Abstract:
Extraposed relative clauses pose certain problems for movement-based analyses. They seem to be insensitive to island constraints, and show intricate interactions with variable binding. Starting from the assumption that complement and modifier extraposition should not be treated alike, I present an analysis of relative clause extraposition that does not rely on movement. Instead, I assume that the same syntactic and semantic constraints interact to determine the grammaticality of both extraposed and non-extraposed relative clauses. Syntactically, the proposed constraints lead to the configurational superiority of the relative clause. This superiority has its origin in the semantics of the relative clause: the relative pronoun is referentially defective and remedies this deficiency by selecting an appropriate antecedent. The present analysis draws on data from German.

For comments and suggestions, I would like to thank Andrea Dauer, Bart Geurts, Hubert Haider, Winfried Lechner, Gereon Müller, Stefan Müller, and Josef Taglicht, as well as seven anonymous reviewers. I am extremely grateful to Peter W. Culicover, who spent a lot of time and effort to make this paper readable.
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.² This strand of research is guided 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 \([DP \ldots [DP \ldots t \ldots]]\) in (4) leads to ungrammaticality. The same holds for extrapositions from adjuncts (5)³. Judgments are less stable with extraposition from subjects, reflecting the uncertain status of German subjects as islands: certain cases are fully grammatical while other cases are generally considered ungrammatical (6)⁴.

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² I will not distinguish standard movement approaches from approaches where movement is rendered in terms of feature percolation, as in GPSG (Gazdar et al. 1985) or HPSG (Pollard and Sag 1994). Base generation approaches that make use of movement constraints without assuming that extraposition is the result of a movement operation, such as Culicover and Rochemont (1990) are also subsumed under movement. Various problems of movement approaches to extraposition are discussed in Culicover and Rochemont (1990). I use the notions movement and A’-movement synonymously in the present paper, unless otherwise indicated.

³ I assume with Fukui (1986/95) that the determiner takes N’ as its argument, i.e. that noun phrases are actually DPs.

(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 pass-aux
   ‘The promise that gravity will be overcome has been helpful to 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).\(^5\)

(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.’


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 Schwerkraft zu überwinden.

here have I during the experiments lazy on the lawn laid the 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 helpful to the team.’

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\(^5\) 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 extraposed phrase is construed as a correlative construction. The example is perfectly grammatical if we assume the second reading, which can be forced 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 helpful for the team to overcome gravity.’
Somewhat surprisingly, then, relative clauses, i.e. nominal modifiers, may be extrapo-

ded freely not only from within complement position (11), but also from complex noun phrases
(12), adjuncts (13), and subjects (14).6

(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-
ned.’

6 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.”

Stucky (1987, p. 381) seems to have been the first in noting that extrapo-
ded non-arguments do not obey island constraints. She suggests that extrapo-
ed non-arguments may appear anywhere after their respective heads
within the local domain of a clause. Although Stucky (1987, p. 401) notes that interpretation seems to play an
important role in the determination of well-formed extrapositions, she does not provide a formal analysis.

Similar ungrammatical cases of complement clause extraposition from complex NPs and adjunct phrases are
discussed in Haider (1996, p. 259). Haider does not derive this contrast from semantic properties of the extra-
posed phrase but assumes that relative clauses are licensed by elements of category N and hence receive
greater freedom in extraposition.

CNPC violations of relative clause extrapositions are also noted in Büring and Hartmann (1996, p. 198) and
Haider (1997, p. 125). Although Haider mentions the insensitivity of RPs to the CNPC, this distinction is not
(14) Der Gruppe hat der Versuch geholfen, bei dem die Schwerkraft überwunden wurde.

‘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).7

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

‘The wife of the messenger was insulted who delivered the command.’

b. Man hatte den Überbringer des Befehls, den Platz zu verlassen, beschimpft.

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

7 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. For a discussion of this property, cf. Büring and Hartmann (1996).
c. Hier habe ich bei vielen Versuchen, bei denen die Schwerkraft
überwunden wurde, faul auf der Wiese gelegen.

‘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,
faul auf der Wiese gelegen.

‘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
wurde, geholfen.

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

f. Der Gruppe hilft der Versuch, die Schwerkraft zu überwinden.

‘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 – conforms to island constraints, it seems worthwhile to ask why modifier
extraposition has been recognized as an extraction of the modifier in the first place. It is the
interpretation of the extraposed phrase which leads to the conclusion that extraposition is a
displacement operation. The modifier receives the interpretation it would acquire if it re-
mained adjacent to its antecedent.8

Different mechanisms are at work with complement extraposition: the link established be-
tween the extraposed phrase and its antecedent is not one of interpretation. Instead, formal
matters are at stake here. The connection is a syntactic one, guided by subcategorization
requirements of the antecedent. It is natural to assume, however, that syntactic links must
obey syntactic constraints, which might be expressed in terms of movement, movement simu-
lation or other means.

Taking the semantic link between the antecedent and an extraposed modifier seriously, I
propose a semantic analysis of modifier extraposition. At its center, the analysis suggests that
principles of interpretation govern modifier extraposition. Many 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, beginning with Stucky’s (1987, p. 401)
observation “that grammaticality is only half of the picture, with interpretability the other
half”.9 With Wittenburg (1987, p. 432) the present proposal shares the assumption that ex-
traposition is a kind of anaphoric relation (cf. section 3.2).10

It is our basic hypothesis that certain intersective modifiers, and particularly restrictive rela-
tive clauses, semantically select the modified element even if modifier and modified element
are not adjacent. Various movement accounts have established the hypothesis that the rela-
tion between modifier and modified element is nonlocal in nature. I accept this premise.
However, I do not accept the conclusion that the source of the nonlocality is to be sought in
terms of movement operations. Syntactically, modifier extraposition is treated as ordinary

8 Stucky (1987, p. 379) has used the term *permutational variants* to describe the same observation, viz. that the
interpretation remains constant under extraposition. As will become clear in section 3.3, not all cases of modi-
fier extraposition can be strictly termed *permutational variants* because extraposition may block certain inter-
pretations.

9 Actually, the present proposal makes the even stronger claim that interpretability partly determines gram-
maticality.

10 Wulstchko (1994) has suggested that a phrase must be adjoined to the next maximal projection for reasons of
interpretation. Culicover and Rochemont (1990) as well as Haider (1996) refer to semantic effects of extraposi-
tion but do not make the interpretation requirements of extraposition explicit.
adjunction, but subject to the following condition on interpretation, which will be made more
precise in section 2.3:

(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.\(^{11}\) Pol-
lard and Sag (1994, p.25) assume that indices play a role analogous to the role of NP indices
in Chomsky (1981). They are constrained by relations that are imposed on them. 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.\(^ {12}\) Relative pronouns differ from other pro-
nouns in that they are referentially defective.\(^ {13}\) This deficiency leads to a parasitic nature of
the whole relative clause. It requires another index, i.e. the index of its antecedent so that
the content of the relative clause can be anchored to the individual denoted by the antece-
dent’s index.

For the moment, I define a *suitable index* as an *index* of a nominal projection contained in
the phrase to which the modifier adjoins. 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

\(^{11}\) That a relative *clause* does not provide an event variable will become clear in the discussion in section 2.3.

\(^{12}\) This idea carries over to verbs, which introduce event variables (cf. Parsons 1990, Landman 2000). Event
variables are constrained by the conditions imposed by the verb, as will be discussed in more detail in section
2.3.

\(^{13}\) The referential deficiency is a property of relative pronouns, not of relative clauses per se, as can be witnessed
by comparing d-relative pronouns (*den, der*) with w-relative pronouns (*wen, wer*) in German. While the latter
may occur in free relative clauses (ii), this construction is not allowed for the former (i).

(i) *Den du kennst, kenne ich auch.*
who you know know I as-well
(ii) Wen du kennst kenne ich auch.
who you know know I as-well
‘I know everybody who you know.’
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.

something whispered-to who there stands has she the man

This is exactly what is happening in cases like (17), where the extraposed relative clause is searching in vain for an index to be identified with the relative pronoun’s index. The only available index 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), I assume that indices are not monadic but are instead composed of a bundle of \( \phi \)-features. A semantic identification thus corresponds to a morphological and syntactic agreement pattern, which is violated in (17).

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, I shall introduce the analysis of relative clauses in-situ, based on Pollard and Sag (1994). In section 2.2, I shall argue for loosening the categorial restriction on relative clause adjunction, thus allowing relative clauses to adjoin to any major category. Section 2.3 offers a formal representation of condition (16) to select a modified phrase without the modifier being adjacent to it. The condition is further amended in section 2.4 to include upward bounding.

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 discusses Culicover and Rochemont’s (1990) and G. Müller’s (1996) analysis of extraposition in terms of barriers. Section 3.2 will discuss the syntactic position of extraposed modifiers, also offering a comparison to approaches by Wittenburg (1987) and Haider (1996, 1997). Section 3.3 discusses the interaction
of extraposition and bound variable pronoun readings. Section 4 will then summarize the results of the present paper.

2. **The Syntax and Semantics of Restrictive Relative Clauses**

2.1 **The Syntactic Structure of Relative Clauses**

The syntactic analysis of relative clauses (RP) in Head-driven Phrase Structure Grammar (HPSG), as proposed in Pollard and Sag (1994, pp. 213-220), will be our starting point. HPSG is a strictly representational theory of language, where syntactic and semantic constraints are expressed in parallel. Rules are interpreted as schematic descriptions of local tree structures and conditions imposed on these schemata, so-called *principles*, guarantee the well-formedness of syntactic and semantic structures. Just like its predecessor, GPSG (Gazdar et al. 1985), HPSG makes abundant use of complex feature representations. It also employs two different kinds of empty elements: *null elements* differ from other lexical material only in that they have an empty phonological specification. *Traces* are null elements that carry information about missing constituents as part of their feature specification. They are hence used to model dislocation, and the actual dependency is represented in a feature called SLASH. The analysis of relative clauses proposed in Pollard and Sag (1994) employs both types of null elements. A schematic analysis of relative clauses in HPSG is given in (18).

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14 Sag (1997) has proposed a construction-grammar based analysis of English relative clauses in HPSG. Sag eliminates traces as well as null elements, among them the empty relativizer. Another type of abstract entities, so-called constructions, is employed to model feature percolation. While the characteristic semantic properties of relative clauses – in particular that they are clauses syntactically, but show the denotation of N' – follow directly from the empty relativizer analysis, they have to be stipulated in Sag’s (1997) proposal. I would like to mention that the internal structure of relative clauses is much less relevant to the present purposes than the external relationship between a relative clause and its antecedent. Any alternative internal analysis of relative clauses, however, should result in the same projection of the relevant syntactic and semantic features that is provided so neatly by the empty relativizer analysis of Pollard and Sag (1994).

15 There are some minor differences between Pollard and Sag’s (1994, pp. 216-218) analysis and the present one. 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
The relative clause (RP) in (18) is an endocentric phrase headed by a null relativizer (R°). Although phonologically empty, R° introduces three 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 Specifier) 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) to the constituent missing in the clausal complement. In addition, the specifier is required to introduce a REL dependency, the value of REL not being the index of the whole phrase but being the index of the relative pronoun.16

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 (19). According to (19), a phrase (XP) consists of a head daughter (H-DTR) and an adjunct daughter (ADJ-DTR). The latter selects certain properties of the former through the MOD attribute. The MOD attribute of the null relativizer requires that the relative clause is adjoined to a nominal projection, since it selects an N°, i.e. a nominal projection whose index is 11. In the following, XP° stands for a phrase XP whose index

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16 The index of the whole phrase will be the index of the relative pronoun unless we are dealing with a pied piping construction.
is [y]. I follow Pollard and Sag (1994) in representing indices as numbers in square boxes throughout the paper, except if they are directly used to indicate certain readings in given examples, where more familiar subscripts like i, j, etc. are used.

(19) Head Modifier Schema

\[ \text{XP} \rightarrow \text{ADJ} \cdot \text{DTR} [\text{MOD} [\mathbb{H}], \mathbb{H} \cdot \text{DTR}] \]

Within the RP, the Head Feature Principle guarantees that the MOD information of \( R^\circ \) – 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.

The Semantics Principle of Pollard and Sag (1994, p. 56, p. 323) treats adjunct daughters uniformly as semantic heads. The semantic head of the phrase not only has to be seen as being the semantic functor, it also determines the index of the phrase. In case of intersective modification, it does not matter which daughter projects its index since both indices are forced to be identical. Although it is thus technically possible to treat adjacent intersective modifiers as semantic heads, this assumption cannot be maintained in the case of extraposed modifiers. As can be witnessed in (20), 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 \([\mathbb{I} \neq \mathbb{C}]\), where \( \mathbb{C} \) stands for an event variable, indicates that the nominal index of RP and the verbal event variable of S – to which RP is adjoined – cannot be identical.

(20) weil \( [[\text{DP jeder Mann}] \text{ schläft}, \text{ der schnarcht}]\)

because \( [[\text{DP every man}] \text{ sleeps who snores}]\)

There are two options available to handle cases like (20): One could propose that (20) is actually not a case of modification at all. Instead, the modifying relative clause has been dislo-
cated. Both the morpho-syntactic and the semantic reflexes of the modification are derived from somehow ‘undoing’ this dislocation.

The alternative option takes it that (20) is in fact a case of modification, and not a case of dislocation. Obviously, this position involves a number of technical, conceptual and empirical requirements.

To begin with, the syntactic requirement of the RP’s MOD attribute has to be relaxed, thus allowing for an adjunction to nominal and non-nominal projections alike. I present syntactic arguments for such a treatment in section 2.2.

In addition, the Semantics Principle must be reshaped so that it does not render the RP into a semantic head in either (20) or its non-extraposed variant (21).

(21) weil jeder Mann, der schnarcht, schläft

because every man who snores sleeps

This aspect will be covered in section 2.3. Finally, even relative clause extraposition is not entirely unconstrained but obeys upward bounding (Ross 1967/86). I will deal with Upward bounding in section 2.4.

2.2 Syntactic Conditions on Modification

The MOD attribute of a relative clause, as given in (18), precludes any realization of a relative clause in a position which is non-adjacent to a nominal projection. Once this restriction has been relaxed, relative clauses could adjoin to any major category. Interestingly, empirical evidence can be offered in support of this view. I will illustrate the supposition that RPs adjoin to phrases that are not the elements modified by them with the following examples:17

17 So-called hyd ras, as discussed in Link (1984, pp. 246-248) further support this conclusion: 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 projections of N. The interpretation of the RP as a modifier of a sum object requires that it 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 ad-
a) RPs adjoining to postpositional phrases illustrated in (22) and (23), and
b) RPs adjoined to nominal phrases that modify non-adjacent contained nominal projections in (24) to (26).

In (22), we find examples cited in Schachtl (1992, p. 444) where a relative clause is adjoined to a postposition.

(22) a. [Aus der Stadt heraus, die den Belagerern schon verlassen schien,]

from the city out which the besiegers already abandoned seem
drängte sich ein Häuflein Leute

came refl a crowd people

‘A small crowd of people came out of the town that was already considered abandoned by its besiegers.’

joined to conjoined S-nodes. I would like to thank an anonymous reviewer for drawing my attention to this example.

(i) The boy, and the girl who dated each other are friends of mine.

(ii) The landlord, and the tenants who are fighting each other will all come together tomorrow in an attempt to find a compromise.

(iii) [S [S John saw a man] and [S Mary saw a woman]] who were wanted by the police.

The examples given in (i) – (iii), particularly example (iii), prohibit an analysis in terms of extraposition as movement since the RP cannot be related to a single origin in these cases.
b. Man muss nicht gleich 

one must not immediately

[eines Sachverständigen wegen, der seinen

an expert because who his

Mund nicht halten kann,] die gesamte Konkurrenz kopfscheu machen.

mouth not keep can the whole competitors nervous make

'It does not make sense to confuse one’s competitors just because an expert could not keep quiet.'

Adjunction to a postpositional phrase is not only possible if the postpositional phrase is topicalized, as in (22a), but also if the phrase remains in-situ, as illustrated in (22b). A non-topicalized variant of (22a) is given in (23).

(23) Dann hat sich aus der Stadt heraus, die den Belagerern schon

Then has self from the city out which the besiegers already

verlassen schien, ein Häuflein Leute gedrängt.

abandoned seem a crowd people came

The examples in (24), taken from G. Müller (1996, p. 227), and (26), taken from Schachtl (1992, p. 448), show that RPs may be adjoined to nominal projections but modify elements contained in the nominal projections. In (24), the modified element is the complement of the phrase to which the RP is adjoined.
(24) [Die Wut des Mannes auf sich, der die Verantwortung hatte,]

the fury of-the man at himself who the responsibility had

hat mich nicht beeindruckt.

has me not impressed

‘The rage of the man who held the responsibility did not impress me.’

(25) Doch Vorfälle wie im vergangenen Herbst, als Abgeordnete der
but accidents as in previous autumn when delegates of the Partei bei der Eröffnung einer Ausstellung des BVS im Stuttgarter party during the opening of a exhibition of-the BVS in Stuttgart’s Landtag über den Rechtsextremismus handgreiflich wurden, zeigen,
parliament about the right-wing-extremism aggressive aux show
dass die Republikaner ein Störfaktor bleiben.
that the Republicans a nuisance remain

‘Accidents like the one in last August, when delegates of the Republican Party became aggressive during the opening of an exhibition of the BVS about right wing extremism show that the Republicans remain a nuisance.’
Cases like (24) are not confined to relative clauses, as is illustrated in (25) where a PP modifies a phrase that is contained in the phrase to which it is adjoined.\textsuperscript{18} It would result in an awkward interpretation if the PP \textit{über den Rechtsextremismus} (about the right-wing extremism) modified the head noun \textit{Eröffnung} (opening). The context indicates that the PP actually must modify the N’ \textit{Ausstellung des BVS} (exhibition of the BVS).

In (26), the modified element is a complement contained in a modifier (a participial phrase).

\begin{quote}
\begin{enumerate}
\item \textit{Die nur von den Grammatikern akzeptierten Beispielsätze, die}
\end{enumerate}
\end{quote}

\begin{quote}
\begin{enumerate}
\item \textit{Konstituentenstruktur für das Alleinseligmachende halten, werden am}
\end{enumerate}
\end{quote}

\begin{quote}
\begin{enumerate}
\item \textit{häufigsten zitiert.}
\end{enumerate}
\end{quote}

\begin{quote}
\begin{enumerate}
\item \textit{‘Examples which are accepted by syntacticians who believe constituent structure to be the ultimate truth are more quoted than others.’}
\end{enumerate}
\end{quote}

\textsuperscript{18} Example (25) was found in \textit{Neue Zürcher Zeitung} 192/2000, 19.08.00, p. 5.

\textsuperscript{19} SUP stands for a superlative marker.
It has sometimes been argued that attributive participial phrases generally prohibit relative clause extraposition. Prima facie, this view is supported by the following ungrammatical example. 20

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

It should be noted, however, that (27) differs crucially from (26) 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 (27), the opposite situation holds in (26). In this example, the modified noun is the object while the antecedent of the RP is the subject. We seem to be confronted with a parochial constraint, which prohibits RPs to take antecedents embedded in a participial phrase if the antecedent is not a subject. I cannot explain this behavior, but presently, it suffices to say that participial phrases may contain antecedents of extraposed relative clauses.

The plausibility of a ban on antecedents in participial phrases is further diminished by the grammaticality of extrapositions from pre-nominal genitive DPs (S. Müller 1999, p. 222) and comparative constructions (Haider 1996, pp. 248-250). The following example illustrates that...

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20 I am indebted to an anonymous reviewer for raising this issue.
an RP that is adjoined to a DP can take the embedded prenominal genitive DP as its antecedent.

(28) Er sagte dies, weil ihm **jeden Mannes** Tod nahe ging

he said that because him every man’s death touched

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 (26), the RP in (28) 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 (29).

(29) Er hat mehr Gedichte als **der Mann** geschrieben der den Preis erhielt

he has more poems than the man written who the award received

‘He has written more poems than the man who received the award.’

The common denominator of the examples given in (22) to (26) 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 is grammatical, but – as will be shown below – intermediate complement extraposition leads to ungrammaticality. Example (30a) shows that *zerstören* (*destroy*) can take a non-animate subject. Let us assume a configuration where the antecedent of the extraposed phrase is the subject while the modified noun is the object of the participle, i.e. the same

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21 I will discuss this issue again in section 3.3.

22 I 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 *mehr* (*more*), the antecedent of the RP is located in the left periphery of the noun to which the RP is adjoined.
configuration as in (26). We would expect that an extraposition from the subject should be possible as well. Nevertheless, this is not the case, as is illustrated by the ungrammaticality of (30a), which is the extraposed variant of the grammatical example (30b).

(30) a. *Der durch die Erkenntnis zerstörte Glaube, dass die geschichtliche Entwicklung diskontinuierlich verlaufen sein muss, hatte noch in den 70er Jahren Bestand.

b. Der durch die Erkenntnis, dass die geschichtliche Entwicklung diskontinuierlich verlaufen sein muss, zerstörte Glaube hatte noch in den 70er Jahren Bestand.

‘The belief which was destroyed by the insight that the historical development was discontinuous was still accepted in the 1970s.’

Example (30a) 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 (31).
(31) *Der durch die Erkenntnis zerstörte Glaube an den Fortschritt, dass
die geschichtliche Entwicklung diskontinuierlich verlaufen sein muss,
hatte noch in den 70er Jahren Bestand.

This line of reasoning is further supported by the ungrammaticality of intermediate complement extraposition to the right of a postposition. Example (32) 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 (22b).

(32) *Man muss nicht gleich der Tatsache wegen, dass die Erde
keine Scheibe ist zum Häretiker werden.

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).

2.3 Generalized Modification

It is the common denominator of the examples presented in section 2.2 that relative clauses can be syntactically adjoined to a phrase if this phrase contains an antecedent for the relative pronoun. The index of such an element will be identified with the index of the relative pronoun, and consequently, the conditions imposed on the relative pronoun will be added to the conditions already imposed on the antecedent’s index. From this point of view, the identification of the relative pronoun’s index with the index of its syntactic sister – i.e. the ‘base case’
– just happens to be the borderline case, where this index is the only one contained in the syntactic sister.

Let us assume then that a relative clause may occupy a position that allows the relative clause to gain access to a suitable antecedent. In its most basic effect, this means that an RP must always occupy a position that is syntactically superior to its antecedent – an aspect to which I shall return in section 3.2. This structural condition is triggered by the semantics of the relative clause, and in particular, by the inherent semantic dependence of the relative pronoun: the relative pronoun obligatorily needs an antecedent to receive an interpretation. In prose, the semantic condition on the realization of relative clauses can be given as in (33).

(33) Generalized Modification:

A relative clause can be realized in a syntactic position which allows access to a suitable antecedent of the relative pronoun.

As a necessary condition, the antecedent and the relative pronoun must be compliant with respect to their φ-features. Since indices are not monadic entities, but consist of agreement features (cf. Pollard and Sag 1994, p. 26), the agreement requirements follow from the identification of the index of the relative pronoun with the antecedent’s index.

Given the assumption that constraints are imposed on local structures – as suggested by Gazdar et al. (1985), and followed by Pollard and Sag (1994) –, the index of an RP cannot just be identified with another index if the latter is contained in the syntactic sister of the RP. The identification requirement for the index of RP must not violate the aforementioned locality condition. Still it has to allow 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 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 projected freely from daughter to mother, even across the maximal projection of their head. The projection of indices is a further step towards our
goal. Nevertheless, the semantic restrictions imposed on the relative pronoun have to be combined with the semantic restrictions imposed on the antecedent of the relative pronoun. This combination must give rise to an intersective interpretation without making use of syntactic dislocation or reconstruction.

I employ a framework by Copestake et al. (1999) to elucidate the semantic background of the present analysis. This framework is termed Minimal Recursion Semantics (MRS). The resulting semantic structures differ from the ones used in Pollard and Sag (1994) in various respects: MRS allows for underspecification, i.e. for the possibility to leave scope relations unresolved. In addition, semantic subordination is not modeled directly. A semantic representation basically consists of a set of relations or elementary predications, the linear order of which does not matter – a feature which I shall employ to facilitate an implementation of (33).

An elementary predication (EP) can be characterized as a single relation with its associated arguments given in argument slots (Copestake et al. (1999, p. 2)). Therefore, an EP of a common noun consists of the noun’s relation name and a single variable for the noun’s referent. Copestake et al. (1999, p. 20) follow other semantic proposals in making use of a neo-Davidsonian representation (Parsons 1990; Landman 2000), where each verb introduces an event variable. EPs of the noun *man* and the verb *sleeps* are given in (34).

(34) a. \{man(\[\])\} \hspace{1cm} b. \{sleep(\[\]),\[\]\}\}

The syntactic process of merging words and phrases to form complex units is mirrored in the semantics by grouping together EPs in bags. A bag has the same properties as a set except that an element may occur more than once in a bag. Bags of EPs thus yield complex conditions on interpretation, similar to the sets of conditions used in Discourse Representation Theory (Kamp/Reyle 1993). I will borrow this term and call the bags of EPs the conditions

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23 Semantic representations in MRS are not directly interpreted. They are descriptions of expressions in a logical object language – predicate calculus with generalized quantifiers – that undergo model-theoretic interpretations, cf. Copestake et al. (1999, p. 2). In this respect, MRS differs from alternative semantic representations used in current work in HPSG, as e.g. Sailer (2000), where a direct model-theoretic interpretation is pursued.
of a phrase or lexical item, and CONDS is the attribute of the content value of signs in which these conditions are stored.

The basic operation to combine conditions is bag union. Hence, EPs are never embedded directly within one another and semantic representations turn out to be ‘flat’ or non-recursive. But obviously, completely flat semantic representations without any indication of subordination would not allow to derive the scopal properties of certain EPs, as can be illustrated with the examples in (35), where a distinction has to be made between the restriction of the quantifier and its scope.

(35)  a. Every old man is sleeping.
     b. Every sleeping man is old.

(36) \{every(\square), \text{old}(\square), \text{man}(\square), \text{sleep}(\square\square)\}

A representation like (36), where this distinction is blurred, would result in the mistaken conclusion that the examples in (35) are logically equivalent. To reify the semantic subordination of one EP to another one, Copestake et al. (1999) utilize tags or handles to relate scope-taking functors to their arguments. A handle as a value in an argument slot is connected to a tag of another EP, indicating that the latter is a semantic argument of the former. Copestake et al. (1999, p. 5) distinguish between ordinary and scoped argument slots. While ordinary argument slots take indices or event variables as their values and never embed other EPs, scoped argument slots, which embed other EPs, take tags or handles as their arguments. Every EP receives such a handle for identificatory purposes. A formal definition of elementary predications is given in (37):\(^{24}\)

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\(^{24}\) The definition is adapted from Copestake et al. (1999, p. 7).
An elementary predication (EP) contains exactly four components:

a. a handle which is the label of the EP
b. a relation
c. a list of zero or more ordinary arguments slots of the relation with their associated variable arguments
d. a list of zero or more scopal argument slots of the relation with their associated handle values.

The EP of the quantifier in (38) has three arguments: the variable bound by the quantifier is filling the ordinary argument slot BV (= BOUND VARIABLE). Handles fill the scopal argument slots for the quantifier’s restriction (RESTR) and SCOPE. The prefixed handle $h0$ is the handle of the quantifier’s EP.

\[(38)\ h0:every(BV: [], RESTR: h1, SCOPE: h2)\]

I will omit argument slots whenever they are obvious and use simpler representations where only the arguments are given, as illustrated for every in (39).

\[(39)\ h0:every([], h1, h2)\]

Once the determiner every is combined with an N’, the handle of the restriction slot is identified with the handle of the EP provided by the N’. In case of intersective modification, the handles of conjoined EPs are identified to indicate that the EPs are on the same level of semantic subordination. This is illustrated for the phrase every old man in (40), where the EPs of man and old carry the same handle $h1$, which links the EPs of old and man to the RESTR slot of the quantifier.

\[(40)\ \{h0:every([], h1, h2), h1:man([], h1:old([]))\}\]
With the concepts of handles and scoped argument slots at hand, the relation of immediate semantic subordination can be recast as given below; subordination is established as the transitive closure of the relation defined in (41).

(41) Immediate Semantic Subordination:

An EP E immediately subordinates an EP E’ if the value of one of the handle-taking arguments of E is the handle of E’. (cf. Copestake et al. (1999, p. 7))

As for elements of bags in general, the order of EPs in a bag of conditions does not matter. Hence the semantic representations of example (35a) in (42) are equivalent to each other.

(42) a. \{h0:every(\[\], h1, h2), h1:old(\[\]), h1:man(\[\]), h2:sleep(\[\], \[\])\}

b. \{h0:every(\[\], h1, h2), h1:man(\[\]), h2:sleep(\[\], \[\]), h1:old(\[\])\}

The property illustrated in (42) is the one which is utilized most crucially to implement (33). Let us illustrate this aspect with the schematic representations of a relative clause attachment in ‘base’ and ‘extraposed’ position in (43).

(43) a. \[s \ldots \{zp \ldots \{dp \ldots N’ \ldots RP\} \ldots Z\]\n
b. \[s \ldots \{zp \ldots \{dp \ldots N’ \ldots\} Z\] \{RP\]

In discussing (43), I will assume that each of the involved phrases introduces just one EP, and that the relation name of each EP is identical to the phrase’s category. What has to be achieved then is that the semantic representation derived from (43a) should not differ from the semantic representation of (43b), despite the fact that RP is combined with N’ before ZP is combined with NP in (43a), but not in (43b). Although the order in which EPs are combined with each other might differ, the resulting semantic structure should be the same. Now (44a) – the semantic representation of (43a) – is indeed equivalent to (44b) – the semantic representation of (43b). This is so since only the respective identification of indices and handles matters, while the relative order of EPs does not.
One crucial piece that is currently missing, however, is the syntactic and semantic operation that allows an identification of the respective arguments and handles in (43a) and (43b).

Obviously, an EP must be predicated of something. In the case of nominal EPs, the pertinent entity is the noun’s *index*, and in the case of verbal EPs, this entity is the event variable that is constrained by the verb. The semantic representation in (40) can thus be amended to explicitly refer to the index of the head noun, as illustrated in (45). In (45), the bag of conditions is prefixed by an index that is constrained by this bag.25

\[
\text{(45)} \quad \text{[}\{h0:every(\_), h1:man(\_), h1:old(\_)\}\text{]}\]

We have to consider that only non-scopal adverbs and intersective modifiers – like relative clauses – select indices or event variables for identification. Since scopal adverbs and quantifiers subordinate EPs, they do not select indices but handles. However, a set of conditions may contain many EPs with different handles. One of the handles contained in the conditions set must be selected as an argument handle at a given stage of syntactic composition. Copestake et al. (1999, p. 11) call this handle the *local top handle*, abbreviated *ltop*. They call it *local top handle* since it is the sole handle that has not been related to a scopal argument slot in an EP at this stage of syntactic combination. In other words: the *ltop* indicates the EP which is still open for becoming a subordinate, a semantic argument.

To sum up, the value of the CONTENT attribute consists of an index serving for index identification, a local top handle serving for scopal selection, and a set of EPs. In the following representations, the index and *ltop* are put into parentheses to keep them apart from the conditions, as is again illustrated for (40) in (46).26

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25 In terms of a feature representation (cf. below), the element over which a predication is made is represented as value of the INDEX attribute, irrespective of its origin as a nominal index or verbal event.

26 The element that is taken to be the *ltop* of a phrase is determined by the *Handle Projection Constraint* given in (49).
I use the notations in (46) as abbreviations of the feature structure representations of the content of a sign in HPSG. In a feature representation, the CONTENT value of the noun *man* receives the representation in (47a), and the CONTENT value of the verb *sleeps* gets the representation in (47b). The *ltop* is represented as value of an attribute called LTOP.

(46) \([h_0:every(h_1, h_2), h_1:man(h_1), h_1:old(h_1)]\)

The principles of semantic composition constrain the projection of the features introduced in (47). Therefore, they must determine the combination of *conditions*, as well as the projection of the *ltop* and the *index*. These conditions are expressed in the *Semantics Principle* in (48).

In the following definition, the *key EP* refers to the EP that is associated with the lexical item that introduces the semantic head.

(48) *Semantics Principle*:

a. The INDEX value of a phrase XP is identified with the INDEX value of the semantic head of XP. The semantic head of a phrase is the adjunct daughter if the LTOP value of the head daughter is identified with one of the scopal argument slots of the adjunct daughter’s *key EP*. In all other cases, the syntactic head is the semantic head.

b. The CONDS value of a phrase XP is given as the result of the set-union of the values of each of XP’s daughter’s CONDS values.
If the LTOP value of the head daughter is identified with one of the scopal arguments of the adjunct daughter’s key EP, as given in (48a), this amounts to saying that the head daughter is the semantic argument of the adjunct daughter. The Semantics Principle in (48) has been reshaped so that it does not uniformly treat modifiers as semantic heads.27 A modifier is not a semantic head if the modifier does not select the $ltop$ of the modified phrase, as is the case for intersective modifiers. The Handle Projection Constraint in (49) determines the value of a phrase’s LTOP.

(49) **Handle Projection Constraint**

If the LTOP value of one of the daughters of a phrase XP is selected as scopal argument of another daughter, the LTOP value of the phrase is identified with the LTOP value of the scope-taking daughter. In all other cases, the LTOP value of a phrase is identical to the LTOP value of the semantic head of the phrase.

Both the Semantics Principle in (48) and the Handle Projection Constraint in (49) refer to the concepts of semantic and syntactic headedness. These two concepts converge in cases of intersective modification, which leads to the conclusion that both the $ltop$ and the index of the syntactic head daughter are projected to the mother if the adjunct daughter is not functional. As an illustration of the principle of semantic composition, consider the representation of an RP in (50).

---

27 In this sense, the Semantics Principle in (48) differs from the Semantics Principle given in Pollard and Sag (1994, p. 402).
Before discussing (50) in detail, I would like to emphasize that intersective modification is indicated through handle identification in MRS. Moreover, the index of the RP – originating as the index of the relative pronoun – must be identified with the index of the modified N’ in order to tie together the EPs of the latter with the EPs provided by the former.

In (50), the bag of conditions of the quantified NP *einen Rivalen* consists of the EPs $\text{h5:}\text{rival}(\text{e})$ and $\text{h4:}\text{exists}(\text{e}, \text{h5}, \text{h1})$. The former EP is subordinated to the latter EP, as indicated through the handle h5. Similarly, the EP $\text{h1:}\text{like} (\text{e}, 1, 2)$ fills the scope argument of the quantifier, as indicated by the handle h1. Following the analysis of relative clauses in Pollard and Sag (1994, p. 216f.), the index of the null relativizer is identified with the REL value of the specifier daughter in the relative clause. Since this value is identical to the INDEX value of the relative pronoun, the index of the relative pronoun is eventually identified with the index of the null relativizer. In (50), this is expressed through the equation $\Box = \Box$.

The intersective semantics of the relative clause is furthermore reflected in the LTOP values of $\text{R°}$ and its clausal complement. The identity of these values is achieved through lexical stipulation. Now, $\text{R°}$ is the syntactic and semantic head of RP, and consequently, the whole RP bears the LTOP value of $\text{R°}$. Since this value is identical to the LTOP value of $\text{R°'}$’s clausal complement, it is the LTOP value of $\text{R°'}$’s clausal complement that provides the LTOP value of the whole modifying phrase. The intersective interpretation of a modifier eventually comes

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28 In their analysis of subject relativization, Pollard and Sag (1994, pp. 218-219) actually do not make use of a subject trace, but of a lexical rule. Nothing hinges on this complication.
about as the result of both identifying the index and the handle of modifier and modified phrase. This is illustrated in (51), where both the indices of the RP and the N° and their respective handles are identified. The identification is indicated through the equations $n_1 = h_3$ and $h_3 = h_2$.

(51) *jeder Mann, der einen Rivalen mag*

Since semantic subordination can be read of a structure by looking at the handles of the EPs and scopal argument slots contained in them, it would be insufficient to project only indices. The semantic contribution of an extraposed RP to the whole clause cannot be determined without indicating the position in terms of subordination for the semantics of the RP. This position should be determined by equating the RP’s handle with the handle of the modified N°. Since this information is stored in the LTOP of the RP and constrained by handle identification, it is reasonable to provide pairs of an index and its corresponding handle for identification purposes.

I call such pairs of index and handle *anchors* to make clear that they anchor the semantic contribution of an extraposed modifier. An anchor takes the form of a tuple $<i, h>$, where $i$ is an index and $h$ is the handle corresponding to that index. Following the feature architecture developed in Pollard and Sag (1994), I assume that anchors belong to the nonlocal attributes, and hence can project across the maximal projection of the lexical item that introduces the anchor. They are collected in a set-valued attribute called ANCHORS. The projec-

---

29 Although the latter equation is in line with the *Handle Projection Constraint* defined in (49), it will become clear immediately that it actually follows from the constraint proposed in (53).

30 This means that $h$ is the value of the HANDLE attribute in the EP that introduces the index.
tion of the anchors is governed by the *Anchors Projection Principle* that is given in a simplified form in (52), but will be amended in section 2.4.

(52) *Anchors Projection Principle:*

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

Given the formulation in (52), 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 (53).

(53) \[ \text{RP}_{\text{[\text{\textit{mod}}\text{\textit{ANCHORS}}\text{\textit{S}}]} \& (x, hn) \in S} \]

The constraint in (53) – which is actually part of the lexical entry of \( R^\circ \) – requires that an RP whose index is \([i]\) and whose handle is \(hn\) modifies a phrase whose \( \text{ANCHORS} \) attribute takes the set \([S]\) as its value. This set has to contain at least one element that can be identified with the index-handle pair \([x, hn]\). Such 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. Since the identification does not only affect the index, but its corresponding handle as well, the content of the RP 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. As a result of the handle identification, the semantic contribution of RP is not only added to one of the indices already introduced but is also correctly embedded in the subordination structure already imposed, thus giving rise to a conjoined interpretation.

This is illustrated in (54) and (55). In the following discussion, I shall make use of the notational conventions given below:

1. \(\text{XP}\{[i, hn], [j, hm], \ldots\}\), where \([i], [j], \ldots\) are indices and \(hn, hm, \ldots\) are handles: A phrase XP which contains anchors \([i, hn], [j, hm], \ldots\).

2. \(\text{word}_{\{[\text{\textit{hn}}]\}}\), where \([i]\) is an index and \(hn\) is a handle: The syntactic representation of word word is the origin of anchor \([i, hn]\).
word\(\text{\textsubscript{word}}\) : The syntactic representation of word word introduces an identification requirement for index \(i\).

4. \(XP[[[i,hn]] = \alpha]\), where \([i]\) is an index, \(hn\) is a handle, and \(\alpha\) is an anchor:

   The identification requirement \([[i,hn]] = \alpha\) can be satisfied if \(\langle[i],hn\rangle\) and \(\alpha\) are identified. If more than one anchor may satisfy an identification requirement, this is indicated by \(XP[[[i,hn]] \in \{\ldots\}]\), where \(\{\ldots\}\) 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 \(XP[[[i,hn]] \in \emptyset]\).

In addition, only the relevant anchors are shown in (54). The combination of RP with the remaining phrase is possible if an appropriate anchor can be found so that both \(x\) and \(hn\) are identified.

(54) weil [jeder Mann schläft, der schnarcht]

because [each man sleeps who snores]

\[
\begin{align*}
\text{S} & \langle [\text{h}2], [\text{h}3] \rangle \\
\text{S} & \langle [\text{h}2], [\text{h}3] \rangle \quad \text{RP} \langle [\text{h}1,hn] = [\text{h}2] \rangle \\
\text{DP} & \langle [\text{h}2] \rangle \quad \text{VP} \langle [\text{h}3] \rangle \\
\text{D} & \text{N’} \langle [\text{h}2] \rangle \\
\text{jeder} & \quad \text{Mann} \quad \text{schläft}
\end{align*}
\]

The constraint imposed by the RP, i.e. \(\langle [\text{h}2], hn\rangle \in [\text{S}]\), can be satisfied if \([[\text{h}1,hn]] = [\text{h}2]\). 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 (55) below, where I have added the semantic representations of the RP and the clause to which RP is adjoined.31

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

\[
\begin{align*}
S\{\text{h}_2, \text{h}_3\} & \quad \text{(h}_1\} \mid \{\text{h}_1 : \text{every}(\text{h}_2, \text{h}_3), \text{h}_2 : \text{man}, \text{h}_3 : \text{sleep}\} \\
\text{RP}\{\text{h}_4\} & = \{\text{h}_2\} \\
\text{DP}\{\text{h}_2\} & \quad \text{(h}_1\} \mid \{\text{h}_1 : \text{every}(\text{h}_2, \text{h}_3), \text{h}_2 : \text{man}\} \\
\text{VP}\{\text{h}_3\} & \quad \text{(h}_3\} \mid \{\text{h}_3 : \text{sleep}\}
\end{align*}
\]

der schnarcht

Given the condition in (53), I basically propose 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 (56).

(56) Generalized Modification

\[
\begin{align*}
\text{YP} & \quad \text{XP}[\text{ANCHORS} = \{\text{h}_m\}] \\
\text{RP}\{\text{h}_n\} & \quad \text{YP} \quad \text{XP}[\text{ANCHORS} = \{\text{h}_m\}]
\end{align*}
\]

YP is well-formed if [\text{h}_m, \text{h}_n], \text{h}_m being the index of the relative pronoun, and \text{h}_n being the handle of RP, can be identified with an element \{\text{h}_m\} of \text{S} such that \text{h}_m is compliant with the \phi-features of \text{S} and the handle \text{h}_n is identified with the handle \text{h}_m.

If these conditions are met, an intersective interpretation is established.

---

31 Since quantificational determiner do not introduce indices, they do not provide anchors, cf. the discussion around (38).
In (56), 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 (53).

2.4  Encoding Upward Bounding

A proper formulation of anchor projection should include the condition that extraposition is upward bounded (Ross 1967/86, pp. 174-176). According to Ross’ analysis, an extraposed phrase must not cross a sentential node, where the concept ‘sentential node’ itself needs some clarification. Ross’ observation is illustrated in (57).32

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

Ulrich had admitted that the ticket stolen was which he found while he drunk was

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

b. *Ulrich hatte zugegeben, dass die Karte gestohlen war, als er betrunken war, die er gefunden hatte.

Ulrich had admitted that the ticket stolen was while he drunk was which he found had

In (57), the RP originates in the subordinate clause dass die Karte gestohlen war. In (57a), the relative clause can be related to an antecedent in this clause, but this is not possible in (57b), where an adjunction of the relative clause to the subordinate clause is syntactically impossible due to the intervening adverbial clause, which modifies the main verb.33 The RP can thus only be adjoined to the projection of the matrix verb. In terms of a movement


33  Example (57a) actually has a second reading where the subordinate clause als er betrunken war modifies the verb contained in the relative clause. This reading is irrelevant to the present purposes.
analysis, the RP has been moved across the maximal projection of the subordinate clause in (57b). In terms of the present analysis, an adjunction of the relative clause to the adverbial clause is already excluded because the subordinate clause does not contain suitable anchors for the RP. It remains to be shown why an adjunction to the matrix clause prohibits identification with the anchors contained in the subordinate clause.

Pollard/Sag (1994, p. 164-166) assume that although the projection of nonlocal elements such as SLASH is unbounded in principle, it must still be possible to cancel a further projection. This is achieved if the respective element is mentioned as TO-BIND on the head daughter of a phrase. A topicalized constituent, e.g., is realized exactly once, and the corresponding nonlocal dependency should vanish if the topicalized phrase is realized. Pollard and Sag (1994) eliminate this unwelcome possibility by identifying the respective SLASH values with the TO-BIND|SLASH value of the head daughter. Such an identification can take place in a rule schema, as e.g. illustrated for the Head Filler Schema Schema 6 of Pollard and Sag (1994, p. 164) in (58).

(58) **Head Filler Schema**

\[ X \rightarrow {\text{YP[LOCAL } \|], S[\text{fin, SLASH } \|], \text{TO-BIND|SLASH } \{\|}\}] \]

In the present proposal, I make use of the cancellation of nonlocal attributes to account for the upward bounding of modifier extraposition and incorporate TO-BIND specifications into the schemata and lexical entries employed here. Kiss (2001) has suggested an analysis of German clause types which makes use of either the head specifier schema – which was already used to build up RPs – or the head complement schema. In (59), an amended version of the head specifier schema is given. It requires that the anchors of both daughters be prohibited to project further, since the TO-BIND|ANCHORS specification of the head daughter contains the union of the ANCHORS values of both daughters.

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34 The value of SLASH is identified with the value of the trace’s LOCAL attribute. Hence, only information stored under LOCAL is projected from a trace to a filler. For discussion of this topic, cf. Pollard and Sag (1994, p.16).

35 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.

36 The head complement schema replaces schemata 1 and 2 from Pollard and Sag (1994).
The head complement schema is not only employed to realize the arguments of the verb in the clause, but also for the combination of subordinate conjunctions and complementizers with their sentential arguments. It thus applies to the subordinate and adverbial clauses in (57). In the partial entry of a complementizer in (60), the TO-BIND|ANCHORS specification indicates that all anchors of its syntactic sister have to be bound.

(60) Partial lexical entry of complementizer:

\[
\begin{bmatrix}
\text{HEAD comp} \\
\text{COMPS} \{ \text{S[ANCHORS \[\]]} \} \\
\text{TO - BIND | ANCHORS \[\]} \\
\end{bmatrix}
\]

Taken together, the TO-BIND|ANCHORS specifications in (59) and (60) guarantee that anchors must not project across a phrase which is either the result of the head specifier schema or the result of combining a subordinate conjunction or complementizer with its sentential argument. Let us further assume that the Anchors Projection Principle in (52) is amended to make reference to the TO-BIND|ANCHORS specification of the head daughter, as formulated in (61).

(61) Anchors Projection Principle (final version)

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

Let us reconsider the ungrammaticality of (57b) in light of these amendments. According to the lexical entry of the complementizer in (60), anchors contained inside a complement clause do not become available outside of it, since all anchors contained in the complement of a complementizer are specified as TO-BIND. As the anchors contained in the complement clause do not become available, an adjunction of the RP to the matrix verb is prohibited. In (57a), the RP is combined with the sentential argument of the complementizer before the complementizer is combined with its sentential argument. The anchors are still available, and hence
a combination is possible. Basically, the relevant structure is similar to the one of (55), where the RP is combined with the sentential argument and the resulting phrase is taken to be the argument of the complementizer. 

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, I will discuss the apparent violation of island conditions, such as the Complex Noun Phrase Constraint (CNPC). In section 3.2, I will discuss the syntactic relation between an extraposed phrase and its antecedent, and finally, in section 3.3, I will discuss the interaction of variable binding, extraposition and word order variation.

3.1 Apparent Violations of Island Conditions

In analyzing the apparent island violations presented in section 1, I will concentrate on the discussion of the complex DP cases in (62) and (63). These examples have been discussed in (Haider 1996, p. 259; Haider 1997, p. 126). As was mentioned in the introduction, the grammatical examples in (62) differ from the ungrammatical ones in (63) only with respect to the type of element extraposed. It is a complement in (63) but a modifier in (62). 

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37 Ross’ condition is sometimes interpreted as ‘an extraposed phrase must not cross an S-node’. One should be aware, however, that such a formulation invites dispute concerning the exact specification of ‘S’. In the present proposal, we have thus refrained from giving a categorial interpretation of upward bounding. Kiss (2003) presents an extension of the present proposal to cover differences of extraposition in German and English topicalization structures, which are instances of the head specifier schema and should thus invoke upward bounding. For space reasons, we cannot go into details here. The present analysis, however, can be extended easily to cover these cases as well.

38 Since finite and non-finite complements behave similarly with respect to extraposition, we will concentrate on non-finite complements in this section.
In the present analysis, modifier extraposition 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 the extraposed phrase finds an anchor. The grammaticality of the examples in (62) follows from this assumption, as is illustrated for (62b) in (64).
(64) weil er die Zeit vor dem Versuch gut verbrachte, der ihn berühmt machte

\[
\text{DP}\{\text{\{h3\},\{h4\}}\} \rightarrow \text{VP}\{\text{\{h3\},\{h4\}}\} \rightarrow \text{RP}\{\text{\{h1\}} = \text{\{h3\}}\}
\]

die Zeit vor dem Versuch \{h3\} gut verbracht \{h1\} ihm berühmt machte

Since the identification of a nominal anchor implies agreement between the origin and the binder, the RP can only be anchored to \{h3\} in (64). Identification with \{h4\} is impossible because the gender specification of \{h4\} differs from the one of the relative pronoun, the latter being masculine while the former is feminine. Given the identification of the respective handles, the analysis correctly relates RP’s content to the restriction of the individual instance introduced by the noun Versuch.

The examples in (63), 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 (62): In each case, the extraposed relative clause is attached to a verbal projection whose anchor set contains the anchor of the embedded DP.

Approaches to extraposition which neglect the fact that modifier extraposition is fundamentally different from complement extraposition cannot explain the grammaticality of the data in (62). 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)).

\[39\] 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
The *Complement Principle* given in Culicover and Rochemont (1990, p. 41) predicts that the examples in (62) are as ungrammatical as the examples in (63). 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 (62) and (63), 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 (64), 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 (63b), however, is identical to (64) in its relevant details. In order to block (63b), 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 that cannot be resolved by the *Complement Principle*.

G. Müller (1996, p. 225f.) 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. In his proposal, 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 (cf. Chomsky (1986)). Following Müller’s lead, example (62b) should receive the analysis in (65). 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.

govern SLASH projection can be applied to the projection of EXTRA as well, it remains unclear how a distinction between (62) and (63) can be drawn.
Müller’s analysis hence 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 (65), how can the ungrammaticality of complement extraposition in (63) be accounted for?

3.2 The Prominence of the Relative Clause

The structural relationship between a nonlocal modifier and its antecedent is determined by the condition given in (56). Since the modifier can only adjoin to a phrase that contains a suitable anchor, it must be realized in a position that is superior to the position of the element which issues the anchor. This assumption stands in contrast to two proposals which have suggested that the antecedent of a relative clause must occupy a position which is superior to the position of the relative clause, viz. Wittenburg (1987) and Haider (1996, 1997). Both approaches share the idea that the extraposed phrase has to be c-commanded by its antecedent. While Wittenburg (1987, p. 435) simply proposes that “the node corresponding to the antecedent must c-command the extraposed phrase”, Haider (1996, 1997) 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 (62) and (63). 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 (66a), which is our analysis, and (66b), which would incorporate Haider’s requirement that the extraposed phrase is realized as a sister of the verb.

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

In both (66a) and (66b), the antecedent of the relative clause (contained in or being identical to DP₁) is embedded in another DP (DP₂) and thus cannot c-command the relative clause. This does even hold if the whole DP₁ is taken as the relevant antecedent: the first branching node immediately dominating DP₁ is at least DP₂. Actually, Wittenburg (1987, p. 436) makes use of another definition of c-command, originally provided by Reinhart (1983, p. 23), according to which DP₁ would c-command the RP if the RP were dominated by DP₂. However, DP₂ does not dominate RP in (66a) or (66b). This problem would persist if one conceded that it is not c-command but m-command (Chomsky 1986) what is relevant here. Again, DP₂ would block a command relationship. Hence, the grammaticality of (62) and (63) cannot be derived in Wittenburg’s (1987) or Haider’s (1996, 1997) analysis.

Büring and Hartmann (1996) have presented a further argument against Haider’s analysis. The ungrammatical example in (67) proves Haider’s (1996) conjecture wrong 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 that serves as the antecedent of the relative clause – are added.
(67) *Etwas zugeflüstert, der dort steht, hat sie dem Mann.

Something whispered-to who there stands has she the man

If this assumption were correct, it would remain unclear why a topicalization of this constituent, as given in (67) should lead to ungrammaticality. Büring and Hartmann (1996, p. 197) assume that (67) is ungrammatical because the extraposed relative clause does not c-command its 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 evacuated from VP before it has been topicalized. To derive the ungrammaticality of (70), the dative DP has to remain outside the core VP after the VP has be reconstructed, as indicated in (68).

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

Why should it be impossible to reconstruct the dative NP? The movement of this NP is considered an instance of A-movement. Büring and Hartmann (1996) follow a long tradition in assuming that A-movement is exempt from reconstruction. This hypothesis, however, has been disputed, as can be witnessed in comparing Lasnik (1999) and Boeckx (2001). While Lasnik argues in favor of the exemption hypothesis, Boeckx presents counter-examples. 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 (69).

(69) A unicorn seems \([s \ t_i \text{ to sit in the garden}] \Rightarrow_{LF} \text{ seems [s a unicorn to sit in the garden]}\)
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 seems implausible that this type of reconstruction is generally forbidden.

In light of the present framework, it does not matter whether the example in (68) is affected by reconstruction. 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 (70).

(70) *Etwas zugeflüstert, der dort steht, hat sie dem Mann.

The ungrammatical example in (70) is thus just the opposite of the grammatical examples in (13), (14), and (62): While anchors are available in examples (13), (14), and (62), there are no available anchors for the relative clause in (70).

3.3 **Word Order and Bound Variable Anaphora**

The examples in (71) 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 Büring 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 (71b).  

---

40 This observation actually goes back to Werner Frey.
(71) a. Wir haben niemandem, die Frage, gestellt, auf die er sich vorbereitet hatte.  
we have no-one the question asked on 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 on which he refl prepared had

The pattern observed in (71) matches the behavior of bound variable anaphora in double object constructions, as can be witnessed by (72).

(72) a. Er hatte [seiner Partnerin jede Tänzer vorgestellt].  
He had his partner every dancer introduced  
‘He had introduced every dancer to his partner.’

b. Er hatte [jeden Tänzer seiner Partnerin vorgestellt].  
He had every dancer his partner introduced  
‘He had introduced every dancer to his partner.’

In (72a), the dative object precedes the quantificational accusative object. I assume with Kiss (2001) that variable serializations of the arguments of the verb are directly reflected in the layered structure of the local binary trees, as is indicated through the bracketing in (72). If the quantifier is configurationally inferior to the variable contained in the dative object, as in (72a), the quantifier must not bind it. In (72b), the quantificational accusative precedes the dative object and is thus configurationally superior to it. The quantifier can bind the pronoun contained in the dative object, giving rise to a bound variable reading. For German,

\[\text{\footnote{For further discussion of German clause structure and scope, the reader is referred to Frey (1993) and Kiss (2001).}}\]
it seems uncontroversial to assume that quantifiers bind pronouns only if the quantifier is syntactically superior to the pronoun; quantifier raising on the level of Logical Form, however, is not sufficient to license such a relation.\textsuperscript{42} This assumption receives additional support from the observation that inverse linking (May 1985) is impossible in German, as can be illustrated by example (73). The intended but ungrammatical interpretation of (73) can be rendered as given in (74). In any case, the ungrammaticality of (73) under the intended reading stands contrast with grammatical, inversely linked examples from English, as given e.g. in (75).

(73) *Ein [Angestellter [jedes Kandidaten,]] hatte ihn, betrogen.

\hspace{1cm} an [employee [every candidate]] had him betrayed.

(74) Every candidate, employs someone who betrays him.\textsubscript{i}

(75) A [citizen of [every Californian city,]] despises it.

In order to account for the contrasts in (71) and (72), as well as for the ungrammaticality of (73), I suggest the following informal condition on variable binding:

(76) \textit{Condition on Variable Binding:}

\hspace{1cm} A quantificational DP can only bind \textit{free} pronouns that are contained in the syntactic sister of the quantificational DP.

While a more precise formulation of (76) must await future research, we may still built on the insight that variable binding is determined by the configuration in which the binding quantifier is realized (cf. Lechner 1997, Kiss 2001).

\textsuperscript{42} As has already been observed in Frey (1993, p. 105f.), the reason for the ungrammaticality of (72a) cannot be sought in terms of a weak crossover violation, since weak crossover violations are possible on the surface in German, as is illustrated in (72b).
As for the concept of a free pronoun, I will restrict myself to a negative formulation: in the configuration \([QP, \ldots, [DP, \ldots, [\ldots \text{pronoun}, \ldots]]]\) the quantifier can only bind the pronoun if \(DP\) is a pronoun as well.

With these prerequisites, let us now consider the syntactic structure of the examples in (71), as is illustrated for (71a) in (77). Here, the relevant pronoun is indicated through the subscript \(\square\).

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

![Syntactic structure diagram](image)

Example (77) satisfies Generalized Modification – the phrase to which RP is adjoined contains the anchor issued by the accusative object, as indicated through the equation \([i, hn] = (\square, h1)\). In addition, (77) also satisfies the Condition on Variable Binding, since the variable is contained in the syntactic sister of the quantifier.

A simultaneous satisfaction of the two aforementioned conditions is barred in (71b). Two alternative analyses are possible for (71b), given in (78) and (79).
(78) *Wir haben die Frage niemandem gestellt, auf die er sich vorbereitet hatte.

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

In (79), the Condition on Variable Binding is met: the quantifier is configurationally superior to the RP and has access to the variable contained in it. However, the identification requirement imposed by the RP cannot be satisfied in (79). The only available anchor for the RP in (79) is the one of the verb, which obviously is of the wrong type.

In (78), the RP is adjoined to the VP. This structure meets the identification requirement of the RP: the anchor of *Frage, i.e. \( \{h1\} \), is available. But the quantifier in the lower V' does not have access to the variable contained in the RP, since the variable is not contained in the syntactic sister of the quantifier. Hence, the Condition on Variable Binding is violated.

One could argue that the ungrammaticality of (71b) is either due to scopal constraints on word order or to a constraint which prohibits simultaneous scrambling and extraposition.
That neither scopal constraints nor prohibitions of extraposition from scrambled phrases are at stake here, can be illustrated by (80) and (81).\textsuperscript{43}

\begin{enumerate}
\item (80) a. Wir haben niemandem die Frage gestellt, die jeder erwartet hatte.
\begin{quote}
we have no-one the question asked which everybody expected had
\end{quote}
\item b. Wir haben die Frage niemandem gestellt, die jeder erwartet hatte.
\begin{quote}
we have the question no-one asked which everybody expected had
\end{quote}
\end{enumerate}

‘No one was asked the question which was expected by everybody.’

\begin{enumerate}
\item (81) Es erwies sich, dass sein Herz es war, dessen Schlag er außer sich hörte.
\begin{quote}
it turned-out refl that his heart it was whose beat he outside-of refl heard
\end{quote}
\end{enumerate}

‘It turned out that it was his heart which he heard pounding outside of him.’

If no bound variable anaphora reading is induced, reordering the quantifier does not affect the grammaticality of the sentences. This is illustrated in (80). The example in (81) further supports our assumption that the ungrammaticality of (71b) 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. The plausible conclusion is that extraposition from dislocated elements is generally possible in German.

For some speakers of German, the contrast in (71) seems to vanish if the binder is a universal quantifier, as illustrated in (82).\textsuperscript{44}

\textsuperscript{43} The example (81) has been taken – in slightly edited form – from Thomas Mann’s \textit{Zauberberg} (The Magic Mountain, Frankfurter Ausgabe, p. 127).

\textsuperscript{44} I would like to thank an anonymous reviewer for pointing this out to me.
(82) a. Wir haben jedem_i die Frage_j gestellt, auf die_j er_i sich
we have every-one the question asked on which he refl
vorbereitet hatte.
prepared had
b. Wir haben DIE FRAGE_j jedem_i gestellt, auf die_j er_i sich
we have the question every-one asked on which he refl
vorbereitet hatte.
prepared had
‘Everyone was asked the question that he expected.’

The proposed grammaticality of (82b), which requires putting stress on the scrambled con-
stituent, as indicated through capitalization, stands in clear contrast to the ungrammaticality
of (71b). Now since the latter does not even allow a bound variable reading if the scrambled
constituent is focused, the stress pattern in (82b) seems to play a secondary role.\(^{45}\) If this
assumption is correct, the contrast between (71b) and (82b) must be derived from different
properties of the quantifiers involved, a negative one in (71b), and a universal one in (82b).
Interestingly, this pattern follows a distinction of universal and negative quantifiers in cases
of so-called dynamic binding – also known as \textit{donkey anaphora} (cf. Kamp and Reyle (1993)).\(^{46}\) Dynamic binding is illustrated in (83).

\(^{45}\) This is not to say that this role can be neglected. In particular, the stress pattern in (82b) creates an effect
whereby the nuclear VP \textit{jedem gestellt} is taken to be presupposed as part of the background information, thus
providing a context that is similar to the contexts that license dynamic binding (cf. below). I would like to
thank an anonymous reviewer for pointing this out to me. That stress placement may interfere with scope de-
termination and variable binding has been discussed in Williams (1988, p. 143), Frey (1993, p. 83), and Krifka
(1998, p. 102), among others.

\(^{46}\) I would like to thank Winfried Lechner for pointing out the relevance of dynamic and implicit argument bind-
ing.
Every customer knows the rules. If he does not obey them, it is his own fault.'

Universal quantifiers differ from negative ones in allowing dynamic binding. This is further illustrated by the ungrammaticality of (84).

‘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 (71b) and (82b) is not one of variable binding, but one of dynamic binding in (82b). Dynamic binding – by its very nature – is not captured by the Condition on Variable Binding. Hence, it does not make any prediction pertaining to readings that are derived from dynamic binding, as in (82b). In any case, the condition is conclusive if dynamic binding is not available, as in (71b).

As a further case consider implicit variable binding, as illustrated in (85). 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).*
(85) a. Wir haben jedem\textsubscript{j} die Frage\textsubscript{j} gestellt, die\textsubscript{j} ein anderer\textsubscript{i} ausgewählt

we have every-one the question asked which an other chosen

hatte.

had

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

b. *Wir haben die Frage\textsubscript{j} jedem\textsubscript{i} gestellt, die\textsubscript{j} ein anderer\textsubscript{i} ausgewählt hatte.

We have the question every-one asked which an other chosen had

The impossibility of (85b) is directly derived from the Condition on Variable Binding together with the identification requirement for RPs, as has been already discussed for example (71b).

The Condition on Variable Binding is silent on the identification of relative pronouns, which must not be considered as variables in the first place. To illustrate this point, consider example (28) again, which is repeated here under (86).

(86) Er sagte dies, weil ihm jeden Mannes Tod naheging

He said that because him every man’s death touched

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’

In (86), the relative pronoun does not count as a variable bound by the quantifier, but instead, it is identified with the anchor introduced by the EP of the quantifier’s restriction, i.e. by the EP introduced by Mannes. A quantifier never binds relative pronouns since relative
pronouns do not introduces variables. Instead, they are identified due to the identification requirement given in (56).

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)). 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. Hence scrambled arguments cannot be syntactically distinguished from non-scrambled ones. If these assumptions are combined, the contrast in (71) obviously cannot be accounted for: in these frameworks, the syntactic structures of (71a) and (71b) do not differ from each other, the differences between these examples being due to pheno-grammatical operations.

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. Under the assumption of a quantifier raising (QR) analysis of quantification, (71b) would receive the LF representations in (87), 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). In (87), \( t \) is the trace of the LF-moved quantifier \( niemandem \). Let us further suppose that no additional mechanisms are involved that block movement of the quantifier to the highest projection of VP. Hence, the quantifier is not forced to stay below the RP.

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


49 I would like to thank an anonymous reviewer for pointing this out to me.
(87) *Wir haben die Frage niemandem gestellt, auf die er sich vorbereitet hatte.

It is obvious that the quantifier c-commands the variable pronoun contained in the RP in (87). 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

I have discussed three properties of extraposed relative clauses in German:

- Extraposed relative clauses apparently violate 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 can be derived from the assumption that extraposed relative clauses do not differ in their modification requirements from non-extraposed relative clauses: relative clauses can simply be adjoined to a wide categorical range of phrases, provided that these phrase contain suitable antecedents for the relative clause. Suitable antecedents for relative clauses are index handle pairs, so-called anchors. They may project almost freely 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.

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