicht halten kann,] die gesamte Konkurrenz kopfscheu machen. ‘It does not make sense to confuse one’s competitors just because an expert could not keep quite.’

Adjunction to a postpositional phrase is not only possible if the postpositional phrase is topicalized, as in (43a), but also if the phrase remains in-situ, as illustrated in (43b). A non-topicalized variant of (43a) is given in (44).

(44) Dann hat sich aus der Stadt heraus, die den Belagerern schon verlassen schien, ein Häuflein Leute gedrängt. ‘Then has self from the city out which the besiegers already abandoned seem a crowd people came’

The examples in (45), taken from G. Müller (1996, p. 227), and (47), taken from Schachtl (1992, p. 448), show that relative clauses may be adjoined to a nominal projection but nevertheless modify elements contained in the nominal projection. In (45), the modified element is the complement of the phrase to which the relative clause is adjoined.

(45) [Die Wut des Mannes auf sich, der die Verantwortung hatte,] ‘It did not impress me that the man got furious who held the responsibility.’
(46) Doch Vorfälle wie im vergangenen Herbst, als Abgeordnete der Partei bei der Eröffnung einer Ausstellung des BVS im Stuttgarter Landtag über den Rechtsextremismus handgreiflich wurden, zeigen, daß die Republikaner ein Störfaktor bleiben.‘Accidents like the one in last August, where delegates of the Republicans became aggressive during the opening of an exhibition of the BVS about right wing extremism show that they remain a nuisance.’

Cases like (45) are not confined to relative clauses, as is illustrated in (46) where a PP modifies a complement of the phrase to which it is adjoined.\textsuperscript{33} Although an alternative interpretation is possible that does not support the present analysis, the context indicates that the PP im Stuttgarter Landtag does not modify Ausstellung but Eröffnung. Consequently, über den Rechtsextremismus cannot be adjoined to the projection of Ausstellung, but only to the projection of Eröffnung.

In (47), the modified element is a complement contained in a modifier (a participial phrase).

(47) Die nur von den Grammatikern akzeptierten Beispielsätze, die Konstituentenstruktur für das Alleinseligmachende halten, werden am häufigsten zitiert.

\textsuperscript{33} Example (46) was found in Neue Zürcher Zeitung 192/2000, 19.08.00, p. 5.
‘Examples which are accepted by syntacticians who believe constituent structure to be the ultimate truth are more quoted than others.’

\[
\text{DP} \\
\text{D} \quad \text{N'} \\
\text{die} \quad \text{N'} \quad \text{RP} \\
\text{PartP} \quad \text{N} \quad \text{die \ldots halten} \\
\text{Adv} \quad \text{PartP} \quad \text{Beispielsätze} \\
\text{nur} \quad \text{PP} \quad \text{Part} \\
\text{P} \quad \text{DP} \quad \text{akzeptierten} \\
\text{von den Grammatikern}
\]

It has sometimes been argued that attributive participial phrases generally prohibit extraposition of a relative clause. Prima facie, this view is supported by the following ungrammatical example.34

(48) *der \ ([mit allen Sätzen einverstandene] Partner, die sie äußerte \ the with all sentences agreeing partner that she uttered

It should be noted, however, that (48) differs crucially from (47) in that the grammatical relations of the modified noun and the DP contained in the participial phrase have switched. Whereas the modified noun (Partner) is the subject, and the antecedent of the RP is the object of the participle in (48), the opposite situation holds in (47). Here, the modified noun is the object while the antecedent of the RP is the subject. There seems to be a parochial constraint at work here, which prohibits RPs to take antecedents embedded in a participial phrase, if the antecedent is not a subject. We cannot offer an explanation for this behavior, but for our present work, it suffices to say that participial phrases may in principle contain antecedents of extraposed relative clauses.

That a configurational ban on taking an antecedent contained in a participial phrase is not at work here is further supported by the grammaticality of extrapositions from prenominal genitive DPs (S. Müller 1999, p. 222) and comparative constructions (Haider 1996, pp. 248-250). The following example illustrates that an RP that is adjoined to a DP can take the embedded prenominal genitive DP as its antecedent.

(49) Er sagte dies, weil ihm \text{jeden Mannes} Tod naheging \ He said that because him every man’s death touched
\text{mit dem er in einem Alter war.} \ with whom he in one age was
‘He said that because he was touched by the death of every man who had the same age’

Similar to (47), the RP in (49) may take an antecedent that is contained in the left periphery of the phrase to which the RP is adjoined. The same pattern can be observed in comparative constructions, as is illustrated in (50).35

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34 I am indebted to an anonymous reviewer for raising this issue.
35 We cannot offer an analysis of comparative constructions in the present paper. Assuming that the antecedent of the extraposed RP \((als der Mann, than the man)\) starts out in combination with \text{mehr} (more), the antecedent of the RP is located in the left periphery of the noun to which the RP is adjoined.
Er hat mehr Gedichte als der Mann geschrieben der den Preis erhielt
‘He has written more poems than the man who received the award.’

The common denominator of the examples given in (43) to (46) is a relative clause (or another intersective modifier) that is adjoined to a position while it modifies an element contained in the phrase to which it is adjoined. S. Müller (1999) suggests allowing for cases of ‘intermediate extraposition’. Such an analysis cannot explain why intermediate modifier extraposition seems to be grammatical, but – as will be shown below – intermediate complement extraposition leads to ungrammaticality. Example (51a) shows that zerstören (destroy) can take a non-animate subject. If we assume the same configuration as in the grammatical example (47), i.e. a configuration where the antecedent of the extraposed phrase is the subject while the modified noun is the object of the participle, we would expect that an extraposition from the subject should be possible. But this is not the case, as is illustrated by the ungrammaticality of (51a), which is the extraposed variant of the grammatical example (51b).

Example (51a) still has a grammatical reading where the complement clause is not related to Erkenntnis, but to Glaube, albeit this reading is non-sensical (strictly speaking). This reading can be excluded by realizing the complement of Glaube, as in (52).

This line of reasoning is further supported by the ungrammaticality of intermediate complement extraposition to the right of a postposition. The example (53) shows that an intermediate extraposition of the complement of N to the right of the postposition leads to ungrammaticality. This example hence contrasts with the grammatical modifier extraposition in (43b).

*Man muß nicht gleich der Tatsache wegen, daß die Erde keine Scheibe ist zum Häretiker werden.
‘One should not immediately the fact because that the earth is not a disk to an heretic become.”
A natural analysis suggests itself, however, if one assumes that the adjunction of relative clauses is not categorially restricted in the sense that a relative clause must adjoin to and modify the same element (which is always of category N).

Let us assume then that an intersective modifier is able to identify its index with an appropriate element contained in its syntactic sister, in a sense to be explained shortly. From this point of view, the identification of the modifier’s index with the index of its syntactic sister just happens to be the borderline case, where this index is the only one contained in the syntactic sister.

2.4 Locality and Identification

2.4.1 The Anchors Projection Principle

The discussion in sections 2.2 and 2.3 has shown that an RP should not be restricted to solely adjoining to nominal projections. Hence, the categorial restriction of the MOD value of $R^\circ$ is weakened. And since its belongs to the head features, the weakened MOD requirement ends up as the MOD value of RP. On the basis of this assumption, we can dispense with the concept of modifier extraposition as an independent syntactic process. But this weakening is only the first step, since the semantic side of modifier extraposition must also be taken into account. Modification may not only apply to the semantic contribution of the syntactic head daughter, but possibly to the semantic contribution of an element contained in that phrase. Following Gazdar et al. (1985) and Pollard and Sag (1994), we assume that constraints are imposed on local structures, i.e. on local trees comprising of the mother and its immediate daughters. Given this assumption, the index of an RP cannot simply be identified with another index if the latter is contained in the syntactic sister of the RP. We thus have to specify how an identification requirement for the index of RP can be given that does not violate the aforementioned locality condition but still allows the identification with an index that might originate from a deeply embedded position within the syntactic sister of RP.

These apparently conflicting requirements can be met by assuming that certain kinds of indices are not only available locally – i.e. at the position where they are introduced into syntactic structure, but can also be accessed at a distance by being projected through the syntactic tree structure. Hence, certain indices, viz. the ones introduced by N and V (and presumably also those introduced by P and C) may be considered as nonlocal elements in the sense of Pollard and Sag (1994). As such, they can be freely projected from daughter to mother and even across the maximal projection of their head.

It is however not sufficient to project indices without their corresponding handles. Since MRS does not express semantic subordination directly, but through handles, an intersective interpretation of a modifier comes about as the result of both identifying the index and the handle of modifier and modified phrase. It is thus necessary to not only project indices, but actually pairs of an index and its corresponding handle. We will call such pairs of index and handle anchors to make clear that they can be used to anchor the semantic contribution of an extraposed modifier. An anchor takes the form of a tuple $(i,n)$, where $i$ is an index and $n$ is the handle corresponding to that index. Following the feature architecture of signs developed in Pollard and Sag (1994), we assume that anchors belong to the nonlocal attributes of a sign and hence are collected in a nonlocal set-valued attribute called ANCHORS. The projection of the anchors is governed by the Anchor Projection Principle that is given in a simplified form in (54), but will be properly amended shortly.

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36 There is also a similarity with the discourse referents of DRT Kamp and Reyle (1993), which are introduced into a semantic representation and remain available for anaphoric processes in a larger syntactic structure. Wittenburg’s approach to relative clause extraposition (Wittenburg 1987) is actually based on discourse referents (cf. section 3.1.2.3).
(54) **Anchor Projection Principle:**

The *anchors set* of a headed phrase consists of the union of the *anchors sets* of the daughters.

Given the formulation in (54), anchors simply project once they have been introduced in the syntactic structure. The Anchor Projection Principle thus allows local access to the anchors of deeply embedded constituents. With this formulation in mind, the semantic identification requirement for RP can be stated as in (55).

(55) $\text{RP}_{[x, n]}[\text{MOD} | \text{ANCHORS } \mathbb{R} \& <x,n> \in \mathbb{R}]$

The constraint in (55) – which is actually part of the lexical entry of $R^\circ$ – requires that an RP whose index is $x$ and whose handle is $n$ modifies a phrase whose ANCHORS attribute takes the set $\mathbb{R}$ as its value. This set has to contain at least one element that can be identified with the index-handle pair $[x, n]$. Such an identification particularly incorporates the requirement that the index of the RP bears the same $\phi$-features as the index that is part of the anchor that is used for identification. Since the identification does not only affect the index, but its corresponding handle as well, the content of the relative clause is properly included in the semantic structure of the whole phrase. The index contained in the anchor and the index of RP share their handles and are hence interpreted as being semantically co-ordinated. The complete semantic contribution of RP is thus incrementally added to one of the indices already introduced in the syntactic structure. This is illustrated in (56). Here, we assume that $[y, n]$ corresponds to the index and the handle of the RP. In addition, only categorial information and the relevant anchors are shown in (56). The combination of RP with the remaining phrase is possible if an appropriate anchor can be found so that both $y$ and $n$ are identified.

(56) weil [jeder Mann schläft, der schnarcht]  
because [each man sleeps who snores]

The constraint imposed by the RP, i.e. $[y,n] \in \mathbb{R}$, can be satisfied if $[y,n] = [x,2]$. This identification has two semantic side effects. First, the indices of Mann and the RP are identified and second, their respective conditions sets are conjoined since their handles are identified. Consequently, the whole semantic contribution of the RP is added to the content of the N’ although this constituent is syntactically embedded into the phrase to which the RP is adjoined. This is illustrated in (57) below, where we have added the semantic representations of the RP and the clause to which RP is adjoined.
(57) weil [jeder Mann schläft, der schnarcht]
because [each man sleeps who snores]

\[
\begin{align*}
S\{x,2\},\{e,3\} \\
e_1 | \{1: \text{every}(x,2,3), 2: \text{man}(x), 3: \text{sleep}(e, x), 2: \text{snore}(e', x)\} \\
S\{x,2\},\{e,3\} \quad \text{RP}[\{g,n\} = \{x,2\}] \\
e_1 | \{1: \text{every}(x,2,3), 2: \text{man}(x), 3: \text{sleep}(e, x)\} \\
D \quad \text{DP}\{x,2\} \\
x_1 | \{1: \text{every}(x,2,3), 2: \text{man}(x)\} \\
\text{schläft} \quad \text{VP}\{e,3\}
\end{align*}
\]

The addition of semantic information to already introduced referents (and to conditions on these referents) can be considered a further virtue of a flat semantic representation. In the representations used in Pollard and Sag (1994), much more complex mechanisms would have to be devised so that the semantic contribution of the relative clause can be added to the already introduced DP. In the present proposal, the addition of semantic information is governed by index and handle identification through anchors.

Given the condition in (55), we basically assume that a nonlocal intersective modifier (such as an RP) must always be attached to a given projection in a position that is superior to the position of the element from which the anchor originates. Schematically, this is depicted in (58).

(58) Generalized Modification

\[
\text{YP} \quad \text{XP} \left[\text{ANCHORS } R = \{x, m\} \ldots\right] \quad \text{RP}_{\{l,s\}}
\]

YP is well-formed if \(i, n/; i\) being the index of the relative pronoun, and \(n\) being the handle of the relative clause, can be identified with an element \(\langle x, m \rangle\) of \(R\) such that \(i\) is compliant with the \(\phi\)-features of \(x\) and the handle \(n\) is identified with the handle \(m\). If these conditions are met, an intersective interpretation is established.

In (58), the modifier requires XP, the modified phrase, to contain an anchor that can be identified with the index and handle of the modifier. If such an identification is possible, the resulting structure is analyzed as satisfying (55).

2.4.2 Constraints on Modification and Extraposition

With the introduction of (58), we have assumed that the identification of the index (and handle) of an RP with an anchor originating in its sister constituent is the basic mechanism for distinguishing grammatical cases of modifier extraposition from ungrammatical ones. A proper formulation of anchor projection must thus include constraints on extraposition, in particular the well-known condition that extraposition is upward bounded (Ross 1967/86, pp. 174-176) must be covered. By an upward bounding of extraposition, we mean that an extraposed phrase must not cross a sentential node. This is illustrated in (59).

---

(59) a. Ulrich hatte zugegeben, daß die Karte gestohlen war, die er gefunden hatte, als er betrunken war.

‘While being drunken, Ulrich had admitted that the ticket he had found was stolen.’

b. *Ulrich hatte zugegeben, daß die Karte gestohlen war, als er Ulrich had admitted that the ticket stolen was while he

To include the upward bounding of extraposition, we will make use of an idea introduced in Pollard and Sag (1994, pp. 164-171) to prohibit further projections of realized and non-realized nonlocal features. In this model, dislocation is represented through the nonlocal attribute SLASH, which originates in a trace. A trace is a sign whose SLASH value is shared with its LOCAL value, and whose PHONOLOGY value is empty. Pollard and Sag (1994, p. 164-166) assume that the projection of nonlocal elements such as SLASH is unbounded by the very nature of the elements being nonlocal. But the projection can be cancelled if the respective element is mentioned as TO-BIND on the head daughter of a phrase. This idea is not employed to deal with island constraints, but to properly handle weak unbounded dependency constructions, such as tough movement (60), as well as topicalization in English.

(60) This man would be easy to bribe.

In the case of tough movement, the missing constituent contained in the non-finite complement of the adjective must not be realized syntactically after it has been identified with the subject of the adjective. If SLASH were to project indefinitely, nothing would block ungrammatical multiple realizations of a missing constituent in a tough construction. This is illustrated in (61), where the missing object has been topicalized despite its index being identified with the index of the subject.

(61) *Him, he, would be easy to bribe t,

The same considerations apply to topicalization. A topicalized constituent is realized only once, and not indefinitely many times. Pollard and Sag (1994) eliminate this unwarranted possibility by identifying the respective SLASH values with the TO-BIND|SLASH value on the head daughter. For the adjective easy, this is illustrated in (62). Here, the SLASH value of the adjective’s complement is bound by the adjective since it is identified with the value of the adjective’s TO-BIND|SLASH value.

(62) easy

Similarly, in the Head Filler Rule (Schema 6) of Pollard and Sag (1994, p. 164), the syntactic head daughter specifies the SLASH value that corresponds to the filler daughter as TO-BIND. Hence, the interaction between the Nonlocal Feature Principle with the relevant rule schemata guarantees that a missing constituent is not realized more than once.

(63) Head Filler Schema

\[
X \rightarrow \text{YP[LOCAL \{\}], S[fin, SLASH \{\}, TO-BIND|SLASH \{\}]}\]
In the present proposal, we make use of the cancellation of nonlocal attributes to account for the upward bounding of modifier extraposition. Following Kiss (2001), we assume that German clauses are either the result of the head specifier schema – which was already employed in (23) to build up relative clauses, or the result of a complementizer realizing its clausal complement. The head specifier schema is given in (64a). It requires that the anchors of bother daughters are prohibited to further project. Similarly, the lexical entry of a complementizer in (64b) specifies that all anchors of its syntactic sister have to be bound. In both cases, this is indicated through the TO-BIND attribute.

\[(64)\]

\[
\begin{align*}
\text{a. } \text{XP} \{\text{SPR} \langle \rangle \} & \rightarrow \text{XP} \{\text{ANCHORS} \}, XX \begin{bmatrix}
\text{SPR} \langle \rangle \\
\text{ANCHORS} \\
\text{TO-BIND | ANCHORS} \\
\end{bmatrix} \\
\text{b. } \text{COMPS} \langle S \{\text{ANCHORS} \} \rangle \\
\text{TO-BIND | ANCHORS} \\
\end{align*}
\]

Let us further assume that the Anchor Projections Principle in (54) is amended to make reference to the TO-BIND|ANCHORS specification of the head daughter, as formulated in (65).

\[(65)\] Anchors Projection Principle (final version)

The anchors set of a headed phrase consists of the union of the anchors sets of the daughter less those anchors that are specified as TO-BIND|ANCHORS on the head daughter.

In this formulation, the Anchors Projection Principle is reminiscent of Pollard and Sag’s Nonlocal Feature Principle (Pollard and Sag 1994, p. 164). Particularly, elements of a nonlocal attribute do not project to the mother if they are specified as TO-BIND on the head daughter. Now in each of the two cases in (64), a TO-BIND|ANCHORS specification imposed on the head daughter – either by syntactic stipulation, as in (64a), or by lexical specification, as in (64b) – requires that a further projection of all anchors is blocked. This specification hence differs from the ones given in (62) and (63) in that the union of all anchors of the respective daughters is specified as TO-BIND. The upward bounding of modifier extraposition is thus derived from the anchor identification requirement of the relative clause (cf. (55)): a relative clause needs an anchor for identification, but anchors which are contained in a clause excluding the relative clause must not satisfy this requirement. In (66), this is illustrated for the ungrammatical example (59b). The RP requires an anchor. The sole appropriate anchor is contained in the embedded complement clause, which, however, excludes the RP.

\[(66)\] *Ulrich hatte [zugegeben, daß die Karte gestohlen war, als er getrunken hatte, die er gefunden hatte].

The same mechanism could be used to handle the upward boundedness of complement extraposition, if e.g. the projection of EXTRA – cf. Pollard and Sag (1994, p. 366), Keller (1995) – is blocked.
This analysis invites the remark that upward bounding is treated by language specific means insofar as language specific schemata contain specifications which lead to the exclusion of extraposition across sentential barriers. The ban on such syntactic relations, however, is actually universal. Instead of discussing this aspect presently, we will refer the reader to the discussion on topicalization structures in section 3.2, where it will become clear that the present formulation of upward bounding, together with two further conditions, allows a comparative analysis of modifier extraposition from topicalized VP structures.

In particular, we will show why English prohibits extraposition from fronted VPs (Culicover and Rochemont 1990, p. 28), while German allows a relative clause to take an element of a fronted VP as its antecedent, as has already been illustrated in (18), repeated here as (67).

(67) a. Mit dem Mann gesprochen hat sie, der dort steht.
   with the man spoken has she who there stands
   ‘She spoke with the man who stood there.’

   b. *The governor said he would meet a man at the party who was from Philadelphia,
      and meet a man at the party he did who was from Philadelphia.

We will show that these differences in the grammar of English and German can be derived from different realizations of the head specifier schema in these two languages. Note particularly that the German topicalization structure has a lexical head in (67b) and (64a). Currently, we will conclude that the present proposal can account for the upward bounding of extraposition by imposing a constraint on anchor projection.

2.4.3 Attachment sites for modifiers

We have already illustrated our proposal in the discussion of modifier extraposition in (56) and (57). In the following discussion, we will make use of the following notational conventions:

1. XP{<i, n>, <j, m> ...}, where i, j, ... are indices and n, m, ... are natural numbers: A phrase XP which contains anchors <i, n>, <j, m>, ...
2. word_{<i, n>}, where i is an index and n is a natural number: The syntactic representation of word word is the origin of anchor <i, n>.
3. word_{x}: The syntactic representation of word word introduces an identification requirement for index x.
4. XP[<i, n] = α], where <i, n> is an index and a handle and α is an anchor: The identification requirement [i, n] = α can be satisfied if [i, n] and α are identified. If more than one anchor may satisfy an identification requirement, this is indicated by XP[<i, n] ∈ {...}], where {...} is the set of anchors possibly satisfying the identification requirement. If no anchor may satisfy the identification requirement of a modifier, this will be indicated by XP[<i, n] = ∅].

Following the notational conventions given, the analysis presented in (56) and (57) is rendered into the following representation.
(68) weil [jeder Mann schläft, der schnarcht]
because every man sleeps who snores

Hence, in (68), the anchor \(\{x,2\}\) is introduced by the noun Mann, while the anchor \(\{x,3\}\) is identified by the verb schläft. Both anchors are projected according to the Anchor Projection Principle. Identifying the relative pronoun’s index with the anchor \(\{x,2\}\) satisfies the identification requirement of the relative clause. Since the verbal index \(e\) forms part of the anchor \(\{x,3\}\), this anchor cannot be identified with a nominal anchor.

The representation in (68) shows that the identification requirement imposed by the RP can be satisfied if the index of the relative pronoun is identified with the index of Mann, mediated through the anchor issued by Mann. Note that the identification requirement of the modifier blocks the alternative syntactic structure in (69), where the relative clause is realized as a syntactic sister of the verb. Such an analysis is suggested in Haider (1996), and will be discussed in section 3.1.2.

(69) weil jeder Mann schläft, der schnarcht

In (70), we find an ambiguous example where the intersective non-local modifier is not a relative clause but a temporal PP, which may either modify the noun Termin or the verb verschoben. The fact that PPs may select various anchor types is captured by assuming that a PP may select an anchor of a more general type, comprising both individual and event anchors.

(70) Sie hatte den Termin verschoben am Montag.
She had the appointment re-scheduled on Monday

‘She had rescheduled the date on Monday.’

The example in (70) differs from the example in (68) in that an alternative syntactic structure is possible here, as indicated in (71). In this structure, the identification requirement of the PP can be satisfied by the verb. The structure, however, does not account for the ambiguity of the example.
Obviously, the identification requirement of nonlocal modifiers gives rise to ambiguous structures. It could be argued that a simple case of non-extraposition is particularly problematic, because it does not only allow the representation in (72a), but also the seemingly spurious analysis in (72b).

(72) a. weil der [Mann der schnarcht] schläft

b. weil [der Mann der schnarcht] schläft

The possibility of the two alternative analyses in (72) follows from the hypothesis that extraposition and in-situ realization of a relative clause are instances of the same identification requirement, which is satisfied in (72a) as well as in (72b). Although the analysis thus introduces a spurious analysis for in-situ cases of relative clause extraposition, it should be kept in mind that both analyses are actually required to cover *hydras* (cf. fn.32) as well as the examples (43) to (46). An in-situ modification analysis of relative clauses as N-adjuncts could not account for these data. The present analysis, on the other hand, accounts for these data by assuming that a relative clause may syntactically adjoin to phrases other than N. If compared, the price paid for the spurious ambiguity in (72) is more than justified by the analyses achieved for (43) to (46), as well as for the analyses of the problematic data presented in section 1, and analyzed in section 3.

3. Analyzing the data as instances of nonlocal modification

This section is devoted to an analysis of the problematic data presented in section 1, as well as to a comparison of the present proposal with its competitors. In section 3.1, we will discuss the apparent violation of island conditions, such as the *Complex Noun Phrase Constraint* (CNPC). In section 3.2, we will discuss cases of ‘wrongly directed extraposition’ and VP topicalization, and finally, in section 3.3, we will discuss the interaction of variable binding, extraposition and word order variation. It will be shown that in each case the grammaticality
of an example is derived because the modifier is realized in a syntactic position where it has access to a suitable anchor, while ungrammatical examples are blocked by the analysis because such an anchor is not available.

3.1 Apparent violations of island conditions

3.1.1 The Data explained

In analyzing the apparent island violations presented in section 1, we will concentrate on the discussion of the complex DP cases in (73) and (74). These examples have been discussed in (Haider 1996, p. 259; Haider 1997, p. 126). As was mentioned in the introduction, the grammatical examples in (73) differ from the ungrammatical ones in (74) only with respect to the type of element extraposed. It is a complement in (74) but a modifier in (73).39

(73) a. Man hat die Frau des Boten beschimpft, der den Befehl überbrachte.  
   one has the wife the messenger insulted who the command delivered.  
   ‘The wife of the messenger was insulted who delivered the command.’

   b. Er hat die Zeit vor dem Versuch gut verbracht, der ihn berühmt machte.  
   he has the time before the experiment well spent which him famous made  
   ‘He has spent a nice time before the experiment which made him famous.’

   one has the messenger of-the command insulted the place to leave  
   ‘The messenger was insulted who delivered the command to leave the place.’

   b. *Er hat die Zeit vor dem Versuch gut verbracht, über Wasser zu wandeln.  
   he has the time before the experiment well spent over water to walk  
   ‘He has spent a nice time before trying to walk over water.’

Configurationally, the examples in (73) and (74) follow the same pattern: the extraposed sentential complement is related to a DP or PP embedded in another DP. In terms of a movement analysis, the examples in (73) and (74) would be subject to the complex noun phrase constraint (CNPC, Ross 1967/86). Hence, the ungrammaticality of the examples in (74) and (73) is predicted under the assumption that extraposition is uniformly to be handled as movement.40

In the present analysis, modifier extrapolation is constrained by anchor identification and not by movement constraints. Anchors may project freely within a clause and examples are expected to be grammatical as long as an anchor for the extraposed phrase can be found. The grammaticality of the examples in (73) follows from this assumption, as is illustrated for illustrated in (73b) in (75).

39 Since finite and non-finite complements behave similarly with respect to extraposition, we will concentrate on non-finite complements in this section.

40 Although Haider (1997, p. 125) mentions the insensitivity of RPs to the CNPC, this distinction is not reflected in the discussion in Haider (1997, pp. 130-133).
(75) weil er die Zeit vor dem Versuch gut verbrachte, der ihn berühmt machte

Since the identification of a nominal anchor implies agreement between the origin and the binder, the RP can only be anchored to \( \langle x,2 \rangle \) in (75). Identification with \( \langle y,1 \rangle \) is impossible because the gender specification of \( \langle y,1 \rangle \) differs from the one of the relative pronoun, the latter being masculine while the former is feminine. As a consequence of the identification of the respective handles, the analysis correctly predicts that the relative clause belongs to the restriction of the individual instance introduced by the noun *Versuch*.

The examples in (74), which are not instances of modifier extraposition, cannot be analyzed on the same basis. Presumably, complement extraposition is to be treated as movement. As instances of movement, their obedience to the CNPC is not surprising.

The data presented in (13) and (14), i.e. apparent instances of adjunct and subject island violations, follow the pattern assumed for the analysis of (73): In each case, the extraposed relative clause is attached to a verbal projection whose *anchor set* contains the anchor of the embedded DP.

3.1.2 Alternative Approaches

Approaches to extraposition which neglect the fact that modifier extraposition is fundamentally different from complement extraposition cannot explain the grammaticality of the data in (73). It does not matter in this case, whether such an analysis is presented in terms of movement restrictions (cf. Müller (1996)), or in terms of a simulation of movement (cf. Keller (1995)), or in terms of base generation constrained by structural conditions (cf. Culicover and Rochemont (1990)).

3.1.2.1 Culicover and Rochemont (1990)

The definition of the *Complement Principle* given in Culicover and Rochemont (1990, p. 41) predicts that the examples in (73) are as ungrammatical as the examples in (74).


\[ \beta \text{ is a potential complement of } \alpha \ (\alpha, \beta = X^{\text{wax}}) \text{ only if } \alpha \text{ and } \beta \text{ are in a government relation.} \]

b. *Government*

\[ \alpha \text{ governs } \beta \text{ if a c-command } \beta \text{ and there is no } \delta, \delta \text{ a barrier for } \beta, \text{ that excludes } \alpha. \]

The application of the *Complement Principle* can be illustrated by the relevant part of the syntactic structure for (73b) given in (77).\(^{42}\)

\(^{41}\) Keller (1995) does not actually address the issue of island constraints, but analyzes relative clauses and complements uniquely as elements that are projected through his EXTRA attribute. The treatment of island constraints in HPSG is discussed in (Pollard and Sag 1994, chapters 4.5-4.6). Assuming that the conditions which govern SLASH projection can be applied to the projection of EXTRA as well, it remains unclear how a distinction between (73) and (74) can be drawn.

\(^{42}\) The *Complement Principle* does not distinguish extraposed complements from extraposed modifiers. This is made clear in Culicover and Rochemont (1990:26fn.4).
Er hat [die Zeit vor dem Versuch gut verbracht, der ihn berühmt machte].

According to the Complement Principle, an extraposition is grammatical if either the extraposed phrase governs its antecedent or vice versa. The antecedents do not govern the extraposed phrases in examples (73) and (74), since they are more deeply embedded than the extraposed phrases. Let us then assume that the relative clause may establish a government relation with its antecedent in (77), as required by the Complement Principle. Hence none of the intervening maximal projections may count as barriers for government. The syntactic structure for the ungrammatical (74b), however, is identical to (77) in the relevant details. In order to block (74b), it would be required to assume that one of the intervening maximal projections actually counted as a barrier. Obviously, the conflicting requirements lead to a dilemma here which cannot be resolved by the Complement Principle.

3.1.2.2 G. Müller (1996)

Müller (1996) assumes that extraposition is to be treated as an instance of rightward movement. As such it differs from other movement types in German, which are directed to the left. Rightward movement, but not leftward movement, may circumvent barriers in the movement process.

(78) a. *Der ihn berühmt machte hat er die Zeit vor dem Versuch
the him famous made has he the time before the experiment
gut verbracht.
well spent

b. *Den Platz zu verlassen hat man den Überbringer des Befehls
the place to leave has one the messenger of-the command
beschimpft.
insulted

The ungrammatical examples in (78) illustrate that relative clause adjuncts and nonfinite sentential complements show the same behavior in case of topicalization: neither may be topicalized. Müller (1996, p. 225f.) assumes that extraposition may circumvent a barrier because the extraposed phrase is right-adjoined to a dominating maximal projection. An intermediate adjunction removes the barrier status of the relevant maximal projection Chomsky (1986). Such a circumvention is not possible in the case of leftward movement, and hence the examples in (78) are analyzed as ungrammatical. Following Müller’s lead, example (73b) should receive the analysis in (79). Here, we assume that the PP, being an adjunct, counts as
a barrier for the antecedent-government of the extraposed relative clause. Hence, the relative clause has to be adjoined to the PP, thus opening the barrier.

(79) Er hat [die Zeit vor dem Versuch gut verbracht, der ihn berühmt machen sollte].

Müller’s analysis relies on two hypotheses: First, overt right-adjunction must be considered a grammatical operation in German. The validity of this assumption is required to justify the application of covert right-adjunction in German. Second, the possibility of left-adjunction must be blocked.43 If left-adjunction were a viable option in German, the mechanism which is used to open barriers for extraposition could also be used to open barriers for topicalization. As a consequence, the examples in (78) would be wrongly classified as grammatical. Hence, left adjunction must be excluded. We take it for granted that overt right-adjunction is a viable option in German. But German also shows overt instances of left-adjunction, which are discussed in Abb (1994) under the rubric of DP-internal and intermediate topicalization and scrambling, as illustrated by the data in (80).

(80) a. Das Bild von der Frau gefällt mir.
   The painting of the woman pleases me
b. Von der Frau das Bild gefällt mir.
   Of the woman the picture pleases me
   ‘I like the painting of the woman.’

The topicalizations in (80) show that das Bild von der Frau as well as von der Frau das Bild form a constituent. Following Abb (1994), we may assume that von der Frau has been left adjoined to the maximal projection of the DP das Bild in (80b). Given the existence of data presented in (80), there is no reason to prohibit covert left-adjunction in German. Consequently, if covert adjunction works in the case of extraposition, it has to be accepted for topicalization, too. If covert adjunction, however, can be applied to both extraposition and topicalization, subtle ways of circumventing barriers turn out to be useless, since the ‘exceptions’ seem to apply in all cases.

This conclusion casts serious doubts on Müller’s explanation: it is not constrained enough to block illicit topicalization. But even if we would ignore this conclusion, Müller’s analysis faces the same problems that have been raised against Culicover and Rochemont (1990): if right-adjunction is possible for the well-formed relative clause extraposition in (79), how can the ungrammaticality of the complement extrapositions be accounted for?

3.1.2.3 Semantic origins of configurational prominence

To find a suitable anchor, a nonlocal modifier must be adjoined to a projection in a position which is superior to the position of the element which issues the anchor. The syntactic prominence of the modifier with respect to the modified element can be recast in terms of c-command, as e.g. defined in Reinhart (1983, p. 18).

(81) *C-Command:*

Node A c-commands node B iff the branching node most immediately dominating A also dominates B.

In syntactic terms, the relationship between modifier and modified phrase could be expressed as in (82).

(82) *Generalized Modification (syntactic rendering)*

A nonlocal modifier may modify a suitable antecedent iff

a) the modifier c-commands the antecedent, and

b) there is no sentential barrier intervening between modifier and antecedent.

Such a formulation stands in sharp contrast to approaches by Wittenburg (1987) and (Haider 1996; Haider 1997). It is a common idea of both approaches that the extraposed phrase has to be c-commanded by its antecedent. Actually, Haider (1996) advocates the even stronger position that an extraposed phrase must always be realized as a sister of the verb.

Neither Wittenburg’s nor Haider’s approach can account for the grammaticality of (73) and (74). In these cases, the required c-command relationship between the modified noun phrase and the relative clause cannot be established, as can be illustrated by the schematic representations in (83a), which is our analysis, and (83b), which would incorporate Haider’s requirement that the extraposed phrase is realized as a sister of the verb.

(83) a. Man hat [die Frau des Boten beschimpft, der den Befehl überbrachte.]

\[
\begin{array}{c}
V' \\
\quad V' \\
\quad \quad DP_2 \\
\quad \quad \quad \quad \text{V \, der \ldots \, überbrachte} \\
\quad \quad \quad \quad \quad \text{die Frau \, des \, Boten} \\
\quad \quad \quad \quad \quad \text{beschimpft} \\
\quad \quad \quad \quad \quad \quad \text{DP_1} \\
\end{array}
\]

b.

\[
\begin{array}{c}
V' \\
\quad V' \\
\quad \quad DP_2 \\
\quad \quad \quad \quad \quad \quad \text{des \, Boten \, beschimpft \, der \ldots \, überbrachte} \\
\quad \quad \quad \quad \quad \quad \quad \quad \text{DP_1} \\
\end{array}
\]

---

44 This is explicit in Haider’s (1996, p.259) remark that “[t]he relation between the relative clause and the antecedent is ... not subject to c-command.”

45 Haider (1996) assumes that the extraposed phrase must be realized as a sister of the verb and that an interpretative link between the antecedent and the extraposed phrase can be established if the antecedent c-commands the extraposed phrase. The first condition is met in (83b), but the second one cannot be established.
In both (83a) and (83b), the antecedent of the relative clause (contained in or being identical to DP\(_1\)) is embedded in another DP (DP\(_2\)) and thus cannot c-command the relative clause. This does even hold if the whole DP\(_1\) is taken as the relevant antecedent: The first branching node immediately dominating DP\(_1\) is at least DP\(_2\). But DP\(_2\) does not dominate RP in (83a) nor (83b). This problem would persist if one conceded that it is not c-command but u-command what is at stake here. Again, DP\(_2\) would block a command relationship.\(^{46}\) Hence, the grammaticality of (73) and (74) cannot be derived in Wittenburg’s (1987) or Haider’s (1996) and Haider’s (1997) analysis.

Since the condition on modifier extraposition can actually be reformulated using the definition of c-command, one may ask why we prefer the semantic definition in (58) over the syntactic one in (82). The definition (82) is a natural generalization, but two properties of relative clause extraposition are left unaccounted for. First, it does not explain why the antecedent and the relative clause have to agree. The agreement pattern, however, follows immediately from the identification of anchor and index-handle pair of the relative pronoun, since such an identification requires compliance of \(\phi\)-features. Second, the definition in (82) does not say anything about the semantic effects of the identification. In this sense, the description in terms of c-command is derivative in the present analysis and obscures the reason for the attachment of modifiers. It derives from the requirement of the modifier to attach to a phrase which contains a suitable anchor for identification.

3.1.2.4 The peripheral position of extraposed relative clauses

G. Müller (1996) explicitly addresses why extraposed phrases appear in the right but not in the left periphery of a clause. As was discussed in section 3.1.2.2, his proposal is problematic: contrary to his claim, left adjunction can be observed overtly in German, and hence, the ungrammaticality of (84a) does not necessarily result from Müller’s analysis.

(84) a. *[Den ich gestern getroffen habe], habe ich [den Mann t\(_i\)] gesehen.
   the I yesterday met have I the man seen
   ‘I have seen the man who I met yesterday.’

b. Ich habe den Mann gesehen, den ich gestern getroffen habe.
   I have the man seen who I yesterday met have
   ‘I have seen the man who I met yesterday.’

But still, Müller’s idea to distinguish the ungrammatical (84a) from the grammatical (84b) in terms of movement direction are relevant for the present proposal. Any theory of grammar must cover the contrast in (84) or more generally, the distinction between topicalization (or other instances of leftward movement) and extraposition. Since we do not rely on movement operations, we have to explain in different terms why extraposed relative clauses in German appear in the right periphery. Two aspects have to be taken into consideration.

First, it is generally agreed upon that extraposed phrases occupy a configurationally prominent position. Notable exceptions are the approaches by Wittenburg (1987) and Haider (1996), but both proposals face serious problems, as has been discussed in section 3.1.2.3, and thus these aspects can be neglected.\(^{47}\) Configurational prominence is achieved in movement-based accounts by assuming that extraposed phrases have to govern and hence c-command their traces. In the present proposal, configurational prominence follows from generalized

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\(^{46}\) Reinhart (1983, p. 23) offers a further definition of c-command based on adjunction which still would not establish a c-command relationship between DP and RP in (83a) or (83b).

\(^{47}\) Detailed criticism of Haider’s proposal is found in Büring and Hartmann (1996), which is mostly devoted to showing that extraposed phrases always have to c-command their antecedents. To a certain extent, the analysis of Culicover and Rochemont (1990) does not follow this idea either. In their analysis, elements extraposed from subject position may appear inside VP. This idea will be taken up in section 3.2.
modification for extraposed modifiers. Generalized modification requires that a suitable antecedent is contained in the phrase to which the modifier is adjoined.48 Second, the extraposed phrase must be realized to the right of its antecedent.

The ungrammaticality of (84a) might be accounted for in the present proposal by assuming that topicalization is always an instance of realizing a nonlocal feature, as e.g., described in Pollard and Sag (1994, pp. 161-163). If the relative clause is adjoined to the remaining clause, it does not satisfy the SLASH dependency of the clause and hence, the structure becomes ungrammatical. Basically, such an exclusion of (84a) builds on the premise that adjunction and SLASH realization are not compatible. This account, however, is incomplete and problematic in itself. To begin with, the position in front of the finite verb in German can be filled by other means than SLASH saturation. Particularly prominent are examples of the so-called Vorfeld es, i.e., of an expletive pronoun which may only appear in preverbal position in verb-second clauses.

(85) a. Ich glaube, es standen drei Männer vor der Türe.  
   I believe expl. stood three men in-front-of the door  
   ‘I believe that three men stood in front of the door.’

b. *Ich glaube, drei Männer standen es vor der Türe.  
   I believe three men stood expl. in-front-of the door

If an adjunct could not be ‘base-generated’ in pre-verbal position, adjunct topicalization must be analyzed as dislocation. An immediate disadvantage of such an analysis is its tendency to spurious ambiguities, as is illustrated in (86). The topicalized adjunct may appear from each of the trace positions indicated in (86), but its interpretation remains constant.

(86) a. [PP An diesem Tag] hat t i Ulrich die Vase Claudia geschenkt.  
   on this day has Ulrich the vase Claudia given

b. [PP An diesem Tag] hat Ulrich t i die Vase Claudia geschenkt.  
   on this day has Ulrich the vase Claudia given

c. [PP An diesem Tag] hat Ulrich die Vase t i Claudia geschenkt.  
   on this day has Ulrich the vase Claudia given

d. [PP An diesem Tag] hat Ulrich die Vase Claudia t i geschenkt.  
   on this day has Ulrich the vase Claudia given

On this day, Ulrich gave the vase to Claudia.

In addition, such an account would fall short of examples like (87), where the relative clause is realized to the left of the antecedent but remains in the Mittelfeld, i.e., in a position which is to the right of the verb in second position.

(87) *Ich habe den ich gestern getroffen habe den Mann geschen.
   I have who I yesterday met have the man seen

To sum up, an analysis of modifier extraposition also has to offer a general account for the linearization of the extraposed elements relative to its antecedent. Such an approach should exclude topicalized as well as scrambled relative clauses. As a starting point, it is helpful to understand how G. Müller (1996) distinguishes extraposition (to the right) from topicalization and scrambling (to the left). Basically, G. Müller (1996, p. 224) equates extraposition with rightward movement while topicalization and scrambling are analyzed as movement to

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48 We have not said how configurational prominence is achieved in cases of complement extraposition. If we assume with Keller (1995) and S. Müller (1999) that extraposition of complements is handled by a nonlocal feature called EXTRA which originates in the head whose complement the extraposed phrase is, the prominence of extraposed complements follows from general principles of feature percolation. Cf. also the discussion of example (94) in section 3.2.1.
the left. It is thus the directionality of movement itself which is offered as an account for the contrasts in (84).

Let us generalize G. Müller’s insight slightly and assume that selectional processes take directionality into account. Let us hypothesize that directionality has to be encoded as a general property of grammar. As an illustration, consider the selectional properties of heads in various languages. In English, heads usually select their complement to their right, whereas in German verbal heads select their complements to their left (A, V), while non-verbal heads (N, P) select their complement to their right. Modifiers, such as relative clauses and PPs differ in their modification direction. Certain modifiers, such as intersective PPs, may select a modified element in both directions, as is illustrated in (88), but in German, relative clauses always select the element which is modified to their left. Since the PP may modify both the noun and the verb in (88a, b), these sentences are genuinely ambiguous. If the PP is realized to the left of the noun, however, it can only modify the verb.

(88) a. Er hat wohl den Termin an diesem Tag vergessen.
   He has part. the appointment on this day forgotten
   ‘On this day, he forgot the date./He forgot the date on this day.’
   b. Er hat wohl den Termin vergessen an diesem Tag.
   He has part. the appointment forgotten on this day
   ‘On this day, he forgot the date./He forgot the date on this day.’
   c. Er hat an diesem Tag wohl den Termin vergessen.
   He has on this day part. the appointment forgotten.
   ‘On this day, he forgot the date.’

While a PP may modify a verb to its left or right, it may modify nominal phrases only to its left. Hence, the ungrammaticality of (89), taken from G. Müller (1996, p. 239) is accounted for in the present approach by assuming that the suitable anchor for the PP can only be found in the wrong direction.

(89) *Mit den blonden Haaren hat die Wut des Mannes auf sich
with the blond hair has the rage of-the man on self
mich beeindruckt.
me impressed

Similarly, a relative clause may neither appear in topicalized nor in scrambled position because both positions necessarily block any anchor identification to their left. And hence, (84 a) is excluded on a par with (87).

The inclusion of directionality as a property of modifiers makes an interesting prediction concerning the nature of modifier extraposition. Since modifier extraposition is taken to be adjunction governed by condition (58) and further constrained by restricting the modification direction, we predict that languages which realize relative clauses prenominally should lack relative clause extraposition. As is discussed in Lehmann (1984, p. 206), there is a clear tendency in the languages of the world to allow extraposition if the relative clause is normally realized post-nominally and to block relative clause extraposition if the relative clause is realized prenominally.

To conclude, both the configurational prominence and the position of extrapoed relative clauses in the right periphery is accounted for in the present proposal. Configurational

49 The relationship between directionality and selectional processes such as complementation or modification has been the subject of intermittent debates at least from 1980 onwards in transformational and non-transformational models of grammar. Cf. Stowell (1981) and Gazdar et al. (1985).

50 We ignore the behavior of the small class of postpositions in German. They are non-verbal and still select their complement to the left.
prominence follows directly from the requirement (58). The realization of relative clauses at the right periphery is derived from the selectional properties of relative clauses as post-nominal modifiers.\textsuperscript{51}

3.2 Extraposition, partial VPs and topicalization

3.2.1 Extraposition in partial VPs

German allows the topicalization of partial VPs, i.e. of VPs not containing all arguments of the verb. We can also find topicalized phrases which contain an extraposed phrase, as is illustrated in (90) with complements and (91) with adjuncts.

(90) a. Geglaubt, daß es UFOs gibt, hatte er nicht.
   Believed that expl. UFOs exist had he not.
   ‘He had not believed that UFOs exist.

b. Die Annahme geglaubt, daß es UFOs gibt, hatte er nicht.
   the assumption believed that expl. UFOs exist had he not.
   ‘He had not believed the assumption that UFOs exist.

(91) a. Dem Mann etwas zugeflüstert, der dort steht, hat sie.
   the man something whispered-to who there stands has she
   ‘She whispered something to the man who stands there.’

b. Dem Mann etwas zugeflüstert \textit{mit blonden Haaren} hat sie.
   the man something whispered-to with blond hair has she
   ‘She whispered something to the man with blond hair.’

As has been mentioned in the introduction, a partial VP which contains an extraposed phrase, but not the antecedent of the extraposed phrase, is ungrammatical. The relevant example (17) is repeated here under (92).

(92) *Etwas zugeflüstert, der dort steht, hat sie \textit{dem Mann}.
   Something whispered-to who there stands has she the man

Keeping the contrast between (91a) and (92) in mind, we might demand of extraposed phrases contained in partial VPs that they must not be realized to the left of their antecedents. Although this condition is intuitively compelling, it is unclear how such a condition should be rendered in terms of a formal grammatical description.

In the present framework, the exclusion of (92) is strikingly simple: The VP to which the relative clause is adjoined does not contain a suitable anchor for the relative pronoun. Thus, the identification requirements of the relative clause cannot be met and the structure is ruled out. This is illustrated in (93).

\textsuperscript{51} The present proposal does not cover cases of free relative clauses (i), which also occur extraposed. From our viewpoint, free relative clauses are to be handled as complements. This can be witnessed by the observation that their realization is obligatory, while restrictive relative clauses are realized optionally. Hence example (iii), where the free relative clause is missing, is ungrammatical. Being complements, free relative clauses are not covered by our analysis.

(i) Wer es kaufen will soll das kaufen.
   Whoever it buy wants should that buy
(ii) Das soll kaufen, wer es kaufen will.
    That should buy whoever it buy wants
    ‘Whoever wants to buy it, should buy it.’
(iii) *Das soll kaufen.
     That should buy
From the viewpoint of the present analysis, the ungrammatical example in (93) is just the opposite of the grammatical examples in (13), (14), and (73): While anchors are available in the examples given in (13), (14), and (73), there are no available anchors for the relative clause in (93).

Here we find an interesting parallel construction with complement extraposition and one could argue that such cases show the same characteristics as example (93).52

(94) *Geglaubt, daß zwei und zwei vier ist, hat er die Annahme.

believed that two plus two four is has he the assumption

‘He has believed the assumption that two plus two equals four.’

We assume a different analysis of (94), though. The verb *glauben* selects either a nominal or a sentential object, but not both. Let us assume that an extraposed complement in any case originates on the COMPS list of a head. Given that the extraposed clause is analyzed as an argument of *glauben*, the feature specification of the topclized phrase will include the information that the complement of *glauben* has already been realized. The DP *die Annahme*, on the other hand, can only be analyzed as a complement to glauben as well. If this assumption is taken, we must assume that the trace (of the topclized phrase) includes the specification that its complement has not been realized yet, while the specification of topicalized phrase includes the specification that the complement has already been realized. Given that an identity between the feature specification of the topicalized phrase and the trace is required in the relevant respects, the two contradicting specifications immediately lead to the exclusion of (94).

3.2.2 Alternative analyses

Büring and Hartmann (1996) have presented the ungrammatical example in (93) against Haider’s (1996) conjecture that an extraposed relative clause must be the most immediate sister of the verb. In this case, the verb and the relative clause form a constituent to which the complements of the verb – including the one which serves as the antecedent of the relative clause – are added. If this assumption were correct, it would remain unclear why a topclization of this constituent, as given in (93) should lead to ungrammaticality. Following Büring and Hartmann (1996), we can assume that the ungrammaticality of (93) presents further evidence for the hypothesis that an extraposed relative clause must be attached to a phrase containing a suitable anchor and against the assumption that the antecedent of the relative clause must c-command the extraposed phrase.

In their approach, Büring and Hartmann (1996) try to derive the ungrammaticality of (93) from more general constraints on movement. Büring and Hartmann (1996, p. 197) assume that (93) is ungrammatical, because the extraposed relative clause does not c-command its

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52 I would like to thank Joachim Jacobs for pointing this out to me.
trace in the antecedent-DP. In order to arrive at this conclusion, they suggest that the antecedent of the relative clause, the dative DP *dem Mann*, has been moved out of VP before it has been topicalized. The movement of the antecedent is considered an instance of A-movement. According to Büring and Hartmann (1996), A-movement cannot be undone by reconstruction. Consequently, the dative DP has to remain outside the core VP after the VP has been reconstructed, as indicated in (95).

(95) \[
[\text{VP } \text{dem Mann } [\text{VP etwas zugeflüstert der dort steht}]]
\]

In the configuration in (95), the relative clause obviously does not c-command the trace contained in the antecedent-DP. It should be mentioned, however, that it is not c-command but m-command which is the necessary relation for the establishment of antecedent government in Chomsky’s (1986) sense between the relative clause and its trace in the scrambled DP. Such an m-command relation is clearly given between the relative clause and the trace contained in the DP, since the latter has been adjoined to the VP. In order to conclude their argument, Büring and Hartmann (1996) would have to show that the DP containing the trace counts as a barrier for antecedent government.

Assuming that such an account can be presented, it rests on the conjecture that A-movement cannot be reconstructed, i.e. that the scrambled NP cannot be realized in its base position. This hypothesis, however, is quite problematic. In particular, it is well-known that A-movement can and must be undone in order to derive narrow scope readings of subjects in raising contexts, as is illustrated in (96).

(96) A unicorn seems [\text{[S } t_1 \text{ to sit in the garden]} \Rightarrow \text{LF} \Rightarrow \text{[S a unicorn to sit in the garden] seems}]

In May (1985), a narrow scope reading of the subject is derived by lowering the A-moved NP into its D-structure position. As long as lowering is not sharply distinguished from A-movement reconstruction, it cannot be argued that this type of reconstruction is generally forbidden.

3.2.3 Extraposition related to partial VPs

German and English differ in that in English extraposed phrases must not take an antecedent contained in a VP if the VP is topicalized but the extraposed phrase is not. Hence, an English example like (18b), repeated here under (97b) is ungrammatical. The contrary is possible in German, as has been illustrated in and (91) and (97b).

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53 Given the broad variety of definitions (and exceptions) for antecedent government originating with Chomsky (1986), I was not able to determine whether the assumption that the scrambled NP counts as a barrier can hold or not. According to Gereon Müller (p.c.) such a characterization of barrierhood can be given. Since I assume a rather different explanation of the pertinent phenomenon, I have not tried to spell out such a barriers analysis.
(97) a. Mit dem Mann gesprochen hat sie der dort steht.

She spoke with the man who stood there.

b. *The governor said he would meet a man at the party who was from Philadelphia, and meet a man at the party he did who was from Philadelphia.

Pollard and Sag (1994, pp. 161-165) assume that topicalization results from SLASH projection and realization: the topicalized phrase is identical in its relevant attributes with the SLASH value of the syntactic sister of the topicalized phrase. Schematically, this analysis is illustrated in (98).

(98) \[
\begin{array}{c}
S\\
VP^{[\text{LOCAL}]}\\
\end{array}
\]

For English, we follow the analysis suggested in (98) closely, yet for German, we assume that topicalization structures are actually instances of the head specifier schema, and not of the head filler schema. This means that topicalization structures in German bear a close resemblance to RPs, the main difference being that topicalization structures do not – and in fact must not – introduce a REL dependency. This analysis of a German topicalization structure is given in (99).

(99) Mit dem Mann gesprochen hat sie.

The main empirical difference between the English topicalization structures in (98) and its German counterpart in (99) concerns the so-called verb-second phenomenon: the topicalized constituent is related to a fronted verb in German, but not in English. We model this difference by assuming that the verb in second position identifies the SLASH value inherited from its sister with its own SPR value, and consequently realizes the missing constituent as a specifier, and not as a filler. The major difference between a head filler structures on the one hand and a head specifier structure on the other hand is that the latter structure involves a relationship between the non-head daughter and a lexical head daughter which introduces the SPR dependency. Such a relationship does not have to be established in the former structure, and this difference will be crucially exploited in the following. Three different analyses can be envisaged to explain the grammaticality of (97a). These are depicted in (100).
At first sight, the analysis in (100c) seems to be the most plausible one: if the adjoined RP requires an anchor that originates within the topicalized VP, it can only be adjoined to the sentence after the topicalized VP has been realized. This analysis, however, is untenable in the present proposal. Recall that the Anchors Projection Principle in (65) is constrained so that anchors which are specified as TO-BIND are not allowed to further project. This cancellation applies to $S_1$ in (100c), since $S_1$ is an instance of the head specifier schema. Following the Anchors Projection Principle, the anchors available inside the topicalized VP are not available outside $S_1$. Hence the analysis in (100c) has to be dismissed.

Next, we can consider the analysis in (100a), where the RP is adjoined to the trace of the topicalized VP. This analysis has to be excluded on empirical and conceptual grounds. To begin with the empirical reasons, if RP were adjoined to traces, the phrase to which the RP has been adjoined could be dislocated whereas the RP remained in situ. Actually, this is the basic idea behind analyzing (97a) as in (100a). If this analysis would be generalized to all cases of topicalization, we could not account for the blatant ungrammaticality of examples like (101).

(101) *[ Den Mann], habe ich [t, den ich gestern traf] gesehen.
the man have I who I yesterday met seen

The derivation of (101) could not be blocked if the analysis in (100a) would be assumed. Clearly, then, this analysis should be excluded. Further support for such a ban can be derived from the feature architecture advocated here. An RP requires an anchor for identification, but anchors form part of the NONLOCAL attributes of a sign. A filler of the corresponding SLASH, however, does only share the LOCAL attributes with the SLASH. The same consideration applies of the SLASH is eventually identified with a specifier. An RP could thus only identify anchors which were stranded in the trace but this anchor could not be identified
with an anchor contained in the filler or specifier. To block an accidental identification of the RP’s index-handle pair with a ‘stranded’ anchor in a trace, we assume that traces never contain anchors, as is expressed in the Trace Conjecture in (102).

(102) Trace Conjecture:  
Traces do not contain anchors.

Having excluded the analyses in (100a) and (100c), we are left with the analysis in (100b). This analysis, however, seems to be impossible for the very reasons which have led to the exclusion of (100a) and (100c): if the trace does not contain an anchor, and the anchors of the topicalized VP are isolated in the topicalized phrase, the RP in (100b) cannot find an anchor for identification. Hence, (100b) becomes as untenable as (100a) and (100c). Having exhausted each possible analysis of (97a), we seem to be forced to wrongly conclude that this example is actually ungrammatical, and moreover, that extraposed RPs may never modify a topicalized phrase.

To circumvent this dilemma, we will exploit the relationship between the specifier and its head. Since the specifier is selected by the lexical head, and hence, the pertinent attributes of the specifier are available in the specification of the lexical head, we will assume that a lexical head which selects a specifier has access to the anchors of the specifier. In itself, this is a stipulation. But this stipulation has some interesting consequences.

The first consequence is that (97a) can be analyzed as grammatical and receives the analysis in (100b). If the anchors of the specifier are present in the lexical head that introduces the specifier, the RP can be adjoined to the phrase which results from the combination of the verb in initial position with its complements. The RP can actually only adjoin to this phrase if it has to modify the topicalized phrase because the Anchors Projection Principle forces the cancellation of the anchors of the topicalized phrase when it is combined with the remainder of the clause.

By the same line of reasoning, we can account for the attachment ambiguity in the following example.

(103) Den Termin verschieben mußte er am Mittwoch.
    the appointment re-schedule had-to he on Wednesday
    ‘He had to re-schedule the appointment on Wednesday.’

In (103), the temporal PP may either modify the modal verb, or the complement verb, or even the DP complement of the complement verb. Since the PP may gain access to the anchors of the topicalized phrase, the ambiguity is predicted.

The next consequence concerns the ungrammaticality of (97b). If (97b) is the result of a combination of head and filler, a structure similar to (100b) cannot be offered. The two remaining analyses in (100a) and (100c) are excluded independently, as explained above for (97a). Hence, (97b) is correctly analyzed as ungrammatical since the anchors of the topicalized phrase are not available for the extraposed modifier. The identification requirement of the RP can thus not be satisfied.

A further consequence concerns the following contrast: although it has remained hitherto unnoticed, English topicalization structures differ from direct wh-question formation in that in the latter case, extraposed phrases can be related to the fronted wh-phrase. This observation is illustrated in (104).

(104) a. Which argument, do you know that, Sandy thought was unconvincing?
    b. *Micro-brews, I like that, are located around the Bay-Area.

(105) a. Which argument that Sandy thought was unconvincing do you know?
    b. Micro-brews that are located around the Bay-Area, I like.
There is one important difference between (104a) and (104b): in (104a), the fronted phrase bears a relationship to a lexical head, but such a relation cannot be established in (104b) because English topicalization structures differ from English wh-questions in that the latter but not the former requires auxiliary inversion. If we conclude that wh-question formation in English is actually an instance of residual verb-second, it seems plausible to further assume that the relationship between the fronted phrase and the lexical head in (104a) is the same as the relationship between the topocalized phrase and the lexical head in (97a), viz. the one between a specifier and the head which selects the specifier. As we have explained, a similar relationship cannot be established in (104b) or (97b), which are excluded accordingly.

Note finally that this analysis also offers an explanation for the observation made in Culicover and Rochemont (1990, p. 36f.) that extraposed relative clauses can be realized as part of VP although they are associated with the subject – which is not realized inside VP. This possibility would follow from the further assumption that the relation between the subject and the verb which selects the subject again is a relationship between a lexical head and its specifier. In this case, the anchors of the subject are present in the verb and hence an RP could be realized inside VP but still modify the subject.

We may hence conclude that heads which have a non-empty SPR attribute share the anchors of their specifiers. Hence an RP can be adjoined to a phrase which contains a lexical head selecting for a specifier, and modify the specifier. The consequence of this assumption together with the Trace Conjecture is that the contrast between (97a) and (97b), as well as the contrast between (104a) and (104b), can be derived from the present analysis.

3.3 Word order and bound variable anaphora
3.3.1 Boundary variable anaphora

The examples in (106) show that a quantifier may bind a pronoun contained in an RP if the antecedent of the RP is realized to the right of the quantifier. In this case, the pronoun acts as a bound variable anaphor (Reinhart 1983). As has been discussed in Büning and Hartmann (1996, p. 194), Haider (1996, p. 260), and Haider (1997, p. 132), a bound variable reading of the pronoun in the RP is precluded if the antecedent of the RP is realized to the left of the quantifier as in (106b).54

(106) a. Wir haben niemandem, die Fragej gestellt, auf diej erj sich
     vorsehert hatte.
     we have no-one the question asked on which refl.
     prepared had
     ‘No one was asked the question that he expected.’

b. *Wir haben die Fragej niemandem, gestellt, auf diej erj sich
     vorsehert hatte.
     we have the question no-one asked on which refl.
     prepared had

The behavior of bound variable anaphora is governed by the Quantifier Binding Condition. This condition has to take care of two aspects of bound variable anaphora: First, pronouns must become available for binding through a quantifier. To guarantee this, we assume that pronominal indices bear a similarity to anchors in that they freely project in a syntactic structure. Second, it must be determined which pronominal indices may actually be identified with the BOUND VARIABLE value of the quantifier. This identification process differs from ‘ordinary’ binding in that it is constrained configurationally: A quantifier may bind a vari-

54 This observation actually goes back to Werner Frey.
able by selecting an index from the set of free indices given at the syntactic sister of the quantifier, i.e. the head daughter. Once the index has been selected as a bound variable, it is removed from the set of free indices, thus blocking a double binding of the index. Since a quantifier may only select from variables which are present at the syntactic sister of the quantifier, the quantifier must always be configurationally superior to the variable which is bound by it. The Quantifier Binding Condition covers these requirements.

(107) Quantifier Binding Condition
   a. The set of free indices of a phrase is the union of the sets of free indices of the daughters of the phrase, except for those indices which have been bound.
   b. In a headed structure, a quantifier may only bind elements from the set of free indices of the head daughter.

Given this proviso, let us now consider the syntactic structure of the examples in (106). Kiss (2001) suggests that the arguments of the verb may be discharged in any order. Hence the various serializations are directly reflected in the layered structure of the local binary trees, as is illustrated for (106a) in (108). In (108) and the following illustrations, the relevant pronominal index is given as \( z \). Its projection is represented by adding a second set to the relevant phrases. The binder of the index either receives the index as a subscript, if binding is possible, or just a question mark, of binding is impossible according to the Quantifier Binding Condition.

(108) niemandem die Frage gestellt, auf die er sich vorbereitet hatte

\[ \begin{array}{c}
\text{VP} \\
\text{NP}_{\text{OBJ}} \quad V' \{ z \} \{ z \} \\
\text{niemandem}_z \\
\text{NP}_{\text{DOBJ}} \{ z \} \\
\text{die Frage} \\
\text{gestellt} \\
\text{auf die er}_z \ldots \text{hatte}
\end{array} \]

---

55 As a consequence of (107), we predict the impossibility of split readings of bound variables, i.e. the ungrammaticality of a split reading of they in (i), as opposed to a split reading emerging from ordinary binding in examples like (ii).
(i) *Every man, told a woman, that they[j,i] should leave.
(ii) John, told Mary, that they[i,j] should leave.

Depending on the formulation of Principle A of Binding Theory, even indices originating from reflexives may belong to the set of free indices. This may happen in English, where certain reflexives are assumed to be exempt from Principle A (cf. Pollard and Sag (1994)).

56 Following Copestake et al. (1997, p. 12), an index is considered as being bound iff
   a) it is the value of the BOUND VARIABLE attribute of a quantifier, and
   b) for any relation \( r \) whose handle is \( h' \), if the index is the value of some attribute slot of \( r \), then \( h' \) is subordinated to \( h \).

57 This formulation of the Quantifier Binding Condition correctly classifies examples like (i) as ungrammatical in German. As is well known, examples of this type – as well as cases of inversely linked quantifiers (May 1985) – are grammatical in English, where a different formulation of the Quantifier Binding Condition would be required.
(i) *Jeden Mannes Mutter mag ihm.
   every man's mother loves him
   'Every man's mother loves him.'

58 For further discussion of German clause structure and scope, the reader is referred to Frey (1993) and Kiss (2001).
Since the RP must be attached to a phrase which contains a suitable anchor for the relative pronoun. This condition is satisfied in (108). In addition, the structure in (108) also satisfies the Quantifier Binding Condition given in (107), since the pronominal index of the variable is contained in the syntactic sister of the quantifier.

A simultaneous satisfaction of the two aforementioned conditions is precluded in (106b). Two alternative analyses are possible for (106b), as given in (109) and (110). Neither of the two, however, can meet both requirements imposed by the Quantifier Binding Condition and the RP.

(109) *Wir haben die Frage niemandem gestellt, auf die er sich vorbereitet hatte.

(110) *Wir haben die Frage niemandem gestellt, auf die er sich vorbereitet hatte.

In (110), the RP is directly combined with the verb. Here, the Quantifier Binding Condition is met: the quantifier has access to the pronominal index contained in the RP since the quantifier is configurationally superior to the RP. However, the identification requirement imposed by the RP cannot be satisfied in (110). The only available anchor for the RP in (110) is the one of the verb, which obviously is of the wrong type. In (109), the RP is adjoined to the VP. In this configuration, the identification requirement of the RP can be met since the anchor of Frage, i.e. \(\{x,1\}\), is available. In this structure, however, the quantifier in the lower V' does not have access to the pronominal index contained in the RP. Hence, the Quantifier Binding Condition is violated.

One could argue that the ungrammaticality of (106b) is either due to scopal constraints on word order or to a constraint which prohibits simultaneous scrambling and extraposition.
That neither scopal constraints nor a prohibition of extraposition from scrambled phrases are at stake here, can be illustrated by (111) and (112).59

(111) a. Wir haben niemandem die Frage gestellt, die jeder we have no-one the question asked which everybody erwartet hatte. expected had
b. Wir haben die Frage niemandem gestellt, die jeder we have the question no-one asked which everybody erwartet hatte. expected had
‘No one was asked the question which was expected by everybody.’

(112) Es erwies sich, daß sein Herz es war, dessen Schlag er außer sich hörte. it turned-out refl. that his heart it was whose beat he outside-of refl. heard
‘It turned out that it was his heart of which he heard the beats outside of him.’

The examples in (111) show that a reordering of the quantifier does not affect the grammaticality of the sentences if no bound variable anaphora reading is induced. The example in (112) further supports our assumption that the ungrammaticality of (106b) is due to a violation of identification requirements: here, the antecedent of the RP – an object – is realized to the left of a weak pronoun, which is the subject of the embedded clause. We may thus conclude that extraposition from dislocated elements is generally possible in German. The ungrammaticality of (106b) must not be derived from a general ban on either extraposition, or scrambling of quantifiers, but derives from a violation of either the Quantifier Binding Condition or Generalized Modification.

For some speakers of German, the contrast in (106) seems to vanish if the binder is a universal quantifier, as illustrated in (113).60

(113) a. Wir haben jedemi die Frage gestellt, auf die er sich vorbereitet hatte. we have every-one the question asked on which he refl prepared had
b. Wir haben DIE FRAGE jedemi gestellt, auf die er sich vorbereitet hatte. we have the question every-one asked on which he refl prepared had
‘Everyone was asked the question that he expected.’

The proposed grammaticality of (113b), which requires putting stress on the scrambled constituent, as indicated through capitalization, stands in stark contrast to the ungrammaticality of (106b). Now since the latter does not even allow a bound variable reading if the scrambled constituent is focused, the stress pattern in (113b) seems to play a secondary role.61 If this assumption is correct, the contrast between (106b) and (113b) must be derived from different properties of the quantifiers involved, a negative one in (106b), and a universal one otherwise illicit readings.

59 The example (112) has been taken – in slightly edited form – from Thomas Mann’s Zauberberg (The Magic Mountain, Frankfurter Ausgabe, p. 127).
60 I would like to thank an anonymous reviewer for pointing this out to me.
61 That stress placement may interfere with scope determination and variable binding has been discussed in Williams (1988, p. 143), Frey (1993, p. 83), and Krifka (1998, p. 102), among others. Frey (1993, pp. 176-179) has suggested minimizing the influence of stress patterns by putting stress on the verb in second position. According to Frey, such a stress pattern makes it impossible to impose additional stress patterns that would allow the derivation of otherwise illicit readings.
in (113b). Before jumping to the conclusion that the latter example actually violates the Quantifier Binding Condition, it should be kept in mind that we have followed Reinhart (1983) in assuming that syntactic conditions on variable binding can only apply to cases where variable binding follows configurational patterns. In this sense, the Quantifier Binding Condition does not cover cases of so-called dynamic binding – also known as donkey anaphora (cf. Kamp and Reyle (1993); Huang (1996)).62 A case of dynamic binding is given in (114).

(114) Jeder Gast, kennt die Regeln. Wenn er, sie nicht einhält, ist er selbst schuld.

‘Every customer knows the rules. If he them not obeys is he himself guilty.’

Universal quantifiers differ from negative ones in allowing dynamic binding. This is further illustrated by the ungrammaticality of (115).

(115) *Niemand, kennt die Müllers. Wenn er, sie anspricht, stell sie ihm vor.

‘No one knows the Müllers. If someone starts talking to them, introduce the Müllers to him.’

Given that dynamic binding is impossible with negative quantifiers, but well-attested with universal ones, it seems plausible to assume that the contrast between (106b) and (113b) is not one of variable binding, but one of dynamic binding in (113b). Dynamic binding – by its very nature – is not catered for by the Quantifier Binding Condition. Hence, it does not make any prediction pertaining to readings which are derived from dynamic binding, as in (113b). It makes, however, strong predictions in case where dynamic binding is not available, as in (106b), the example being correctly classified as ungrammatical. This conclusion is further supported by cases of implicit variable binding, as illustrated in (116). Again, dynamic binding becomes impossible, if a quantifier does not bind an explicit, but an implicit variable, as e.g. issued by ein anderer (someone else).

(116) a. Wir haben jedemi, die Frage, gestellt, auf die, ein anderer, ausgewählt
we have every-one the question asked on which an he chosen
hatte.

had

‘Everyone was asked a question which had been chosen by someone else.’

b. *Wir haben die Frage, jedem, gestellt, auf die, ein anderer, ausgewählt
we have the question every-one asked on which an he chosen
hatte.

had

The impossibility of (116b) is directly derived from the Quantifier Binding Condition together with the identification requirement for RPs, as has been already discussed for example (106b).

It should be noted that the possibility of variable binding is not only restricted by word order variation, but also by topicalization, as is illustrated in (117).

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62 I would like to thank Winfried Lechner for pointing out the relevance of dynamic binding.
While the topicalization of the binding quantifier does not affect variable binding (117a), a topicalization of the antecedent of the RP yields an ungrammatical result if the variable binding into the RP should be retained, as is illustrated in (117b). The analysis of topicalization presented in section 3.2.3 offers an immediate explanation of this contrast. Since traces do not contain anchors, and relative clauses must not modify traces, the RP has to be adjoined to the verb-first clause *haben wir niemandem gestellt* in (117b) in order to satisfy the identification requirement of the relative pronoun. In this position, the RP gains access to the anchor of the topicalized phrase, yet the quantifier niemandem cannot access the variable contained in the RP. The example is consequently analyzed as ungrammatical. In (117a), the RP can adjoin to a phrase contained in the verb-first clause *haben wir die Frage gestellt* and satisfies the identification requirement of the relative pronoun. What is more, the quantifier in clause-initial position may access the pronominal index contained in the RP, hence satisfying the Quantifier Binding Condition as well.

### 3.3.2 Variable Binding, complement and modifier extraposition

The example in (118) poses an interesting problem for the present analysis. The adjoined RP occupies a position that is configurationally superior to the quantifier. The extraposed complement clause can either be adjoined to the same phrase, or to the phrase immediately dominating the extraposed RP.

(118) *Man merkte es jedem an, der daran teilnahm, daß er sich langweilte.*

'It became apparent that everyone who participated was bored.'

These two options are represented in (119).

(119) a. ![Diagram](image1)

b. ![Diagram](image2)

In either case, variable binding in the extraposed complement clause should be precluded, since the quantifier does not occupy a position that is configurationally superior to the one of the variable. Yet, the grammaticality of (118) seems to contradict this assumption.

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63 I would like to thank an anonymous reviewer for pointing this out to me.
This problem is different from the one discussed in the previous section: the grammaticality of (118) cannot be derived from dynamic binding. If the universal quantifier in (118) is replaced by a negative one, as in (120), the grammaticality is retained.

\[(120)\text{ Man merkte es niemandem an, der daran teilnahm, daß er sich langweilte.}\]

\[\text{one felt it no-one pref. who in-that participated that he refl. bored.}\]

‘It became apparent that no-one who participated was bored.’

The problem can neither be solved by assuming that the extraposed complement is subject to reconstruction. Following the assumption that the reconstruction can only take place into the domain of the antecedent of the dislocated phrase (or into the position of its trace), the complement clause would still be realized in a position that is configurationally superior to the quantifier. This is so since the correlate of the extraposed complement – the pronoun \(es\) – is realized to the left of the quantifier.\(^{64}\) Given these conclusions, the grammaticality of (118) and (120) could be derived by either sacrificing the Quantifier Binding Condition, or the identification requirement for RPs. We think, however, that there is good reason to retain both, and consequently to derive the grammaticality of these examples from other, potentially extra-grammatical factors. Let us begin by assuming that the Quantifier Binding Condition actually does not hold and see which consequences can be derived from proposing that a quantifier does not have to occupy a position which is configurationally superior to the position of the variable. Consider the examples in (121).

\[(121)\text{ a. *Er stellte seiner Partnerin jeden Tänzer vor.}\]

\[\text{He introduced his partner every dancer pref.}\]

\[\text{b. Er stellte jeden Tänzer seiner Partnerin vor.}\]

\[\text{He introduced every dancer his partner pref.}\]

‘He introduced every dancer to his partner.’

If the Quantifier Binding Condition is assumed, the grammaticality of (121b), as well as the grammaticality of (121a) does not come as a surprise.\(^{65}\) It is only in (121b) that the quantifier is configurationally superior to the variable. This conclusion is shared by Haider (1996, p. 260f) who assumes “that variable binding is a genuine semantic relation conditioned by a syntactic configuration: if a DP is in the scope of a quantifier in the semantic representation, this DP must be c-commanded by the quantifier in the syntactic representation.”

Given the obvious absurdity in assuming that the Quantifier Binding Condition does not hold, let us explore once again the consequences of dropping the identification requirement for RPs expressed in (58). As an alternative to (58), one could either take the position of Culicover and Rochemont (1990) that either the extraposed RP has to be superior to its antecedent, or vice versa, or the position of Haider (1996) and Haider (1997) that the antecedent must be configurationally more prominent than the extraposed phrase.

If these positions were taken, the grammaticality of (12), (13), (14), and (18a), as well as the ungrammaticality of (17) and (19b) poses an immediate challenge. Since we have already discussed the cases of (12), (13), (14), and (17) at length, let us concentrate on (18a) and (19b) here.

If we maintain standard assumptions about (18a), this example should be ungrammatical on both accounts. Under Haider’s view, the extraposed RP forms part of the constituent that

\(^{64}\) One could even argue that a literal reconstruction is impossible since the correlate \(es\) occupies the landing site of the extraposed complement. Within HPSG, however, the effect of reconstruction could be achieved by making available the pronominal indices of the extraposed complement in the representation of the corollary – just like the subject of a raising verb, which is actually represented as a subject of the raising verb complement as well (cf. Pollard and Sag (1994)).

\(^{65}\) As has already been pointed out by Frey (1993), the ill-formedness of (121a) cannot be derived from the assuming that this example violates the Weak Crossover Condition. If this were the case, (121b) should be ungrammatical as well.
has been topicalized. Under the analysis of Culicover and Rochemont (1990), the extraposed RP could only be adjoined to the complete sentence to satisfy the Complement Principle. As we have shown in section 3.2.3, however, an adjunction to the sentence does not account for the upward bounding of extraposition.

The grammaticality of (18a) hence remains a mystery if (58) is given up. With respect to (19b), both approaches falsely predict its grammaticality. If the extraposed RP is realized as a sister of the verb, as in Haider’s analysis, it is both inferior to the quantifier and its antecedent. Hence, the Quantifier Binding Condition is not violated and (19b) should be fine.66 The same conclusion follows if the Complement Principle is assumed. To put it in other words: if the grammaticality of (118) and (120) is derived from relinquishing either the Quantifier Binding Condition or the identification requirement for RPs, the ungrammaticality of (19b) cannot be derived.

This brief discussion should have made clear that both the Quantifier Binding Condition and the condition (58) are justified on the basis of a broad range of data. Still, we must admit that the grammaticality of (118) and (120) is not accounted for. However, it seems that additional factors determine the grammaticality of these examples. This conclusion can be illustrated by (122). If we assume that the quantifier has configurational access to the variable in (118) and (120), the quantifiers should also have access to the variables in (122), and yet both examples are ungrammatical.

(122) a. *Mindestens eine Frau i merkte es jedem j an, die i daran teilnahm, daβ er i sich langweilte. 
   at-least one woman felt everybody pref. who in-that participated that he refl. bored.
   b. *Mindestens eine Frau i merkte es niemandem j an, die i daran teilnahm, daβ er i sich langweilte. 
   at-least one woman felt nobody pref. who in-that participated that he refl. bored.

The examples in (122) differ from the ones in (118) and (120) in that the antecedent of the RP – and hence the relative pronoun – differs in gender from the pronoun bound by the quantifier. In (122), it is hence not the quantifier which serves both as an antecedent of the RP and a binder of the variable. But configurationally, the examples in (122) are analogous to the ones in (118) and (120): in all cases, the quantifier is realized in a position that is inferior to the position of the extraposed complement. It seems then that the grammaticality of (118) and (120) is less a question of configuration, but at least partially also a question of agreement. We may tentatively assume conclude that the data in (118) and (120) actually pose a problem to the present analysis, as well as to its competitors, and leave its integration to future research.67

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66 As has already been pointed out by Büning/Hartmann (1996, p. 192), Haider’s approach faces additional problems with examples like (i), which is taken from Reinhart (1983, p. 49). If a configurational binding theory is assumed, (i) is falsely classified as violating principle C of Binding Theory.
(i) Nobody would ever call her before noon who knows anything about Rosai’s weird sleeping habits.

67 The same conclusion seems to hold for result clauses (so-daß-clauses), as is illustrated in (i) and (ii): if the variable bound by the quantifier agrees with the relative pronoun, the example is grammatical, but without agreement, the example becomes ungrammatical. Again, we leave this issue to future research. I would like to thank an anonymous reviewer for drawing my attention to these constructions.
(i) Die Frau hat jeden, so angeblickt, der zu ihr kam, daß er rot wurde.
   the woman has everyone so stared-at who to her came that he red became
   ‘The woman looked at everybody who came to her so that he blushed.’
(ii) Die Frau hat jeden, so angeblickt, die auf die Kinder aufpasste, daß er rot wurde.
   the woman has everyone so stared-at who for the children cared that he red became
   ‘The woman who took care for the children looked at everybody so that he blushed.’
3.3.3 Problems of phonological extraposition, stylistic movement and LF movement

The preceding discussion should have made evident that extraposition must not be treated as a phonological process. Phonological analyses of extraposition, i.e. analyses that assume that extraposition (and similarly, scrambling) is a stylistic operation that does not affect the syntactic structure, cannot explain the intricate interactions between extraposition and word order variation discussed in the previous sections. Still, extraposition has recently been analyzed in these terms within linearization-based approaches in HPSG (cf. Kathol and Pollard (1995); Kathol (2000)). Linearization-based HPSG assumes a distinction between tecto-grammar, i.e. syntactic structure, and pheno-grammar, linear appearance. Simplifying somewhat, tecto-grammar feeds into semantic interpretation while pheno-grammar feeds into phonetic interpretation. Kathol and Pollard (1995) analyze extraposition as a pheno-grammatical operation. Reape (1994), using a similar framework, assumes that word order variation between the arguments of the verb is also to be treated as a pheno-grammatical process. If these assumptions are combined, the contrast in (106) obviously cannot be accounted for: in these frameworks, the syntactic structures of (106a) and (106b) do not differ from each other, the differences between these examples being due to pheno-grammatical operations. I have refrained from spelling out the exact analysis of examples like (106a) and (106b) in Kathol’s framework because Kathol (2000) does not discuss the relevant details. Although Kathol (2000) remains silent about scrambling in German, Reape (1994) and Crysmann (2000) assume an analysis of scrambling where scrambled arguments are not dislocated in syntax. If syntactically neither the relative clause nor the quantifier is dislocated, the contrast between (106a) and (106b) cannot be explained if one assumes that only tectogrammatical structure feeds semantic interpretation. One solution would offer itself in retreating from this assumption. As a consequence, however, one of the building blocks of this framework would have to be relinquished.

The examples discussed in the previous section also cause obvious problems for approaches that treat scope and variable binding at the level of logical form. If we assumed a quantifier raising (QR) analysis of quantification, (106b) would receive the LF representations in (123), where the quantifier is adjoined to VP. Note, however, that the same considerations would apply if the quantifier was adjoined to S. Adjunction to S and VP at the level of logical form is admitted by May (1985) and Aoun and Li (1993). Here, $t_z$ is the trace of the LF-moved quantifier niemandem.

(123) *Wir haben die Frage niemandem gestellt, auf die er sich vorbereitet hatte.

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68 Similar arguments against treating extraposition as a phonological process have been raised by Culicover and Rochemont (1990) within Government-Binding Theory.

It is obvious that the quantifier c-commands the variable pronoun contained in the RP in (123). It is irrelevant in this case whether the relative clause is still in extraposed position at logical form, or has been reconstructed into its ‘base’ position with the NP die Frage. The conclusion to be drawn here is that quantifier raising is not sufficient to block ungrammatical bound variable anaphora readings.

In the present analysis, no such problem emerges: The quantifier is not raised to an A’-position but must select the pronoun to be bound as one of the anchors of its syntactic sister. Given the analysis of relative clause extraposition presented, the relevant anchor is not given in the syntactic sister of the quantifier and thus the example is correctly rendered ungrammatical.

4. Conclusion

We have discussed three seemingly unrelated properties of extraposed relative clauses (and other intersective modifiers) in German:

• Extraposed relative clauses seemingly violate barriers for (or other constraints on) movement.
• Extraposed relative clauses may only form part of a partial verb phrase if their antecedent does, too.
• Extraposed relative clauses interact with variable binding.

These properties have been described as consequences of the assumption that extraposed relative clauses do not differ in their modification requirements from non-extraposed relative clauses: Both extraposed and non-extraposed relative clause can only be adjoined to a phrase that contains a suitable antecedent for the relative clause. Suitable antecedents for relative clauses are index handle pairs, so-called anchors, which are issued when a noun is introduced into a syntactic structure. Anchors may percolate freely within a clause and will be picked up by extraposed and non-extraposed relative clauses. Since modifier extraposition is not analyzed as movement, the apparent violation of movement constraints does not turn out to be a surprise any longer: As long as no sentence boundary is crossed, a relative clause has access to all anchors whose origin agrees in number, person, and gender with that of the relative clause.

That an extraposed relative clause cannot be topicalized within a partial VP if the antecedent of the relative clause is not contained in the partial VP follows from the same considerations: Since the present approach does not assume reconstruction of movement, an extraposed relative clause which is adjoined to a partial VP must obey the same constraints as any other relative clause: A suitable anchor must be present in the VP. In describing the ungrammaticality of the pertinent example we have thus abstracted away from the context in which the relative clause is realized. It is not the partial VP that is relevant for the ungrammaticality, but the simple fact that the phrase to which the relative clause has been adjoined does not contain a suitable anchor.

The analysis also offers an account for the contrast between German and English VP topicalizations, where the extraposed RP remains outside the VP. In German, the RP may still modify VP-internal material. We have derived the impossibility of this option in English from the loss of verb-second. While verbs in second position share the anchors with their specifiers, the anchors are not available in case of topicalization without a verb-second construction.
Finally, the interaction between bound variable anaphora and anchor identification has been covered in section 3.3. A quantifier has to occupy a configurationally prominent position if this quantifier should bind variables. An RP must occupy a configurationally prominent position to gain access to its anchor. These requirements can be met in parallel, but not necessarily. Variation in word order and topicalization lead to configurations where one of the two requirements is violated if the other one can be met. Consequently, bound variable readings are precluded in these cases.

References


