Constraint-Based Approaches to Germanic Syntax

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Configurational and Relational Scope Determination in German

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6.1 Introduction

It is customary to assume that the relative scope of a quantified NP in German is determined in accordance with its position in the clause: if the position of all arguments of a given verb in the clause follows the basic word order, the relative scope of the quantified NPs corresponds to its configurational and linear prominence. In such a setting, subjects unambiguously receive scope over objects and the indirect object unambiguously receives scope over the direct object. If the order of quantified arguments does not correspond to the basic word order, the scope of quantified arguments tends to become ambiguous. In this respect, German differs from English, where matters of position and word order variation enter into scope determination to a much lesser degree.

This paper investigates two recent proposals on scope in German, Frey (1993) and Lechner (1997). These proposals suffer from certain deficiencies, which are mainly due to the assumption that scrambling is movement. Moving the quantifier results in a trace in its base position which can directly or indirectly enter into scope determination. If traces are considered for scope determination, systematically more readings are derived than are actually available. We propose an alternative analysis which eschews the use of traces for scrambling and rests on the idea that both configurational and relational properties are relevant for scope determination in German.

In certain languages the surface position of a quantifier is relevant for the determination of its nuclear or relative scope if the word or-
der is unmarked.\textsuperscript{1} In this respect, Japanese (Hoji, 1986; Aoun and Li, 1993), Korean (Joo, 1989) and German (Frey, 1993; Lechner, 1997) differ significantly from English (May, 1985; Aoun and Li, 1993; McCawley, 1999). In the unmarked order in German, the indirect object (IOBJ) precedes the direct object (DOBJ), as is illustrated in the subordinate clause in (1a). Given this order, the subordinate clause in (1a) turns out to be unambiguous with respect to quantifier scope: the IOBJ receives wider scope than the DOBJ. Contrary to the interpretation of similar examples in English, other readings are not available.

If the realization of arguments of the verb does not follow the un-marked linearization pattern IOBJ > DOBJ, however, as in the subordinate clause in (1b), the sentence becomes ambiguous. Thus, the subordinate clause in (1b) has a reading which corresponds to the interpretation of the subordinate clause in (1a) in addition to the surface induced reading where the DOBJ receives wider scope than the IOBJ.\textsuperscript{2}

(1) a. Es ist nicht der Fall, daß er mindestens einem Verleger fast jedes Gedicht anbot.
   
   it is not the case that he at-least one publisher almost every poem offered
   
   'It is not the case that he offered at least one publisher almost every poem.'

   b. Es ist nicht der Fall, daß er fast jedes Gedicht mindestens einem Verleger anbot.
   
   it is not the case that he almost every poem at-least one publisher offered
   
   'It is not the case that he offered almost every poem to at least one publisher.'

   And similarly, (2b)—where the DOBJ is realized to the left of the subject (SUBJ)—is ambiguous, while (2a) receives a unique interpretation.

\textsuperscript{1} We borrow the notion of unmarked word order from works such as Stechow and Sternefeld (1988, ch. 12), where German word order and the unmarked one is discussed extensively.

\textsuperscript{2} In the translations of the German examples into English, we will make use of the following conventions: Unambiguous German examples will be translated into unambiguous English examples, if possible. Thus, we have used the double object construction as a translation for (1a) but the dative construction in (1b). According to Aoun and Li (1993) and Kuno et al. (1999), the English double object construction does not lead to ambiguity if both objects are quantificational while the dative construction does. Since transitive constructions are generally acknowledged to be ambiguous in English, the following convention is used: If the German sentence is unambiguous, the active transitive construction is used as a translation, if the German sentence is ambiguous, the by-passive construction is used as a translation.
(2) a. Es ist nicht der Fall, daß mindestens eine Studentin fast jeden Professor traf.  
   it is not the case that at-least one student almost every professor met  
   'It is not the case that at least one student met almost every professor.'

b. Es ist nicht der Fall, daß jeden Professor mindestens eine Studentin traf.  
   it is not the case that almost every professor at-least one student met  
   'It is not the case that almost every professor was met by at least one student.'

While Frey (1993) and Haider (1993) suggest that the configurations in (1b) and (2b) induce ambiguities independent of the quantifier type involved, it has been argued that the examples in (1b) and (2b) are in fact not ambiguous. According to Pafel (1993) and Lechner (1997) an ambiguity occurs only if the dislocated quantifier is a weak quantifier.³ Lechner (1997) defines a weak quantifier as an NP headed by a weak determiner which shows up in the English existential construction. Accordingly, cardinals (3a), indefinite quantifiers like irgendein (‘some’) (3b), as well as viele (‘many’) (3c) can be classified as weak determiners.

(3) a. Drei Bücher hat dieser Mann gelesen.  
   three books has this man read  
   'This man has read three books.'

b. Irgendein Mann hat jedes Buch gelesen.  
   somebody man has every book read  
   'Some man has read every book.'

c. Viele Studenten haben kein Buch gelesen.  
   many students have no book read  
   'Many students have not read any book.'

The examples in (4) and (5) differ from the ones given in (1) and (2) in that the dislocated quantifier is a weak one. Following Pafel (1993) and Lechner (1997) (4b) and (5b) are considered ambiguous while (1b) and (2b) are not.

³The notion weak quantifier goes back to Milnark (1974), and is also discussed in Barwise and Cooper (1981, 1982). Lechner's definition deviates from the one given in Milnark in including partitives in the class of weak quantifiers.
(4) a. Es ist nicht der Fall, daß er fast jedem Verlag irgendein Gedicht für diesen Sammelband anbot.
   *it is not the case that he almost every publisher some poem for this collection offered*
   'It is not the case that he offered almost every publisher some poem for this collection.'

   b. Es ist nicht der Fall, daß er irgendein Gedicht fast jedem Verlag für diesen Sammelband anbot.
   *it is not the case that he some poem almost every publisher for this collection offered*
   'It is not the case that he offered some poem to almost every publisher for this collection.'

(5) a. Es ist nicht der Fall, daß fast jeder Professor irgendeine Studentin auf dem Campus traf.
   *it is not the case that almost every professor some student on the campus met*
   'It is not the case that almost every professor met some student on campus.'

   b. Es ist nicht der Fall, daß irgendeine Studentin fast jeder Professor auf dem Campus traf.
   *it is not the case that some student almost every professor on campus met*
   'It is not the case that some student was met by almost every professor on campus.'

I cannot follow Pafel (1993) and Lechner (1997) in their assumption that only weak quantifiers induce ambiguities after dislocation in German, at least it does not conform to my intuition. But let us assume that Pafel and Lechner's position can be maintained. I will show then that Frey (1993)'s and Lechner (1997)'s analyses share certain concepts pertaining to the nature of dislocation which are problematic insofar as they allow the derivation of readings which are not present in the given data. It will become apparent that the problematic aspect concerns the use of traces for scope determination, either directly, as in Frey's proposal, or indirectly, as a trigger for reconstruction, as in Lechner's proposal. We will begin by discussing Frey's proposal, and then continue with Lechner's proposal.

Frey (1993)—following Hoij (1986)'s approach to Japanese—assumes that the ordering of subjects, direct and indirect objects is base generated in (1a) and (2a) but derived by a movement operation in (1b)

---

4 As will be briefly discussed in section 1.6 of the present paper, similar reasons have led Aoun and Li (1993) to dismiss certain types of traces in their analysis of scope in English, Chinese, and Japanese.
and (2b). As indicated in (6), the movement of the DOBJ in (1b) leaves a trace in the position where it surfaces in (1a).

\[(6) \text{ daß er fast jedes Gedicht mindestens einem Verlag angeboten hat} \]

\[\begin{array}{c}
\text{S} \\
\text{NP} \\
\text{er} \\
\text{fast jedes Gedicht} \\
\text{mindestens einem Verlag} \\
\text{angeboten hat} \\
\text{NP'} \\
\text{V'} \\
\end{array}\]

In Frey's proposal, traces form part of the interpretative machinery required to determine syntactic constraints on possible interpretations. From the representation in (6) Frey derives both readings of (1b) through his *Scope Principle* ('Skopusprinzip'), an informal version of which is given in (7).\(^5\)

\[(7) \text{Scope Principle:} \]

A quantifier phrase \(\alpha\) may receive scope over a quantifier phrase \(\beta\) if \(\alpha\) either c-commands \(\beta\) or a trace of \(\beta\).

The *Scope Principle* constrains the set of possible interpretations emerging from a syntactic structure. An interpretation may be derived from a given syntactic structure if it is supported by the configurations given in (7). Let us assume that \(Q_1\) and \(Q_2\) are argument quantifiers and \(\triangleright\) represents the relation of the first quantifier outscoping the second one. If a sentence allows the interpretation \(Q_1 \triangleright Q_2\), the *Scope Principle* predicts that \(Q_1\) either c-commands \(Q_2\), or a trace of \(Q_2\). The *Scope Principle* also systematically correlates scope ambiguities with movement: if \(Q_1\) moves to the left of \(Q_2\), \(Q_1\) c-commands \(Q_2\), and \(Q_2\) c-commands the trace of \(Q_1\).

It follows from (7) that (6) allows two readings, one emerging from the dislocated DOBJ c-commanding the IOBJ, the other from the latter

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\(^5\)This formulation of the *Scope Principle* covers nominal quantifiers only. Frey (1993, 205ff.) offers a more general version which also handles scope options of modal verbs, adverbials and negation. The initial formulation of the *Scope Principle* in Aoun and Li (1993, 11) bears close resemblance to the simpler formulation of Frey's *Scope Principle* used here. The final version of the *Scope Principle* in Aoun and Li (1993, 88), however, differs significantly from Frey's *Scope Principle* in allowing only intermediate traces to enter into scope determination. Cf. section 1.6 below.
c-commanding the trace of the former. Although this approach seems to be appealing intuitively, it raises problems since it allows the derivation of more readings than are available in certain orderings of quantified arguments. This can be illustrated with (8).

(8) Ich glaube, daß mindestens einem Verleger fast jedes Gedicht nur diesem Dichter angeboten hat.

'I believe that only this poet has offered at least one publisher almost every poem.'

In (8) both IOBJ and DOBJ are realized to the left of the subject, but still retain their basic order with respect to each other. The syntactic structure contains two traces, one for each of the scrambled objects (cf. Frey, 1993, 189). Since each object c-commands the traces, Frey predicts that each object may be interpreted as having scope over the other one. An inverse reading of the quantifiers, however, i.e., a reading where the direct object receives wider scope than the indirect one, does not seem to be available in (8).

In this example we have assumed that the subject is non-quantificational. If a quantificational subject is added, even more problematic predictions can be derived. This is illustrated in (9).

(9) Ich glaube, daß fast jeder Frau mindestens einen Strauß drei Floristen zusammengestellt.

'I believe that three florists arranged at least one bouquet for almost every woman.'
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Applied to (9), Frey’s *Scope Principle* does not only predict that each object may receive wide scope, but also that the subject may receive intermediate scope between both quantifiers, independent of the relative scope of the other quantifiers. Hence, (9) should support all six interpretations indicated in (10), where the intermediate readings are given in boldface.

(10) a. IOBJ DOBJ SUBJ  
    b. SUBJ IOBJ DOBJ  
    c. SUBJ DOBJ IOBJ  
    d. IOBJ SUBJ DOBJ  
    e. DOBJ SUBJ IOBJ  
    f. DOBJ IOBJ SUBJ

The interpretation in (10a)—for *almost every woman there is a bouquet which has been arranged collectively by three florists*—is derived from the in-situ positions of the quantifiers, i.e., the IOBJ c-commanding the DOBJ which in turn c-commands the SUBJ. (10b) is derived from the SUBJ c-commanding the traces of both indirect and direct object and the IOBJ c-commanding the DOBJ. Here, the subject NP is interpreted distributively, while the interpretation for the objects follows the one given for (10a). For (10c), the SUBJ again c-commands the traces of both objects, but now, the DOBJ c-commanding the trace of the IOBJ is taken as relevant.6

To derive (10d), the first intermediate reading, the IOBJ c-commanding the SUBJ, and the SUBJ as well as the IOBJ c-commanding the trace of the DOBJ are taken as relevant for scope determination. Its interpretation would be that *for each member of a set of women, there are three florists who collectively arrange a bouquet*. To derive (10e), the second intermediate reading, the DOBJ c-commanding the SUBJ, and

6 At first sight, one could assume that the interpretation of (10c) is implausible, and hence, that an exclusion of (10e) is not required from a syntactic point of view. A situation can easily be envisaged where three florists distributively provide at least three types of bouquets for almost every woman. This would be the most natural interpretation of (i). Example (10f) is truly implausible in this sense, its most natural, and still cumbersome interpretation being *that there is at least one bouquet which has been arranged for every woman and the arrangement was carried out by three florists for every woman*. Hence, if the cardinality of woman would be five, this would amount to 15 florists arranging a single bouquet.

(i) Ich glaube, daß drei Floristen mindestens einen Strauß fast jeder Frau

1 believe that three florists at least one bouquet almost every woman

zusammenstellten.

arranged
the SUBJ as well as the DOBJ c-commanding the trace of the IOBJ are
exploited. Its interpretation would be that there is at least one bouquet
which has been collectively arranged for every woman by three florists.
The derivation in (10f), finally, is the result of the IOBJ and DOBJ
c-commanding the SUBJ while the DOBJ c-commands the trace of the
IOBJ.

Contrary to this prediction, (9) can be considered as being ambiguous
in two ways, viz. between a wide and a narrow scope reading of
the subject. Thus, only the readings in (10a) and (10b) are actually
available.

Although Lechner (1997)’s assumptions pertaining to German clause
structure differ in its details from the one proposed by Frey, these differ-
ences are orthogonal to the problems reported here and hence can be
ignored in the following discussion.7 Lechner (1997) assumes that narrow
scope readings of dislocated quantifiers in examples like (11), i.e., ∀ > ∃,
come about as a result of optional semantic reconstruction, where sem-
antic reconstruction is described as the “semantic effect of λ-converting
the descriptive content of the [quantified] phrase into the position of the
. . . trace” (Lechner, 1997, 5). So in contrast to Frey’s proposal, where
traces enter directly into interpretative constraints, traces are used in-
directly as indicators for possible semantic reconstruction in Lechner’s
proposal.8

(11) Ich glaube, daß irgendeinen Professor, fast jede Studentin traf.
1 believe that some professor almost every student met
(∃ > ∀ or ∀ > ∃ )

‘I believe that some professor was met by almost every student.’

It should be recalled here that Lechner assumes that only weak quan-
tifiers such as irgendein Gedicht allow for ambiguity after dislocation,
while examples like (12), in which the dislocated quantifier is not weak,
are considered unambiguous in his approach.

7Frey (1993), following Haider (1993) assumes that German clauses are projec-
tions of INFL. Lechner (1997) makes use of a model of German clause structure
where each projection of V is dominated by an AgrP, including a specifier which
attracts subject and objects (cf. Chomsky, 1995). Since AgrPs are local in the sense
that each object (or the subject) is directly dominated by its respective AgrP, the
structures after movement to AgrP in Lechner’s model are equivalent to the base
structures assumed in Frey’s model.

8As Lechner (1997) points out, traces do not serve for syntactic reconstruction
proper but as indicators for possible applications of λ-conversion in the semantic
component.
(12) Ich glaube, daß fast jeden Professor, irgendeine Studentin $t_i$ traf.  
$I$ believe that almost every professor some student met  
($\forall > \exists$)  
'I believe that for almost every professor there is a student such that the student met him.'  

This putative difference between (11) and (12) is explained in Lechner’s proposal by a condition which requires that only higher type traces trigger semantic reconstruction. A higher type trace, represented as $T$ in Lechner’s approach, is stranded by weak but not by non-weak quantifier phrases. Hence, (11) receives the representation in (13a) while (12) is represented as in (13b). Since a higher type trace is not available in (13b), the dislocated phrase cannot be reconstructed and thus a narrow scope reading is not available.\(^9\)  

(13)  
\begin{itemize}  
\item a. daß [irgendeinen Professor], fast jede Studentin $T_i$ traf  
\item b. daß [fast jeden Professor], irgendeine Studentin $t_i$ traf  
\end{itemize}  

It should be stressed for the following discussion that Lechner—\(^9\)In the following exposition, we have simplified Lechner's structures. This simplification, however, is orthogonal to the point in question and can thus be viewed as syntactic sugar for the somewhat more complex structures Lechner is operating with.
following Milisark (1974)—considers both indefinites like *irgendein*, and cardinals as weak determiners, and moreover that he explicitly acknowledges the possibility that indirect and direct objects may strand higher type traces. Now consider examples like (14).

(14) Ich glaube.

a. daß er irgendwem drei Gedichte gewidmet hat
   *that he somebody three poems dedicated has*

b. daß er drei Gedichte, irgendwem T_i gewidmet hat
   *that he three poems somebody dedicated has*
   \((3 \geq i \text{ or } i \geq 3)\)

c. daß er drei Verlegern irgendein Gedicht angeboten hat
   *that he three publishers some poem offered has*

d. daß er irgendein Gedicht, drei Verlegern T_i angeboten hat
   *that he some poem three publishers offered has*
   \((3 \geq i \text{ or } i \geq 3)\)

The examples in (14a) and (14c) are unambiguous: the indefinite *irgendwem* receives wide scope over *drei Gedichte* in (14a), meaning that there is someone such that three poems were dedicated to this person. The same applies to (14c): three publishers have been offered one or another poem. The examples in (14b) and (14d) are ambiguous. This ambiguity is predicted by Lechner’s approach, since the weak quantifiers—*drei Gedichte* in (14b) and *irgendein Gedicht* in (14d)—leave a higher type trace. Semantic reconstruction, applying optionally, allows a narrow scope reading of *drei Gedichte* in (14b) and *irgendein Gedicht* in (14d), respectively, in addition to the wide scope readings.

The examples in (14) illustrate that both cardinals and indefinites have to be considered as weak quantifiers, and that these quantifiers interact in a non-trivial manner, meaning that the two readings to be derived from (14b) and (14d), respectively are not equivalent to each other.

Now consider an example which is structurally identical to the one presented above in (8), but differs from (8) in that both dislocated quantifiers are weak ones.

(15) Ich glaube, daß irgendeinem Verleger drei Gedichtbände nur dieser

1 believe that some publisher three poem-collections only this

Dichter angeboten hat.

*poet offered has*

‘I believe that only this poet has offered some publisher three collections of poems.’

Since both quantifiers leave higher type traces, semantic reconstruction is available for both of them. If the higher quantifier reconstructs
while the lower one does not, a problematic inverse reading emerges where each of the three collections of poems has been offered to a different publisher. Hence, the problem of non-existent inverse readings in Frey’s approach carries over to Lechner’s.

Given appropriate examples with weak quantificational NPs, Lechner’s proposal shares the problem illustrated in (9) and (10) with Frey’s proposal, too. In contrast to Frey’s analysis, in which examples of type (9) give rise to six possible scope interpretations, Lechner’s approach allows the derivation of only four readings. Lechner’s approach allows the derivation of intermediate subject readings given in (17b) and (17c), in addition to the narrow scope and wide scope readings of the subject in (17a) and (17d). His approach dismisses readings like $3_{\text{OBJ}} > 3_{\text{OBJ}} > 2_{\text{SUBJ}}$ and $2_{\text{SUBJ}} > 3_{\text{OBJ}} > 3_{\text{OBJ}}$, where the IOBJ is contained in the scope of the DOBJ while the SUBJ either takes widest or most narrow scope. The first one, which would correspond to Frey’s (10f), can neither be derived from the in-situ position of the quantifiers nor from a reconstruction; the second one, corresponding to Frey’s (10c), would require reconstruction of both quantifiers, but in this case, only $3_{\text{OBJ}} > 3_{\text{OBJ}}$ would be possible.


‘I believe that only two 20th century poets offered three collections of poems to a publisher.’

(17) a. in-situ interpretation of all quantifiers:

$(3_{\text{OBJ}} > 3_{\text{OBJ}} > 2_{\text{SUBJ}})$

b. reconstruction of IOBJ to $T_i$:

$(3_{\text{OBJ}} > 2_{\text{SUBJ}} > 3_{\text{OBJ}})$

c. reconstruction of DOBJ to $T_j$:

$(3_{\text{OBJ}} > 2_{\text{SUBJ}} > 3_{\text{OBJ}})$

d. reconstruction of IOBJ to $T_i$ and DOBJ to $T_j$:

$(2_{\text{SUBJ}} > 3_{\text{OBJ}} > 3_{\text{OBJ}})$

To sum up, both Frey and Lechner predict unavailable readings. They differ in so far as in Frey’s approach a dislocation of any quantificational NP may lead to ambiguity while in Lechner’s approach only dislocated weak quantificational NPs trigger ambiguity. Also, Frey’s constraint-based approach to scope determination offers more (illicit) readings than Lechner’s reconstruction-based analysis.

In the following, we will first present our assumptions concerning German clause structure. Apart from our analysis of scrambling, these
differ from the assumptions made in Frey (1993) in minor details only. In
the present approach, word order variation is not derived by movement
operations, but base-generated.

Scope relations will then be described as being dependent on both
configurational and relational properties in section 1.3. It will be crucial
to our approach to assume that the scope of a quantifier can either be
determined configurationally or relationally. In the first case, the nuclear
scope of the quantifier is identical to the semantic contribution of the
syntactic sister of the quantifier, as indicated in (18), where \( q \) is the
semantic contribution of the QP and \( i \) is the semantic contribution of
XP.

(18) **Configurational Scope Determination**

\[
\begin{array}{c}
\text{XP:} q(i) \\
\text{QP:} q \quad \text{XP:} i
\end{array}
\]

In the second case, the scope of a quantifier will be the semantic con-
tribution of a less oblique co-dependent. Hence the scope of an indirect
object can be the direct one, independent of the syntactic position of
IOBJ and DOBJ. Relational scope determination can apply even though
the quantifier which takes wider scope is syntactically less prominent
than the quantifier which is embedded in the scope of the former. Since
quantifiers are free to determine their scope either configurationally or
relationally, we predict ambiguities whenever the configurational real-
ization of a quantifier does not conform to its relational properties. This
is indicated in (19), where the direct object, being relationally inferior
to the IOBJ, is realized in a syntactic position which is configurationally
superior to the position of the IOBJ. Here, \( i \) is the semantic contribution
of XP, \( q \) is the semantic contribution of the IOBJ and \( p \) is the semantic
contribution of the DOBJ.

(19) **Relational Scope Determination**

\[
\begin{array}{c}
\text{XP:} q(p(i)) \\
\text{QP:} p \quad \text{XP:} q(p) \\
\text{QP:} q \quad \text{XP:} i
\end{array}
\]

Examples like (8) and (15) will not be analyzed as being ambiguous
in the present proposal. This result is due to the fact that the indirect
object is configurationally and relationally superior to the direct object,
even though both objects are realized to the left of the subject. The
same considerations will prohibit inverted and intermediate readings in
elements of type (9) and (16), where all three arguments of the verb are
quantificational. The present approach thus allows for the derivation
of fewer readings than either Frey's or Lechner's approach and does
not encounter the problems mentioned above. Taking the distinction
between weak and non-weak quantifiers into account, we will present
two versions of the Scope Principle, one considering weak quantifiers
while the other applies to any kind of quantifier.

6.2 Word Order and Subcategorization

The linearization of complements (and adjuncts) in German is less con-
strained than, e.g., the linearization of these elements in English. At
least some of the linearization options have semantic reasons.10

If a quantifier is realized to the left of another quantifier, a wide
scope reading becomes possible. Given this assumption, we will take it
as a working hypothesis that the ordering of complements in the German
Mittelfeld is unrestricted, but additional constraints will filter out certain
linearization patterns.11 In the following analysis, I will assume a binary
structure of the German clause, where modifiers and complements are
added one-by-one to the verbal head, as is illustrated in (20).12

(20) daß er oft jedem Frau eine Geschichte erzählt

that he often every woman a story told

'Often, he told every story to a woman.'

10As can be illustrated by the examples given in (i) and (ii), some linearization op-
tions definitely do not have semantic reasons. Although the linearization of an IOBJ
preceding the DOBJ is unmarked in general, it is considered strictly ungrammatical
by many German speakers if both IOBJ and DOBJ are pronouns, as in (ii). In this
case, it is required that the DOBJ precedes the IOBJ, as illustrated in (i). For a

(i) Sie hat es ihm gegeben.
   she has it him given

(ii) *Sie hat ihm es gegeben.
    she has him it given

'She gave it to him.'

11We will not discuss these constraints in the present paper for the simple reason
that their nature and application is currently not properly understood. Most authors
agree that the constraints governing linearization have to be considered as being weak
(cf. Stechow and Sternefeld, 1988; Uszkoreit, 1987). This means that they can not be
considered as being mutually consistent, and certain linearization patterns will
satisfy certain constraints but violate others.

12Arguments in favor of this position and a comparison with alternative flat-
structure approaches are presented in Kiss (1995), further arguments for a binary
branching structure of German from the perspective of the Theory of Principles and
Parameters are presented in Haider (1993).
Instead of assuming schemata 1 and 2 from Pollard and Sag (1994), we propose the following schema to derive the binary branching structure in (20).

\[(21) \text{Complementation Rule Schema} \]
\[\text{phrase} \]
\[\text{dtrs} \quad \text{[head-complement-structure]} \]
\[\text{[head-dtr sign]} \]
\[\text{comp-dtr sign} \]

According to (21), a phrase may contain a head daughter and exactly one complement daughter (cf. Kiss, 1995, 219ff.).\(^{13}\) Given the proposed syntactic framework, the relative order of complements cannot be derived by ordinary linear precedence (LP) rules because these normally require the ordered elements to be dominated by the same projection (cf. Gazdar et al., 1985).

We will integrate the relative freedom of complements in German into the present framework by assuming that the subcat attribute is not list- but set-valued. This view is found in Pollard (1996) and Hinrichs and Nakazawa (1994). Under it, the Subcategorization Principle will be given the following formulation:

\[(22) \text{Subcategorization Principle:} \]

The subcat value of the head daughter equals the union of the set derived from the comp-dtrs list with the subcat value of the phrase.

As an illustration, consider the analysis of the example in (23). Since the Complementation Rule Schema in (21) requires that the comp-dtrs

\(^{13}\)As for the combination of a modifier and a head, we assume the schema for modification presented in Pollard and Sag (1994). To derive the relative but semantically justified freedom of modifiers in the present framework, I will assume that adjuncts may be freely introduced into a structure, i.e., adjoined to any given projection. For a more detailed view on modification and its semantic reflexes, cf. Kiss (2000).
list contains exactly one element, the subcat value of the projections in (23) corresponds to the subcat values of the respective head daughters modulo the realized element in accordance with the subcategorization principle in (22).

\[(23) \quad \text{daß er oft jede Geschichte einer Frau} \text{ erzählte}
\]

\[\text{that he often every story} \quad \text{a woman told}
\]

\[\text{'that he often told every story to a woman'}\]

It has been argued that relaxing the subcat list to a subcat set does not allow the use of the subcat value for matters of relational prominence, i.e., obliqueness, any longer. This objection is actually correct. But, as the following sections will make clear, we do not employ the subcat value but the value of arg-st (for argument structure) for the representation of grammatical prominence (cf. section 1.3). Both scope options and binding constraints (the latter not being discussed in the present paper) will be handled by referring to arg-st. The subcat set thus remains the pure host of the valence of a sign, without indicating the relational hierarchy within the elements whose realization is required by a head.

Before we return to the analysis of scope in German, a property of the present model which is shared with the models of Frey (1993) and Lechner (1997) should be made explicit: here, as well as in the other frameworks mentioned, linear precedence is related to configurational prominence in the sense that an argument which is syntactically realized to the left of its co-arguments is also found in a syntactic position which is more prominent than the positions of its co-arguments, as can be witnessed for the direct object in (23). The difference between the present approach and the approaches by Frey and Lechner pertains to the status of traces to model word order regularities: traces are not
employed in the present approach. The relation between linear precedence and configurational prominence, however, will be exploited in our analysis of scope.

6.3 Scope, Obliqueness and Subordination

According to Frey (1993), the relative scope of an NP-quantifier is governed by the following conditions:

1. An argument of a verb may receive wider scope than any other co-dependent(s) if the argument is realized to the left of the other co-dependent(s).

2. An argument of a verb may receive wider scope than other co-dependents if the argument c-commands the traces of the co-dependents.

The subject is configurationally the most prominent co-dependent. Any element which is realized to the left of the subject in Frey’s approach (as well as in Lechner’s) has to be scrambled across the subject. It follows that the subject c-commands the traces of the dislocated elements and hence may receive wider scope that any other co-dependent, irrelevant of the subject’s linear position in the clause.

In Pollard and Sag (1994), grammatical functions are defined by the obliqueness hierarchy on the SUBCAT list of a head. The least oblique element, the subject, occupies the left-most position on the SUBCAT list (provided there is one), other grammatical functions follow in order of their relative obliqueness.\footnote{The assumption that grammatical functions follow in a certain order on the hierarchy of obliqueness should not be confused with the assumption that there is a unique order of elements on such a hierarchy which could be defined independent of verb classes in a language. In German, e.g., most ditransitive verbs with dative and accusative objects can be classified such that the accusative object is more oblique than the dative object. Verbs of this class are used throughout the present paper. This is not the only class of ditransitive verbs in German with dative and accusative objects, however. For the verbs ausliefern (‘to hand over’) and unterstellen (‘to subordinate’), e.g., the accusative object is more prominent than the dative object, as is illustrated below (cf. also Stechow and Sternefeld, 1988, 455f.):}

(i) Er unterstellte die Truppen dem General,
    \textit{he subordinated the troops \textit{the general}}

(ii) \textit{?} Er unterstellte dem General die Truppen,
    \textit{he subordinated \textit{the general the troops}}
    ‘He subordinated the troops to the general.’

(iii) Er lieferte den Mann dem Gangster aus.

Recent reformulations of the general architecture of signs in HPSG starting with Pollard and Sag (1994, ch. 9) have led to a representation of grammatical prominence in terms of the ARG-ST list, which is a representation of the argument structure present in lexemes. Contrary to these approaches, we will assume that ARG-ST is present not only in lexemes, but in signs in general, particularly comprising phrases. This modification is achieved by assuming that ARG-ST forms part of the categorial specification of signs. As a CAT feature, it is projected according to the *Argument Projection Principle.*\(^\text{15}\) Making use of the hierarchy of grammatical functions on ARG-ST in terms of codependency and obliqueness, we can restate Frey’s insights as follows:\(^\text{16}\)

\[(24) \text{Quantifier Scope in German}\]

The scope of a quantifier is either the semantic contribution of the syntactic sister of the quantifier or the semantic contribution of a more oblique co-dependent of the quantifier.\(^\text{17}\)

\[(25) \text{(Less oblique) Co-dependency:}\]

A co-dependent of an element X is an element Y which is found on the same ARG-ST as X. X is less oblique than Y if X is realized to the left of Y on ARG-ST.

With a proper formulation of the condition in (24), traces are no longer needed as explanatory devices for scope determination. Instead, reference is made to the hierarchy of grammatical functions. With an account based on configurational and relational properties of a sentence, the non-ambiguity of examples like (26) receives a simple explanation: in such examples, the obliqueness hierarchy as expressed on ARG-ST and the syntactic structure are in perfect correspondence in the sense that each element on ARG-ST occupies a syntactic position which corresponds

\[\text{(iv) Er leistete dem Gangster den Mann aus.} \]

‘He handed over the man to the gangster.’

\(^\text{15}\) The *Argument Projection Principle* simply says that the ARG-ST of the head daughter corresponds to the ARG-ST of the phrase. One could object that a simpler treatment of ARG-ST projection could be achieved by assuming ARG-ST to be part of the head feature specification. ARG-ST could then project as a head feature. However, as Stefan Müller has pointed out, ARG-ST as a head feature would cause problems if we assume that head feature specifications are shared under coordination.

\(^\text{16}\) Both (24) and (25) could be reformulated in terms of local co-command (cf. Pollard and Sag, 1994, 253). The condition in (24) would be rendered as follows: The scope of a quantifier is either the semantic contribution of the syntactic sister of the quantifier or the semantic contribution of an element which is locally co-commanded by the quantifier.

\(^\text{17}\) As W. Lechner has pointed out, it is a fortunate consequence of this proposal that non-inverted clauses headed by unaccusative verbs are immediately classified as ambiguous by (24).
to its position on ARG-ST: \( \text{NP}_q \) outranks \( \text{NP}_r \) both configurationally, i.e., from its syntactic position, and relationally, i.e., viewed from its position on ARG-ST. Hence, the two disjoint conditions for scope determination in (24) are conflated. In each case, the semantic contribution of a more oblique quantifier happens to be the local scope of a less oblique quantifier because the former is selected as the semantic contribution of the syntactic sister of the latter.

(26) daß er fast jedem Verleger mindestens ein Gedicht anbot

_That he almost every publisher at least one poem offered_

‘He offered almost every publisher at least one poem.’

Recall that the formulation of the Subcategorization Principle allows the realization of the syntactic arguments in any order. Thus, the Subcategorization Principle may bring a direct object into a syntactic position in which it may take scope over the semantic contribution of its syntactic sister. As a consequence it may receive widest scope according to (24) even if it is the most oblique element on the ARG-ST list. But the realization of the argument does not change its position on the ARG-ST list. Thus, even if a more oblique argument is realized in front of a less oblique one, the order of elements on ARG-ST makes clear that the now syntactically more prominent element is relationally less prominent. So, an ambiguous example receives the representation in (27), where the syntactic position of the direct object, i.e., \( \text{NP}_r \), stands in contrast to its prominence on the obliqueness hierarchy represented by ARG-ST, where \( \text{NP}_r \) is outranked by \( \text{NP}_q \).
(27) daß er mindestens ein Gedicht fast jedem Verleger anbot

According to (24), the scope of the direct object in (27) may either be determined on the basis of its syntactic position (leading to wide scope) or on the basis of its position on ARG-ST (narrow scope).

Finally, a subject may receive widest scope independently of its syntactic position. In any case, it is the least oblique element on ARG-ST. Before we can turn this rather informal presentation of scope determination into the Scope Principle, we must clarify how the notion of semantic contribution is to be understood in the present framework.

6.4 Semantic Representations

The semantic contribution of a nominal sign consists of a referent, represented by an index, as well as conditions imposed on the referent, represented by a set of relations. In addition to individual referents, we will make use of event referents. Hence all major lexical categories can be represented as a pair consisting of an index (individual or event) together with a set of relations imposed on that index. The present proposal is an off-spring of a proposal first presented in Copestake et al. (1995)\(^\footnote{There are major differences between Copestake et al. (1995) and the present proposal, but these do not touch our present concerns and hence will not be discussed.}\)

In discussing adverbial modification, Copestake et al. (1995) show that if more than one intersective adverbial appears in a clause, an embedding representation of subordination will lead to spurious functor-argument orderings of the adverbials, as can be witnessed by the schematic representations for the sentence Yesterday, John met Jim in the park in (28)\(^\footnote{Here, we make use of Davidson's initial representations for expository purposes. It is well-known that these representations lead to problematic entailments, cf. Parsons (1990).}\).
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(28)  a. yesterday(in_the_park(meet(john, jim)))
    b. in_the_park(yesterday(meet(john, jim)))

They argue that the spurious ambiguity emerging with (28) justifies the introduction of event variables for verbs. Both adjectival and adver-
bial modifiers receive a treatment in terms of non-recursive embedding. As for the example given above, the sole introduction of event variables suffices to provide a unique, non-spurious analysis. This is illustrated in (29).

(29) e{[in_the_park(e), yesterday(e), meet(e, john, jim)]}

Copestake et al. (1995) argue that semantic representations in general should be non-embedding, i.e., not only intersective but also non-
intersective combinations should be treated by simply adding conditions to a given individual or event variable. The representation of quanti-
 fier scope in such a framework is addressed by adding handles to the representation language: they serve as indices for semantic subordina-
tion. In the present setting, we will equate the very notion of semantic contribution with the handle of a given element.

If we assume that the semantic representation of a quantifier has three parts—the naming of the variable bound by the quantifier, the re-
striction set of the quantifier and its nuclear scope—the latter two being conceived as the semantic arguments of the quantifier, then values of the latter two will not be semantic representations (as in the approach given in Pollard and Sag, 1994) but handles pointing to such representations. Using handles, we achieve the representation of (30a) in (30b), where the restrictor and the scope of the quantifier are distinguished by their respective handles 1 and 2.\footnote{From the representations in (30) a more familiar representation of the semantic contribution can be derived by replacing the handles in the argument slots of semantic functions by the semantic representations they point to. This operation makes the intended interpretation for handles apparent: if a handle belonging to a relation appears in the argument slot of another relation, the first is a semantic argument while the second is a functor being applied to the first. For (30) the result of this operation would be (i):

(i) every{x, (old(x), man(x)), sleep(e, x))}
}

(30)  a. Every old man sleeps.
    b. every0(x, 1, 2) & old1(x) & man1(x) & sleep2(e, x)

In the following, we will refer to the individual and the event vari-
ables as instances. The relations imposed on the instances will be called conditions. They are collected in the conditions set of an instance. The
members of the conditions set are relations, as they have been introduced in Pollard and Sag (1994). In addition to the standard attributes, each relation contains an instance and a handle feature, the instance determining which object is primarily constrained by the relation, and the handle determining the level of subordination.  

In general, a semantic contribution then consists of an instance, a handle assigned to this instance, and a conditions set imposed on this instance. The values of these features are constrained by the projection principles given in (31) to (33).

\[(31)\] Semantics Principle

The instance value of a headed phrase is identical to the adjunct daughter if the adjunct daughter is a semantic functor applied to the head daughter. In all other cases, the instance of a headed phrase is identical to the instance of the head daughter.  

What the Semantics Principle says is that the instance always projects from the head daughter to the phrase, except in the case where the adjunct daughter is an operator. In its effects, the formulation of the Semantics Principle in (31) differs from the version presented in Pollard and Sag (1994, 322) in that intersective adjunct daughters are not considered semantic heads.  

\[(32)\] Handle Projection Constraint

In a headed structure, the handle of the phrase is token identical to the handle of the quantifying non-head which takes the handle of the head daughter as the value of its scope attribute, and to that of the semantic head in all other cases.

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21 As an anonymous reviewer correctly remarks, quantificational relations do not introduce an instance attribute in Copestake et al. (1995). In order to indicate that the semantics of a quantifier should not be equated with a set of objects \(z\), where \(z\) is the variable bound by the quantifier, the variable is introduced by the attribute BV (for bound variable) of Copestake et al. (1995). In the following, we will make use of the attribute instance for both quantificational and non-quantificational relations, where the former is to be interpreted as a bound variable.

22 In terms of handle identification, the Semantics Principle would receive the following—albeit slightly confusing—rendering:

\[(1)\] Semantics Principle

In a headed phrase, the instance value is identical to that of the adjunct daughter if the handle value of the head daughter is token identical to one of the argument slots of the adjunct daughter, and with that of the head daughter otherwise.

23 This assumption is exploited in an analysis of extraposition developed in Kiss (2000).
(33) *Conditions Principle*

In a headed structure, the *conditions* set of the phrase is determined by the union of the *conditions* values of the daughters.

The *Handle Projection Constraint* requires that a handle of a quantifier is projected to the phrase only in the case that the quantifier takes the semantic contribution of the syntactic head as its argument. If this is not the case, e.g., in a case where a quantifier selects the semantic contribution of a more oblique co-dependent, the handle of the semantic head will project. Schematically, this is illustrated in (34) and (35). In (34) the quantifier QP₂ takes the semantic contribution of the head (V₀) as its argument. According to (32), the handle of the QP, i.e., 2, is projected. In (35) we assume that QP₂ takes the semantic contribution of the less oblique QP₁ as its argument. Accordingly, the handle of V₀ is projected.

(34) \[
\begin{array}{c}
\text{VP₂:QP₂(V₀)} \\
\quad \quad \quad QP₂ \quad V₀ [\text{ARG-ST} \langle xP₂, xP₁ \rangle]
\end{array}
\]

(35) \[
\begin{array}{c}
\text{VP₀:QP₂(QP₁)} \\
\quad \quad \quad QP₂ \quad V₀ [\text{ARG-ST} \langle xP₂, xP₁ \rangle]
\end{array}
\]

In general, the effect of (32) is that the handle of a semantic head remains available as argument for other operators if it has not been selected by its syntactic sister, as, e.g., in (35). Assuming that in (35) QP₁ now takes the still available VP₀ as its semantic argument, (36) will result. Here, QP₂ takes wider scope than QP₁ although QP₂ is the syntactic sister of V₀, i.e., it is configurationally less prominent than QP₁.

(36) \[
\begin{array}{c}
\text{VP₁:QP₂(QP₁(V₀))} \\
\quad \quad \quad QP₁ \quad \text{VP₀:QP₂(QP₁)} \\
\quad \quad \quad \quad \quad \quad QP₂ \quad V₀ [\text{ARG-ST} \langle xP₂, xP₁ \rangle]
\end{array}
\]

In (34) QP₂ has selected V₀ as its semantic argument. Consequently, QP₁ cannot take V₀ as its semantic argument any longer. Moreover, QP₁ is the most oblique element on the ARG-ST of V₀ and hence cannot take a more oblique co-dependent as its semantic argument. So QP₁ is forced to take the semantic contribution of its syntactic sister, i.e., the
handle of VP₂ as its semantic argument, resulting in a configurally triggered wide scope reading of QP₁ over QP₂. Following the Handle Projection Constraint, the handle of QP₁ is projected after combination, yielding the schematic representation in (37).

\[(37) \quad \text{VP₁:QP₁(QP₂(VO))} \]

\[\quad \text{QP₁} \quad \text{VPₐQP₂(VO)} \]

\[\quad \text{QP₂} \quad \text{VO [ARG-ST (XP₂, XP₁)]} \]

In the following, semantic contributions will not be represented by attribute-value-structures with feature INSTANCE, HANDLE, and CONDITIONS. For greater perspicuity, we will make use of a linear notation, which is illustrated in (38).

\[(38) \quad \text{inst}_{\text{handle}} = \{\text{rel}_{\text{handle}}(\text{arg}_1, \ldots, \text{arg}_n), \ldots\} \]

In (38) inst is the individual or event variable, i.e., the value of the INSTANCE attribute of the lexeme or semantic head, handle represents the value of the HANDLE attribute, rel is the relation's name, and arg₁, ..., argₙ are the argument slots of the relation and hence can either be handles or instances. Given the semantic representations illustrated above, we turn the rather informal presentation of scope determination given in section 1.3 into the Scope Principle, which determines which handle will become the value of the SCOPE attribute of a quantifier.

\[(39) \quad \text{Scope Principle} \]

The SCOPE value of a quantifier is either identical to the HANDLE of its sister constituent or to one of the HANDLES of its more oblique co-dependents, i.e., of an element occurring on the same ARG-ST, but to the right of the quantifier.

The application of the Scope Principle can be illustrated with the ambiguous example in (40).

\[(40) \quad \text{daß er fast jedes Photo einer Frau schenkte} \quad \text{that he almost every picture a woman gave} \]

\[\quad \text{‘that he gave almost every picture to a woman’} \]

According to (39), the quantifier einer Frau can either take the handle of the verb schenkte as its SCOPE value, or the handle of the more oblique quantifier jedes Photo. The ambiguity is depicted in the representation in (41), which describes the semantic contribution of the quantified NP einer Frau in (40). In (41), we make use of a further
notational simplification: the value of the scope attribute of the
quantifier, i.e., its second argument, is left open and will be represented by
a variable annotated with the possible values the variable may assume
according to the Scope Principle, in this case $\alpha_{0,3]}$.

(41) $y_2\{\exists_2(y, 4, \alpha_{0,3]}, \text{woman}_4(y)\}$

The condition “$\exists_2(y, 4, $\alpha_{0,3]}$)” describes the semantic contribu-
tion of the quantificational NP prior to scope determination. The
restriction of the quantifier is addressed by the handle 4. The scope of
the quantifier is determined by assuming a value for $\alpha$. In (41) the value
can either be the handle 0 or the handle 3. The former is the handle of the
syntactic sister of the quantifier, i.e., of the verb, the latter is the
handle of the DOBJ, being the sole more oblique element on the ARG-ST
of the head on which the IOBJ occurs.

If the first option applies, the Handle Projection Constraint requires
that the handle of the quantifier is projected to the phrase. After the
quantifier einer Frau has determined its scope, the quantifier fast jedes
Photo can only take scope over it, since the latter quantifier is the most
oblique element on the ARG-ST list, and thus can only take the handle of
its syntactic sister as its scope value. The structure in (42) is an instance
of the derivation of a configurationally determined wide scope reading
already given in (34) and (37).

(42) daß er fast jedes Photo einer Frau schenkte

\[
\begin{array}{c}
\exists_0\{\text{almost-every}_3(z, 5, 2), \text{picture}_3(z),
\exists_2(y, 4, 0), \text{woman}_4(y), \text{give}_0(e, x, y, z)\} \\
\exists_3\{\text{almost-every}_3(z, 5, \beta_{0,3}],
\text{picture}_3(z)\} \\
\exists_2\{\exists_2(y, 4, 0), \text{woman}_4(y),
\text{give}_0(e, x, y, z)\} \\
\exists_4\{\exists_2(y, 4, \alpha_{0,3]},
\text{woman}_4(y)\} \\
\end{array}
\]

In (42) the lower quantifier may select the handle of the verb while
the handle of the quantifier is projected. Not having a more oblique
element at its disposal, the direct object can only take the handle of its
syntactic sister, i.e., 2 as its argument.

The second option of scope determination for (40), following the lead
of (35) and (36), is illustrated in (43). Here, the indirect object quantifier
receives wider scope than the direct object, although the indirect object
is embedded more deeply in the syntactic structure.
(43) daß er fast jedes Photo einer Frau schenkte
\[
e_0 \{ \text{exists}_d(y, 4, 3), \text{woman}_4(y), \text{give}_0(e, x, y, z) \},
\]
\[
x_3 \{ \text{almost-every}_z(z, 5, \beta_{[0]}), \text{pictures}_5(z) \},
\]
\[
y_2 \{ \text{exists}_d(y, 4, \alpha_{[0, \alpha]}), \text{woman}_4(y) \}
\]

In this second reading, the quantifier einer Frau takes the handle of the more oblique quantifier fast jedes Photo, i.e., 3, as value of its scope attribute. Since the quantifier does not take the handle of its syntactic sister as its argument, it follows from the Handle Projection Constraint that the verb's handle, i.e., 0, is projected to the phrase. It hence remains available for the quantifier fast jedes Photo, which takes the verb's handle as its argument. Note again that the direct object can only take the handle of its syntactic sister as its argument since it is the most oblique element on ARG-ST. Thus, the second reading of the sentence is determined.

So far, the account seems to offer a strikingly simple analysis of argument scope in German. The required level of complexity, however, becomes apparent if readings emerging from sentences with more than two quantifiers are considered. In (44) the subject quantifier should always receive wide scope while either object may receive wider scope than the other one.

(44) daß zwei Dichter [Jedes Gedicht einer Frau widmeten]

\[\text{that two poets every poem a woman dedicated}\]

'Two poets dedicated every poem to a woman.'

Since the scope of the objects is determined locally within the bracketed part of (44), it seems as if the only option remaining for the subject quantifier would be to take the handle of its syntactic sister as its scope, as can be witnessed in (45) and (46). In the representation in (45) each quantifier selects the semantic contribution of its syntactic sister as its scope by selecting the appropriate handle. In (46) the IOBJ and the SUBJ do not select the semantic contribution, i.e., the handle, of their respective syntactic sister, but the handle of a more oblique co-

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24 Obviously, the analysis could be carried over to other languages which behave like German in this respect, cf. Hoijj (1986) and Aoun and Li (1993) for Japanese and Joo (1989) for Korean.
dependent. While the IOBJ selects the DOBJ, the SUBJ selects the IOBJ.

(45) daß zwei Dichter jedes Gedicht einer Frau widmeten
\(\exists_{\text{SUBJ}} > \forall_{\text{DOBJ}} > \exists_{\text{DOBJ}}\)

\[\begin{align*}
& \exists_{\text{SUBJ}} \{ y, 6, 0 \}, \text{dedicated}_0 \{ e, x, y, z \} \\
& x_1 \{ \exists_{\text{SUBJ}} \{ x, 4, \gamma \mid 2, \beta \} \}, e_1 \{ \text{every}_3 \{ z, 5, 2 \}, \exists_{\text{DOBJ}} \{ y, 6, 0 \}, \\
& \quad \text{dedicated}_0 \{ e, x, y, z \} \}
\]

\[\begin{align*}
& z_0 \{ \text{every}_3 \{ z, 5, \beta \}, e_2 \{ \exists_{\text{DOBJ}} \{ y, 6, 0 \}, \\
& \quad \text{dedicated}_0 \{ e, x, y, z \} \}
\]

\[\begin{align*}
& \quad y_2 \{ \exists_{\text{DOBJ}} \{ y, 6, \alpha \mid 0, \beta \}, e_0 \{ \text{dedicated}_0 \{ e, x, y, z \} \}
\]

(46) daß zwei Dichter jedes Gedicht einer Frau widmeten
\(\exists_{\text{SUBJ}} > \exists_{\text{DOBJ}} > \forall_{\text{DOBJ}}\)

\[\begin{align*}
& \exists_{\text{SUBJ}} \{ x, 4, 2 \}, \text{every}_3 \{ z, 5, 0 \}, e_1 \{ \exists_{\text{DOBJ}} \{ y, 6, 3 \}, \text{dedicated}_0 \{ e, x, y, z \} \}
\]

\[\begin{align*}
& x_1 \{ \exists_{\text{SUBJ}} \{ x, 4, \gamma \mid 2, \beta \} \}, e_1 \{ \text{every}_3 \{ z, 5, 0 \}, \exists_{\text{DOBJ}} \{ y, 6, 3 \}, \\
& \quad \text{dedicated}_0 \{ e, x, y, z \} \}
\]

\[\begin{align*}
& z_0 \{ \text{every}_3 \{ z, 5, \beta \}, e_0 \{ \exists_{\text{DOBJ}} \{ y, 6, 3 \}, \\
& \quad \text{dedicated}_0 \{ e, x, y, z \} \}
\]

\[\begin{align*}
& \quad y_2 \{ \exists_{\text{DOBJ}} \{ y, 6, \alpha \mid 0, \beta \}, e_0 \{ \text{dedicated}_0 \{ e, x, y, z \} \}
\]

Apart from the two required representations, the analysis arrives at a third representation, where the DOBJ receives lower scope than IOBJ and SUBJ, while the relative scope of SUBJ and IOBJ is not determined. This representation is given in (47).
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(47) daß zwei Dichter jedes Gedicht einer Frau widmeten
\( \exists_{\text{SUBJ}} > \forall_{\text{DOBJ}} \& \exists_{\text{IOBJ}} > \forall_{\text{DOBJ}} \)

\[
e_1 \{ \exists y (z, 4, 3), \exists y (z, 5, 0), \\
\exists y (z, 6, 3), \text{dedicated}_0 (e, x, y, z) \}
\]

\[
x_1 \{ \exists y (z, 4, \gamma^2, 3) \} \quad e_1 \{ \exists y (z, 5, 0), \exists y (z, 6, 3), \\
\text{dedicated}_0 (e, x, y, z) \}
\]

\[
z_3 \{ \exists y (z, 5, \beta_0) \} \quad e_0 \{ \exists y (z, 6, 3), \\
\text{dedicated}_0 (e, x, y, z) \}
\]

\[
y_2 \{ \exists y (z, 6, \alpha_0, 0) \} \quad e_0 \{ \text{dedicated}_0 (e, x, y, z) \}
\]

The **Scope Principle** does not block a scope determination where the SUBJ and the IOBJ select the direct object as their nuclear scope. It is obvious, however, that a handle should not be selected as the *scope* value of an operator if the handle has already been selected by another operator. We will eliminate this possibility by making visible at each local tree which quantifiers have already been selected as scope arguments by other elements. In general, we do not want a quantifier \( \alpha \) which has been selected as the nuclear scope of a quantifier \( \beta \) to become the nuclear scope of another quantifier \( \gamma \), i.e., scope relations like \( \beta (\alpha) \& \gamma (\alpha) \), where \( \beta \neq \gamma \), should be excluded.

To this end, an additional (set-valued) feature called **subordinations** is introduced which contains pairs of handles. Each pair consists of the handle of the functor and the handle of the argument. The **Subordinations Constraint** in (48) guarantees that each pair of handles resulting from a scope determination will appear in the **subordinations** set of the projection.

(48) **Subordinations Constraint**

The **subordinations** value of a phrase is the union of the **subordinations** value of the head-DTR with the pair of **handle** values whose second member is the **handle** value that has been selected as **scope** argument by the non-head.

For the time being, we can assume that **subordination pairs** are introduced by expressions which bear a **scope** attribute. For other elements, the **subordinations** value is the empty set. The following version of the **scope principle** considers **subordinations**.

(49) **Scope Principle**

The *scope* value of a quantifier is either identical to the handle of its sister constituent or to one of the handles of its more oblique co-dependents.
In either case, the selected handle must not be an argument element of the subordinations set of the HEAD-DTR.\textsuperscript{25}

The application of the amended principles is illustrated in (50). In the linear notation used here, the subordinations attribute is represented by SUB, followed by the subordination pairs. The representation in (50) shows how the illicit interpretation is blocked: the handle of the direct object, i.e., 3, is selected by the indirect object, and consequently, the pair (2, 3) is added to SUB. If the subject were to select the handle of its syntactic sister, the resulting subordinations pair would be (1, 3). Since the selected handle is an argument element of another subordination pair, the representation is correctly ruled out and the subject is forced to select the handle of the indirect object.

With the inclusion of subordination pairs, we have introduced an additional factor of scope determination: scope is determined by configurational and relational properties and is governed by the condition that any argument must not be selected by more than one functor. This additional condition introduces the concept of resource sensitivity into the present analysis, expressing that an argument cannot be used as such after it has been “consumed” by a functor.\textsuperscript{26}

\begin{equation}
\text{daß ein Dichter jedes Gedicht einer Frau widmete}
\end{equation}

The mechanisms of semantic projection and scope determination will now be applied to the problematic cases discussed before.

\section*{6.5 Relative Scope of Arguments}
\subsection*{6.5.1 Comparison to Frey (1993)}
As was noted in the introduction, the examples in (51) and (52) are problematic for Frey’s trace-based analysis, because in each case the

\textsuperscript{25}An “argument element” is contained in the set of elements derived from the range of the pairs in subordinations.

\textsuperscript{26}Resource sensitivity in semantics has been introduced in Dalrymple et al. (1997).
analysis predicts the existence of readings which are not available.

(51) daß mindestens einem Verleger fast jedes Gedicht nur dieser Dichter angeboten hat

(52) daß fast jeder Frau mindestens einen Strauß drei Floristen zusammenstellten

Frey’s analysis predicts that in (51), the quantifiers may receive scope in inverse order of surface appearance, i.e., a reading can be derived where DOBJ receives wider scope than IOBJ. This conclusion can be deduced from the configurational properties of the sentence: since both quantifiers have left their base position, the direct object quantifier c-commands the trace of the indirect object quantifier, while the latter c-commands the former. This is illustrated in (53).

(53) daß mindestens einem Verleger fast jedes Gedicht nur dieser Dichter angeboten hat

In the present framework, the second reading cannot be derived, as can be seen from (54).

(54) daß mindestens einem Verleger fast jedes Gedicht nur dieser Dichter angeboten hat

In order to derive the illicit reading of (51), the DOBJ would have to take the semantic contribution of the IOBJ as its nuclear scope. Since
the IOBJ is less oblique than the DOBJ, the *Scope Principle* would only allow a configurational selection of the IOBJ's handle by the DOBJ. In (54), however, the handle of the syntactic sister of the DOBJ is the one of the verb, i.e., 0, and not the one of the IOBJ, the latter one being realized after the DOBJ. Independently of the syntactic position of the subject, the DOBJ may receive scope over the IOBJ only if it were discharged after the indirect object.

For (52) Frey’s analysis predicts not only that a scope reversal of indirect and direct object becomes available, such as in (51), but also that the now quantificational subject may receive intermediate scope between indirect and direct object. The six-way ambiguity of this example in Frey’s system can be derived from the fact that each quantifier either c-commands the other or a trace of the other quantifier. The six pertinent scope statements are given in (55), where X > Y is to be interpreted as ‘X takes scope over Y’.

(55) a. SUBJ > IOBJ > DOBJ
    b. **SUBJ > DOBJ > IOBJ**
    c. IOBJ > SUBJ > DOBJ
    d. IOBJ > DOBJ > SUBJ
    e. DOBJ > SUBJ > IOBJ
    f. **DOBJ > IOBJ > SUBJ**

From the discussion of example (51) we can already deduce that the present analysis excludes all readings where the direct object is assigned scope over the indirect object, i.e., (55b), (55e), and (55f). Given that the direct object is more oblique than the indirect one and that the latter has been discharged after the former, the readings cannot be derived. It remains to be shown that (55e) is excluded as well.

In order to derive (55e) from (52), it would be necessary that the subject takes the direct object as its nuclear scope. In this case, the *Handle Projection Constraint* would require that the handle of the semantic head, i.e., the handle of the verb, is projected. Consequently, the direct object would have to take this handle as its scope. Now, the *Handle Projection Constraint* would require that the handle of the direct object is projected to the phrase. This situation is schematically depicted in (56).
(56) How (not) to arrive at OBJ > SUBJ > DOBJ in (52):

\[
\begin{array}{c}
\text{SUB} \{1,3\}, \{3,0\} \\
\text{SUB} \{1,3\} \\
\text{ver}_0
\end{array}
\]

In the configuration in (56) there is no way for the indirect object quantifier to satisfy the Scope Principle: there is only one more oblique handle, i.e., the handle of the syntactic sister of the indirect object quantifier. This handle, however, has already been selected by the subject and is hence no longer available as an argument to be taken by another quantifier. Consequently, the structure is ruled out.

The present analysis predicts that (51) is not ambiguous at all and that (52) is ambiguous between a wide and a narrow scope reading of the subject.

6.5.2 Comparison to Lechner (1997)

Recall that Lechner’s approach differs from Frey (1993) in that Lechner allows semantic reconstruction, i.e., narrow scope readings after dislocation, for weak quantifiers only. We can accommodate for the distinction between weak and strong quantifiers by assuming that the semantic representation of quantificational determiners includes a specification indicating the weak-strong distinction. This is illustrated in (57), where \(w\) indicates that \(irgendein\) (‘some’) is a weak quantifier, and \(s\) that \(jeder\) (‘every’) is a strong determiner.\(^{27}\)

(57) a. \(irgendein: y_1\{\text{some}_1(y, w, \beta, \alpha)\}\)

b. \(jeder: y_1\{\text{every}_1(y, s, \beta, \alpha)\}\)

Given the distinction between weak and strong quantificational determiners introduced above, we can reformulate the Scope Principle as follows:

\(^{27}\)This is a strict implementation of Lechner’s descriptive generalization (Lechner, 1997, 9) that weak QPs are those which are headed by weak determiners. It should be pointed out that the characterization of quantificational determiners in terms of \(weak/strong\) is agnostic with respect to a DP or NP analysis of nominal constructions. In a DP analysis, the respective feature would be projected and hence become available at phrase level because the determiner is the head of the phrase. In an NP analysis, the information could be projected according to a condition on specifiers, as, e.g., illustrated in Pollard and Sag (1994, 494).
(58) *Scope Principle:*

The scope value of a quantifier is either identical to the handle of its sister constituent or to one of the handles of its more oblique weak co-dependents. In either case, the selected handle must not be an argument element of the *Subordinations* set of the *Head*.

Let us illustrate the application of (58) with the following examples:

(59) a. daß irgendein Buch fast jeder mit Freude gelesen hat

that some **book** almost everybody **with pleasure** read **has**

b. daß fast **jedes** Buch irgendeiner mit Freude gelesen hat

that almost every **book** somebody **with pleasure** read **has**

According to Lechner (1997), (59a) is ambiguous because the weak quantificational NP *irgendein Buch* strands a higher type trace. The strong quantificational NP *fast jedes Buch* does not strand a higher type trace and hence Lechner predicts that (59b) is not ambiguous. This conclusion follows from the *Scope Principle* in (58) as well. To illustrate this, consider the analysis of (59b) given in (60) first.

(60) daß fast jedes Buch irgendeiner mit Freude gelesen hat

Contrary to the *Scope Principle* presented in (39), the *Scope Principle* in its present formulation does not allow the SUBJ to take the DOBJ in its scope because the quantifier type of the DOBJ—indicated on ARG-ST—is strong. The *Scope Principle* in (58) requires that less oblique co-dependents must be weak in order to select them relationally. This condition is met in (61), where the DOBJ is a weak quantifier. Accordingly, (59a) is analyzed as ambiguous.

(61) daß irgendein Buch fast jeder mit Freude gelesen hat

![Diagram](attachment:diagram.png)
So far, we have shown that the present proposal can easily be extended to cover the distinction between weak and strong quantificational NPs. Actually, the present proposal does better than Lechner’s, because, as was illustrated in the introduction, Lechner’s approach suffers from the same deficiency as Frey’s. In examples like (62) and (63), Lechner’s approach predicts inverse as well as intermediate readings which are not present with the given examples. This is mainly so because Lechner, following Frey in this respect, assumes that scrambling strands traces and that traces enter into considerations of scope.

(62) Ich glaube, daß irgendeinem Verleger drei Gedichtbände nur dieser
1. believe that some publisher three poem-collections only this
Dichter angeboten hat.

‘I believe that only this poet has offered some publisher three collections of poems.’

(63) Ich glaube, daß irgendeinem Verleger drei Gedichtbände nur zwei Dichter

Given the reformulation of the Scope Principle in (59), the scope of a quantifier is determined on the basis of the following considerations:

- configurational aspects, i.e., the syntactic position of the quantificational NP,
- relational aspects, i.e., the position of the syntactic argument licensing the quantificational NP on the prominence scale of grammatical functions as expressed on ARG-ST,
- resource sensitivity, i.e., the assumption that each argument will not be available after selection by a functor, and finally,
- the strong-weak distinction.

Taking these aspects into consideration, the Scope Principle predicts that (62) is unambiguous and that (63) is two-way ambiguous, just like the examples discussed in section 1.5.1.

### 6.6 Summary and Prospects

Contrary to the approaches by Frey (1993) and Lechner (1997), the analysis does not rest on traces (of possibly different types) but on the assumption that both configurational and relational aspects enter into considerations concerning argument scope in German.\textsuperscript{28} In addition to

\textsuperscript{28} Although it seems suggestive to assume that relational and configurational aspects are in competition with each other, I will not use this term since HPSG, contrary to Optimality Theory (Prince and Smolensky, 1993) does not make use of violable constraints.
configurational and relational aspects, the resource sensitivity of operators and a possible distinction between weak and strong quantificational NPs are relevant for scope determination.

At this point, it should be stressed again that our viewpoint towards the distinction between weak and strong quantificational NPs is agnostic. But if such a distinction is assumed (and taken to express a generalization over the data observed), the present formulation of the Scope Principle is obviously better suited to cover the data than Lechner’s trace-based proposal, where inverse and intermediate readings cannot be blocked.

As for the data discussed in Frey (1993), the same conclusion applies, except that the strong-weak distinction will not be taken into consideration. A trace-based analysis suffers from problems which are eliminated in the present approach.

In this respect, it is perhaps worthwhile to mention that Aoun and Li (1993) come to a similar conclusion with respect to the status of traces for scope determination. Aoun and Li (1993, 84) discuss examples of type (64) which would be wrongly analysed as being ambiguous between a wide scope and a narrow scope reading of the quantifier if the trace of the wh-phrase is considered in determining scope.

(64) What t do you wonder whether everyone bought t?

Since the quantifier e-commands the trace of the wh-phrase, a wide scope reading of the quantifier should be derivable from (64). Such a reading, however, is not present with examples of this type. The unambiguity of (64) has led Aoun and Li (1993) to the conclusion that traces in base positions must not be considered for scope determination.29

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References


29 Somewhat ironically, Aoun and Li (1993) modify their Scope Principle to take into account intermediate traces, i.e., traces in A'-position instead of following the present paper in the conclusion that traces in general should be banned from scope determination.


McCawley, J. 1999. Why surface syntactic structure reflects logical structure as much as it does, but only that much. *Language* 75/1:34–62.


