

Thomas Groß and Timothy Osborne

Toward a Practical Dependency Grammar Theory of Discontinuities

Abstract

The paper presents the major principles and concepts of a dependency grammar theory of discontinuities for English and German (and presumably for many other languages as well). Discontinuities are identified in terms of traditional projectivity violations. These violations are then reanalyzed according to the *Rising Principle*. This principle sees the relevant constituent attaching to a word that is not its governor, but that dominates its governor. Perhaps the most innovative aspect of the account is the *chain*. By acknowledging the chain as the fundamental unit of syntax, the door opens to an efficient surface account of discontinuities and many other phenomena of syntax.

1. Discontinuities

Most theories of syntax acknowledge discontinuities (= long distance dependencies) in some manner or another. English and German sentences like the following are unacceptable because they contain illicit discontinuities:

- (1) a. **Whose do you like answer?*
- (2) a. **That she will never reveal secret.*
- (3) a. **weil er sich das Geheimnis geweigert hat zu erwähnen*
because he himself the secret refused has to mention
'Because he refused to mention the secret.'
- (4) a. **That one claimed was mentioned that it would rain.*
- (5) a. **Desire I have no(ne).*

Sentences (1a) and (2a) are disallowed because the pre-noun modifiers *whose* and *that* are separated from their governors *answer* and *secret*, respectively. Example (3a) is disallowed because *das Geheimnis* is separated from its governor *zu erwähnen*. Example (4a) is disallowed because the relative clause *that it would rain* is separated from its governor

claimed. And example (5a) is disallowed because the quantifier *no(ne)* is separated from its noun *desire*. In other words, each of (1a–5a) is disallowed because an illicit discontinuity obtains.

While the discontinuities in (1a–5a) result in ungrammaticality, other, quite similar discontinuities are perfectly acceptable.

(1) b. *Whose answer do you like?*

(2) b. *That secret she will never reveal.*

(3) b. *weil er das Geheimnis versucht hat zu erfahren*¹
 because he the secret tried has to learn
 Because he tried to find out the secret.

(4) b. *The claim was mentioned that it would rain.*

(5) b. *Lust habe ich keine.*
 desire have I none
 ‘I have no desire (to do something).’

Sentence (1b) contains a *wh*-fronting discontinuity, example (2b) a topicalization discontinuity, example (3b) a scrambling discontinuity, example (4b) an extraposition discontinuity, and example (5b) a splitting discontinuity. The question that arises here concerns the contrast between the a- and b-sentences. Why are the discontinuities in the b-sentences possible but the quite similar discontinuities in the a-sentences blocked?

Examples (1a–b) and (2a–b) are often addressed in terms of Ross’ (1967) Left Branch Condition and pied-piping, examples (3a–b) in terms of *Infinitivverschränkung* (Kvam 1983; Richter 2002) or in terms of the so-called “third construction” (Besten & Rutten 1989; Kiss 1995: 109ff.; Hinrichs & Nakazawa 1998; G. Müller 1998: 189ff.; Reis & Sternefeld 2004: 488ff.), examples (4a–b) in terms of Ross’ (1967) Right Roof Constraint, and examples (5a–b) in terms of split topicalization (= splitting) in German (Riemsdijk 1987; Holmberg 1997: 14f.). To understand the phenomena that these terms denote, one must assume a grammar framework. The accounts of these discontinuity types then vary based upon

¹ Grammaticality judgments vary with sentences like (3a–b), whereby a number of factors seem to influence acceptability. An anonymous reviewer points out that the appearance of two accusative objects (*sich* and *das Geheimnis*) may be responsible for blocking (3a). Note in this regard that (3b) contains just a single accusative object (*das Geheimnis*). Furthermore, examples with an accusative and a dative object are possible, e.g. *weil er sich das Rätsel vorgenommen hat zu lösen* ‘because he took it upon himself to solve the riddle’.

the relevant aspects of the framework chosen. Constituency-based derivational theories such as Government and Binding (GB) and the Minimalist Program (MP) usually address discontinuities in terms of movement and traces. Constituency-based non-derivational theories employ some sort of information passing mechanism in order to address discontinuities, e.g. the slash mechanism of Generalized Phrase Structure Grammar (GPSG) and Head Driven Phrase Structure Grammar (HPSG) (Gazdar et al. 1985: Ch. 7; Pollard & Sag 1994: Ch. 4) and the functional uncertainty of Lexical Functional Grammar (LFG) (Bresnan 2001: 64ff.).

Dependency-based theories of syntax also have their means of addressing discontinuities. These theories identify and formalize discontinuities in terms of *projectivity* (see for instance Hays 1964; Gaifman 1965; Robinson 1970; Melčuk 1988: 35ff.; Heringer 1996: 259ff.; Eroms 2000: 311ff.; Hudson 2000). A discontinuous structure contains one or more projectivity violations. Many such accounts explore projectivity in great detail, whereby various types of projectivity violations are described and defined in a formal manner (Lombardo & Lesmo 2000; Bröker 2000, 2003; Groß 1992, 1999, 2003; Eroms and Heringer 2003). These accounts have provided a strong theoretical underpinning for the dependency grammar understanding of discontinuities. However, we see a shortcoming in the extent to which the various formalisms can be practically employed to efficiently explore the discontinuities that a given language does and does not allow. Our account below has this shortcoming in mind.

This paper endeavors to present and develop the basic principles of a more practical dependency grammar theory of discontinuities. The goal is to establish empirically the central limitations on discontinuities in English and German. When all is said and done, a dependency grammar theory of discontinuities will have been established that can lead to insightful accounts of the various discontinuity types (e.g. *wh*-fronting, topicalization, scrambling, extraposition, splitting). Three highlights of our theory are given here for orientation:

Chain

A word or a combination of words that is top-down (or bottom-up) continuous.

Rising Principle

The head of a given chain must either be that chain's governor or dominate that chain's governor.

Rising chain

The minimal chain containing the root of the risen chain and the risen chain's governor.²

The chain concept developed in this paper is foreshadowed by Bech's (1955) seminal exploration of coherent and incoherent constructions. The verb combinations that Bech investigated are chains in our dependency grammar system. Our understanding of the chain, however, follows O'Grady (1998) insofar as the chain is a unit of syntax unique to dependency grammar. By acknowledging chains and the role that they play in discontinuities, the major limitation on discontinuities is identified, namely the Rising Principle, and based on this principle, rising chains are discerned in view of which one can characterize specific types of discontinuities.

This paper is organized as follows: Section 2 presents some central aspects of our dependency grammar. Section 3 establishes the concept of rising. Section 4 defines and illustrates inversion and shifting, two mechanisms that result in non-standard orderings, but that do not involve rising. Section 5 presents our assumptions underlying *wh*-discontinuities. Section 6 examines rising chains. Section 7 summarizes and concludes the paper. While the data we examine is limited to English and German, we assume that our approach is applicable to many other languages as well.

2. Dependency grammar

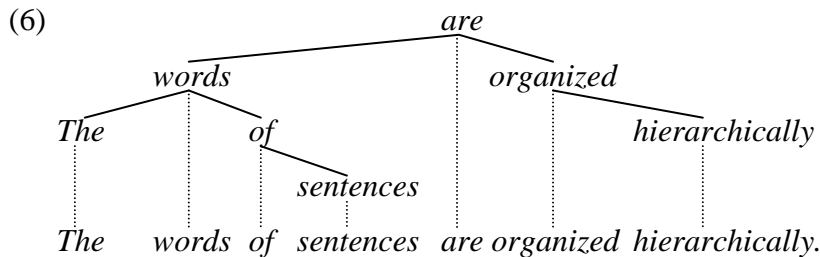
The following two sections present some traits of dependency grammar. Many aspects of this approach are consistent in relevant respects with a long-standing tradition of dependency grammar since Tesnière (1959).³ The particular dependency grammar we pursue follows Groß (1999, 2003) and Osborne (2005a, 2005b, 2006, 2007, 2008).

² The root of a given chain is the one word in that chain that is NOT dominated by any other word in that chain. The root of a sentence is usually the finite verb.

³ Some prominent dependency grammars since Tesnière (1959) are listed here: Hays 1964; Robinson 1970; Kunze 1975; Matthews 1981, 2007; Mel'čuk 1988, 2003; Schubert 1988; Starosta 1988; Lobin 1993; Pickering & Barry 1993; Engel 1994; Jung 1995; Heringer 1996; Groß 1999; Eroms 2000; Kahane 2000; Tarvainen 2000; Hudson 1984, 1990, 2007; Ágel et al. 2003, 2006. One should note that Ágel et al. (2003, 2006) is a massive two volume compilation of contributions on dependency and valency grammar from well over 100 authors.

2.1 Preliminaries

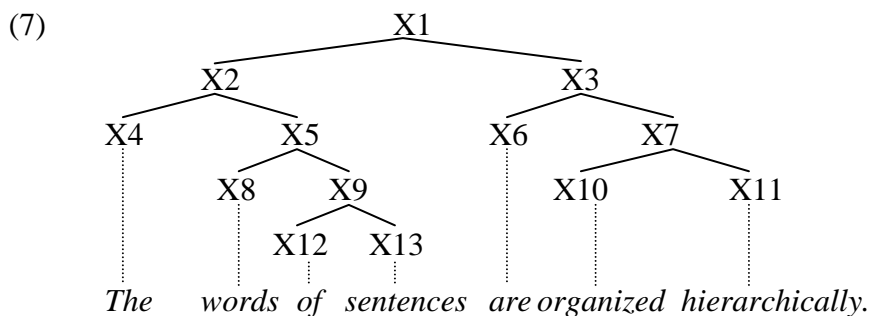
Dependency-based theories of syntax view sentence structure in terms of the mother-daughter relation. Words are organized hierarchically in terms of directed dependencies.



Dependency trees such as this one convey much information. The words are organized with respect to precedence and dominance. The mother-daughter relation is indicated via the dependency edges, i.e. the solid lines connecting the words into a tree. A given word has none, one, or more daughters. The word *words*, for instance, has the daughters *the* and *of*, and the word *organized* has the daughter *hierarchically*. Excepting the root word, a given word in a sentence also has exactly one mother word. The mother of *sentences*, for instance, is *of*, and the mother of *the* is *words*.

The mother-daughter dependency relation is a one-to-one relation. That is, for every word in the string, there is exactly one node in the structure. This one-to-one relation is clearly visible in (6), where the sentence *The words of sentences are organized hierarchically* contains seven words, and correspondingly, there are seven nodes in the hierarchy above the sentence. This one-to-one relation allows one to plug the words directly into the tree, as done in (6). The result is a minimal and transparent representation of sentence structure.

The one-to-one dependency relation should be contrasted with the one-to-more-than-one constituency relation.



This tree shows the part-whole constituency relation, which is a one-to-more-than-one relation. There are still seven words in the sentence, but now the structure contains 13 nodes. Thus each word in the sentence corresponds to more than one node in the structure. The one-to-more-than-one constituency relation results in much larger more involved structures than the one-to-one dependency relation. The constituency tree (7) shows 13 nodes and 12 edges, whereas the dependency tree (6) shows 7 nodes and 6 edges.

Dependency trees like (6) are not arbitrary. The words are organized hierarchically in a manner that matches best the results of standard constituency tests (e.g. topicalization, clefting, pseudoclefting, pronominalization, answer fragments). Key units of syntax are complete subtrees (= constituents). In (6) for instance, the subject phrase *the words of sentences*, the prepositional phrase *of sentences*, and the verb phrase *organized hierarchically* are complete subtrees. In this regard, notice that the number of complete subtrees (= constituents) in dependency hierarchies is far less than the number of complete subtrees (= constituents) in constituency trees. Many individual words in dependency trees fail to qualify as constituents (e.g. *words*, *of*, *are*, and *organized* in (6)).

Certain aspects of the dependency hierarchies we assume are controversial. For example, the determiner *the* in (6) is shown as a daughter of the noun *words*. This is contrary to the DPs assumed in many constituency-based grammars (since Vennemann 1977 and especially Abney 1987) and in some dependency-based grammars as well (e.g. Hudson 1984, 1990; Lobin 1993; Lombardo & Lesmo 2000). We believe that a number of considerations support NP over DP, e.g. Ross' Left Branch Condition, idiom formation, aspects of N-ellipsis, aspects of splitting (see below), etc.⁴ Unfortunately, there is not room in this paper to go over these points. We can state, however, that our NPs (as opposed to DPs) are consistent with the majority, that is, most dependency grammars assume NP, not DP (e.g. Schubert 1988; Engel 1994; Van Langendonck 1994; Heringer 1996; Weber 1997; Tarvainen 2000; Groß 1999, 2003; Hellwig 2003; Hyvärinen 2003; Kahane 2003; Uzonyi 2003; Starosta 1988, 2003; Mel'čuk 1988, 2003).

⁴ Consider for instance the Left Branch Condition. Determiners cannot be separated from their nouns in English, e.g. (...) *and the pizza he ate* vs. *(...) *and the he ate pizza*. In this regard, determiners behave just like all other pre-noun modifiers. This situation suggests strongly that all pre-noun modifiers should occupy the same hierarchical position (i.e. they should all be dependents of their noun).

Our dependency grammar is non-derivational and monostratal and is therefore completely representational. In this regard, the lexicon plays a major role in our system. For instance, the active-passive dichotomy resides in the lexicon, not in the syntax. A participle such as *seen* has (at least) two entries, one for the active form (e.g. *He has seen you*) and one for the passive form (e.g. *You have been seen*). Furthermore, the subject is not raised out of the VP in our system, but rather it is “base generated” as a dependent of the finite verb. In these respects, the types of discontinuities/movements that GB/MP tends to view as A-movement are in no way viewed as discontinuities in our system. Our system does, however, acknowledge many of the discontinuities associated with A-bar movement, although we do not acknowledge movement.

Finally, it is worth noting that the dependency grammar we assume is unlike two prominent dependency-based frameworks. Richard Hudson’s (1984, 1990, 2007) dependency-based Word Grammar is unlike our system insofar as Word Grammar assumes networks (as opposed to the trees that we assume). The problem with networks, in our view, is that they render the chain – the key unit of syntax in our system, as established in the next section – ineffectual. Given networks, the number of chains in a given structure increases to the point where the chain concept becomes vacuous, since most every word combination qualifies as a chain.⁵ Igor Mel’čuk’s Meaning-Text Theory (1988, 2003) is also unlike our system. Meaning-Text Theory views dominance as more basic than precedence. In so doing, it acknowledges deep strata of syntax where only dominance obtains. Our system, in contrast, grants precedence and dominance “equal rights”. In so doing, our system acknowledges surface syntax only.

2.2 Chains

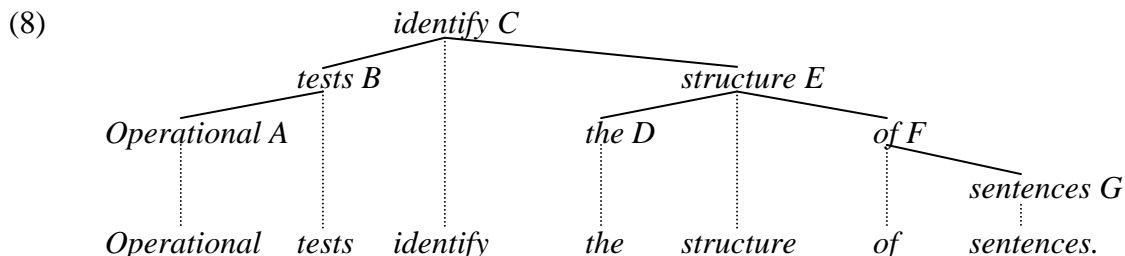
O’Grady (1998) presents a dependency grammar theory of idioms in terms of *chains*. Osborne (2005b) builds on O’Grady’s work, demonstrating that the chain is the key unit for a syntactic account of predicate-argument structures and ellipsis. The chain is/can be defined as follows:

Chain

A word or a combination of words that is top-down (or bottom-up) continuous.

⁵ Word Grammar overcomes this problem by distinguishing between surface and non-surface dependencies (Hudson 2000). Word Grammar hierarchies that show only surface dependencies are trees. Our chain concept is applicable to these trees.

With this definition in mind, consider the following structure.



The capital letters serve to abbreviate the words. According to the definition, any single word or any combination of words that is continuous with respect to dominance qualifies as a chain. Thus each single word is a chain, i.e. A, B, C, D, E, F, G.

A two word combination qualifies as a chain if the two words are connected by a dependency. There are 6 two-word combinations in (8) that qualify as chains: AB, BC, CE, DE, EF, and FG. There are also 6 three-word combinations that qualify as chains: ABC, BCE, CDE, CEF, DEF, and EFG.⁶ There are 6 four-word combinations that qualify as chains: ABCE, BCDE, BCEF, CDEF, CEF, and DEFG. There are 5 five-word combinations that qualify as chains: ABCDE, ABCEF, BCDEF, BCEFG, and CDEFG. There are 2 six-word combinations that qualify as chains: ABCDEF and ABCEFG. And of course the entirety counts as a chain: ABCDEF.

All told, there are 33 distinct word combinations in (8) that qualify as chains. The chain is in this respect a quite flexible unit of syntax, many word combinations of a given structure qualifying as chains. However, one should note that there are usually more word combinations that fail to qualify as chains than that qualify as chains. In (8) for instance, there are 94 combinations that fail to qualify as chains. Nine of these 94 are listed here for illustration: AC, AG, CD, ADE, CEF, ABDE, BCEG, BCDFG, ABDFG, etc.

We view the chain as the basic unit of syntax, not the constituent. Noteworthy in this respect is the fact that all constituents are chains, but there are very many chains that are not constituents. This fact holds for

⁶ Identifying and listing all the chains in a given structure can be tedious. To ensure that the chains are all identified, one needs a specific convention to simplify the job. We therefore move left-to-right when listing the word combinations, starting with one-word combinations, proceeding to two-word combinations, etc.

both dependency- and constituency-based theories of syntax. There are, for instance, 6 constituents (= complete subtrees) in (8), but as stated, 33 chains. The corresponding constituency-structure of (8) would contain approximately 13 constituents, whereby all would qualify as chains, which means there would be 20 word combinations that qualify as chains but that fail to qualify as constituents.

By acknowledging chains, the current system establishes the foundation for a theory of discontinuities that remains entirely in surface syntax.

3. Rising

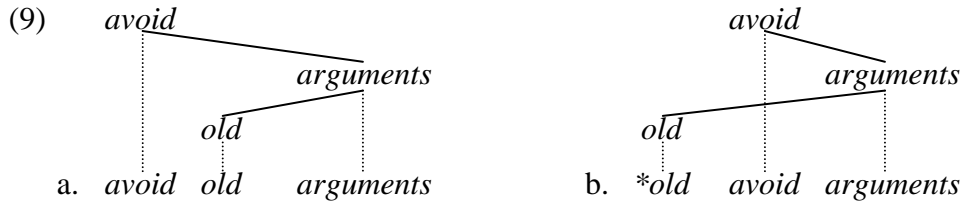
The relatively flat structures of dependency grammars see fewer discontinuities than the more layered structures of most constituency grammars (Hellwig 2003: 621).⁷ Despite this fact, discontinuities are a common phenomenon and dependency grammar must therefore have a means of addressing them. The following subsections present and defend the basic means by which the current dependency grammar addresses discontinuities. *Rising* is assumed. “Rising” denotes a constellation in which a chain has attached to a word that is not its governor. The account we pursue here has many precedents in the dependency grammar literature (Duchier & Debusmann 2001; Gerdes & Kahane 2001; Hudson 2000; Bröker 2003; Eroms & Heringer 2003; Starosta 2003; Osborne 2005a, 2007).

3.1 The Rising Principle

A discontinuity is perceived when a given chain is separated from its governor by words that dominate its governor. Traditional dependency-based accounts of such cases (e.g. Hays 1964; Gaifman 1965; Robinson

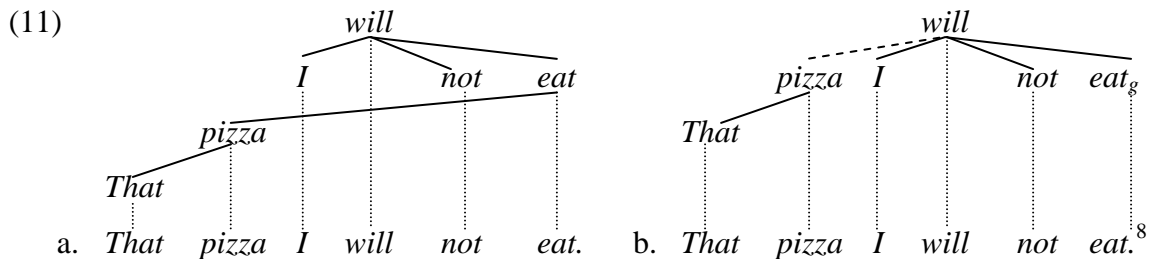
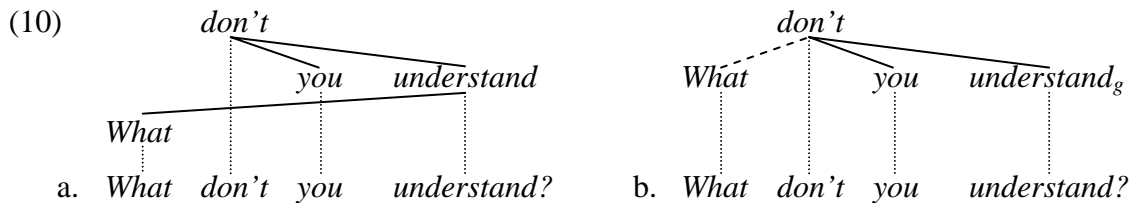
⁷ The majority of constituency grammars (e.g. GB/MP, HPSG, CG, LFG, etc.) posit syntactic structures that are a good bit more layered than most any dependency grammar. This difference does not, however, necessarily obtain. The constituency relation allows flat structures as well. The question that proponents of flatter constituency structures must address in this area, though, concerns the choice of constituency over dependency. If one chooses flatter structures from the start, then the motivation to assume constituency over dependency disappears. Dependency will get the job done with less apparatus.

1970; Melčuk 1988: 35ff.; Heringer 1996: 259ff.; Eroms 2000: 311ff.) describe the phenomenon in terms of *projectivity* and crossing lines.

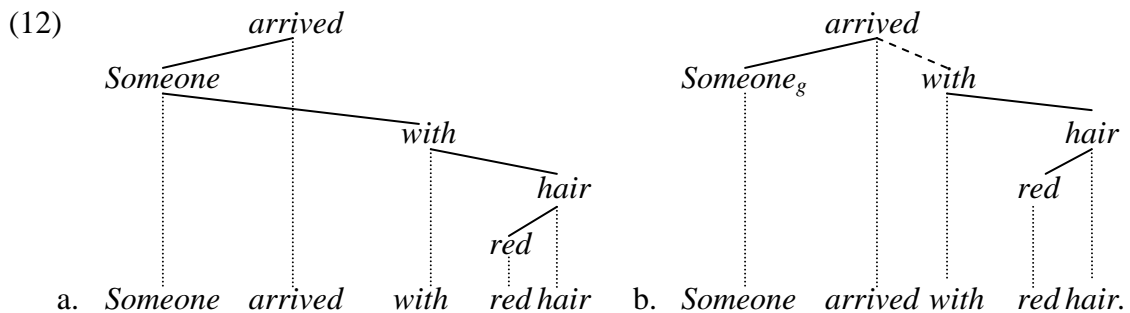


Example (9a) has no crossing lines, which means the structure is projective. Example (9b), in contrast, has crossing lines, which means that the structure is non-projective. The adjective *old* is separated from its governor *arguments* by *avoid*, which dominates *arguments*. Most non-projective structures in English and German are ungrammatical like (9b).

Some non-projective structures are, though, quite grammatical. Furthermore, the amount and type of non-projective structures that a given language allows varies greatly, inflectionally poor languages allowing many fewer projectivity violations than inflectionally rich languages. The following a-examples illustrate grammatical non-projective structures in English. The b-examples illustrate how the current theory addresses these cases.



⁸ Most dependency grammars assume that a topicalized expression is a dependent of the finite verb, as shown here in (11b). An alternative analysis might view the root of the topicalized expression as the root of the clause and thus have the clause as a dependent



Sentence (10) illustrates a *wh*-fronting discontinuity, sentence (11) a topicalization discontinuity, and sentence (12) an extraposition discontinuity. The crossing lines in the a-sentences identify the discontinuities (= projectivity violations). The manner in which these discontinuities are addressed in the current theory follows Osborne (2005a: 236ff., 2007: 34ff.) and is shown in the b-sentences. The b-sentences, namely, show *rising*. The dashed dependency edges indicate the risen chain (often a constituent) and the “_g” subscript marks the governor of the risen chain.

The head of a given chain is THE ONE WORD THAT IMMEDIATELY DOMINATES THAT CHAIN. The governor of a given chain, in contrast, is THE ONE WORD THAT LICENSES THE APPEARANCE OF THAT CHAIN. Most of the time, the head and the governor of a given chain are one and the same word. When a discontinuity is perceived, however, the two are separate words. In (11b) for instance, *will* is the head of *that pizza* but *eat* is its governor, and in (12b), *arrived* is the head of the extraposed *with red hair*, whereas *someone* is its governor.

In (10b, 11b, 12b), the risen chain attaches to a word that dominates its governor: *what* in (10b) attaches to *don’t*, which dominates *understand*, the governor of *what*; *that pizza* in (11b) attaches to *will*, which dominates *eat*, the governor of *that pizza*; and *with red hair* attaches to *arrived*, which dominates *someone*, the governor of *with red hair*. The principle that underlies this account of discontinuities is called the *Rising Principle*. This principle is expressed as follows:

Rising Principle

The head of a given chain must either be that chain’s governor or dominate that chain’s governor.

of the topicalized expression. While we believe that this alternative analysis is plausible and worth pursuing, we do not address the matter in this paper.

Given the Rising Principle, one distinguishes between those chains the head and the governor of which are the same word and those chains the head and the governor of which are separate words. When a chain attaches to a word that is not its governor, it has *risen*. A *risen chain* is defined as follows:

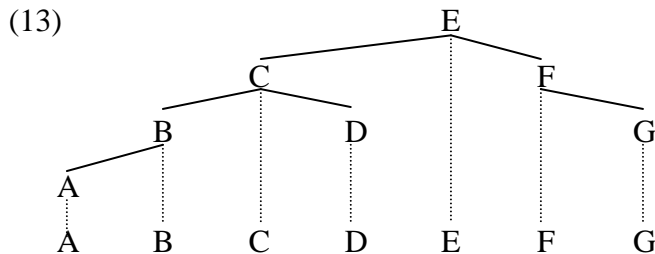
Risen Chain

A chain the head and the governor of which are distinct words.

Risen chains are marked by the dashed dependency edge, as illustrated in (10b, 11b, 12b): *What* in (10b), *that pizza* in (11b), and *with read hair* in (12b) are risen chains.

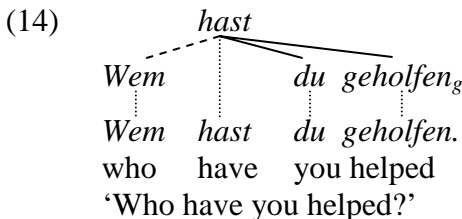
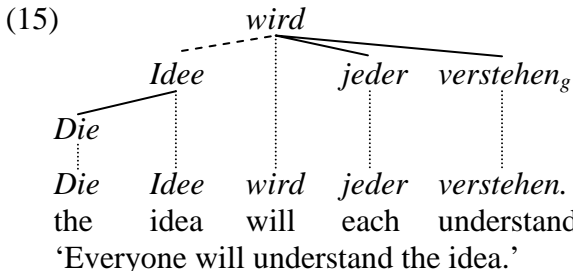
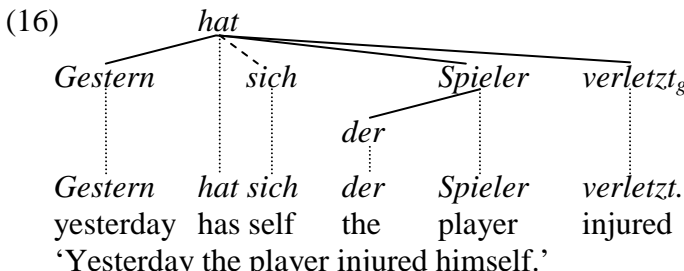
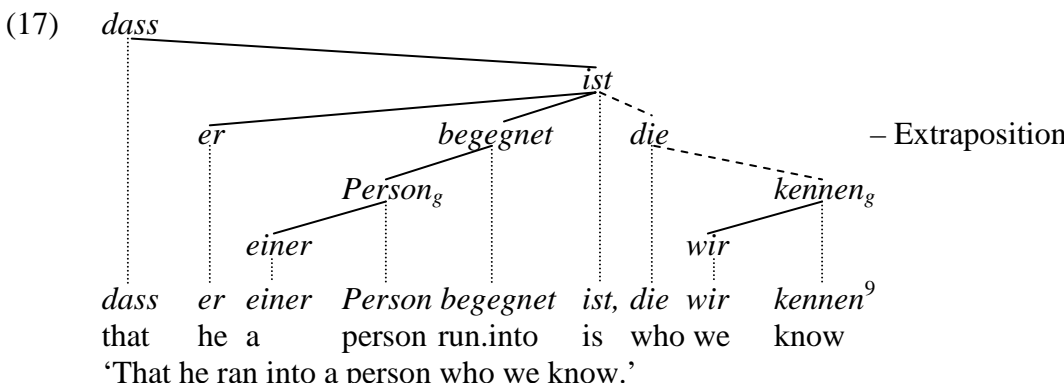
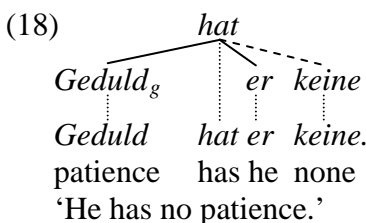
A word of caution about the terminology is warranted. Our dependency-based grammar is decidedly non-derivational. We do not assume that the risen chain ever appears as a dependent of its governor at some stage of a putative derivation below or beyond the surface. But rather the notion of rising is understood figuratively. The terms *rising* and *risen* are convenient metaphors for denoting a constellation in which a given chain has attached to a word that is not its governor.

The Rising Principle is illustrated with the following abstract example:



The letters represent words. Focusing on D, whereby C is assumed the governor of D, the Rising Principle prohibits D from ever attaching to A, B, F, or G because A, B, F, and G do not dominate the governor of D, which is C. The Rising Principle would, however, allow D to attach to E because E DOES dominate C.

Examples (10–12) illustrate various types of rising in English. Rising of course also occurs in German. German actually has types of rising that English does not.

- (14)  – W-fronting
Wem hast du geholfen_g
Wem hast du geholfen.
 who have you helped
 ‘Who have you helped?’
- (15)  – Topicalization
Die Idee wird jeder verstehen_g
Die Idee wird jeder verstehen.
 the idea will each understand
 ‘Everyone will understand the idea.’
- (16)  – Scrambling
Gestern hat sich der Spieler verletzt_g
Gestern hat sich der Spieler verletzt.
 yesterday has self the player injured
 ‘Yesterday the player injured himself.’
- (17)  – Extraposition
dass er einer Person begegnet ist, die wir kennen_g
dass er einer Person begegnet ist, die wir kennen⁹
 that he a person run.into is who we know
 ‘That he ran into a person who we know.’
- (18)  – Splitting
Geduld_g hat er keine
Geduld hat er keine.
 patience has he none
 ‘He has no patience.’

⁹ Two dashed dependency edges appear in this example. The higher one indicates that the relative clause has risen from its governor *Person*, and the lower one indicates that the relative pronoun *die* has risen from its governor *kennen*. Section 5.2 presents our account of relative clauses.

The rising in (14–18) obeys the Rising Principle. In each case, the risen chain has attached to a word that dominates its governor. Scrambling and splitting are two types of discontinuities that German allows but that English appears not to allow. The five discontinuity types illustrated – i.e. *wh*-fronting, topicalization, scrambling, extraposition, and splitting – certainly do not exhaust the inventory of discontinuity types, but they do represent the clearest and perhaps least disputed types of discontinuities.

The concept of rising just introduced has many precedents in the dependency grammar literature, although the terminology varies: Duchier and Debusmann (2001) choose the term “climbing”, Gerdes and Kahane (2001) opt for “emancipation”, Hudson (2000: 32) employs the term “raising”, Bröker (2003: 294) sees the relevant constituent “lifting”, and Eroms and Heringer (2003: 26) suggest movement and then “adjunction”. While there are certainly differences between the accounts of these linguists, the underlying idea is the same. This idea is that a flattening of structure occurs in order to overcome the discontinuity.

3.2 Evidence for rising

Evidence for the notion of rising introduced in the previous section comes in various forms. The following subsections briefly examine four phenomena that provide empirical support for our concept of rising:

1. Aspects of the long passive,
2. Aspects of N-ellipsis and splitting,
3. Certain ambiguities associated with negation, and
4. The non-derivational argument.

Each of these points is discussed in turn in the following subsections.

3.2.1 The long passive

The long passive (Stechow 1990: 189ff.; S. Müller 2002: 94; Haider 2003; Wurmbrand 2007: 256f.) obtains in German when the object of an embedded infinitival predicate takes the nominative case (as opposed to the accusative). The matrix predicate in such cases is passivized.

- (19)
-
- a. *dass* *den* *Wagen* *zu reparieren* *versucht* *wurde*
 that the-ACC car to repair tried was
 ‘That one tried to fix the car.’
- b. *dass* *der* *Wagen* *zu reparieren_g* *versucht* *wurde*
 that the-NOM car to repair tried was
 ‘That one tried to fix the car.’

The long passive does not exist in English, as the translations indicate. Furthermore, our native informants most always hesitate with such sentences. Instances of the long passive are therefore viewed as marginal here.¹⁰ Overlooking this marginality, these sentences demonstrate that the object noun phrase can take the nominative or the accusative case. When the noun phrase takes the accusative, rising has not occurred, as seen in (19a). When the nominative obtains, however, rising HAS occurred, as seen in (19b). Thus the flexibility in case is explained in terms of rising.

The key data from the long passive that support the rising account occurs when the constellation is such that rising must have occurred. In such cases, the account predicts that the nominative should be obligatory. This prediction is born out.

¹⁰ An anonymous reviewer points out that the long passive is definitely possible. (S)he provides the following example produced by Engelen (1996: 19): *Das ist eigentlich auch nicht verwunderlich, da mit allen drei Methoden derselbe Gegenstand zu analysieren versucht wird* ‘that is actually not surprising since the attempt has been made to analyze the same object with all three methods’.

- (19)
-
- Topicalization
- c. [?]*Der* *Wagen* *wurde* *zu reparieren_g* *versucht*.
 the-NOM car was to repair tried
- d. **Den* *Wagen* *wurde* *zu reparieren* *versucht*.
 the-ACC car was to repair tried

- (19)
-
- Topicalization and scrambling
- e. [?]*Zu reparieren* *wurde* *der* *Wagen* *versucht*.
 to repair was the-NOM car tried
- f. **Zu reparieren* *wurde* *den* *Wagen* *versucht*.
 to repair was the-ACC car tried

Sentences (19c) and (19e) are possible because the risen noun phrase *der Wagen* shows the nominative case. Sentences (19d) and (19f), in contrast, are bad because the risen noun phrase shows the accusative case instead of the nominative.

The data (19a–f) is explainable based on the assumption that when the object noun phrase rises, it must take the nominative case. If the object phrase does not rise, it maintains the accusative case. This account is possible based on the rising concept. Without rising, these data would be difficult to explain.

3.2.2 N-ellipsis and splitting

Aspects of N-ellipsis and splitting deliver further support for the concept of rising. N-ellipsis occurs when the noun of a noun phrase is absent; the content of such nouns is retrieved from context.

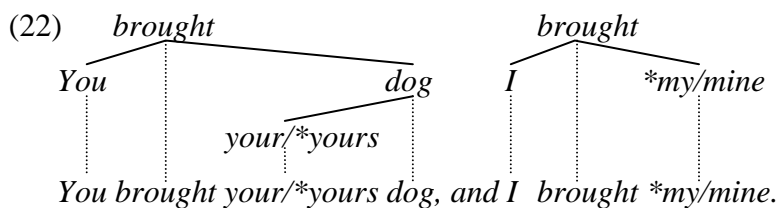
(20) *He took the first train and she took the second.*

(21) *Er fuhr mit dem ersten Zug und sie mit dem zweiten.*
 he drove with the first train and she with the second

The noun *train/Zug* has been omitted from the second noun phrase in each case. These omitted nouns are available in the immediately preceding

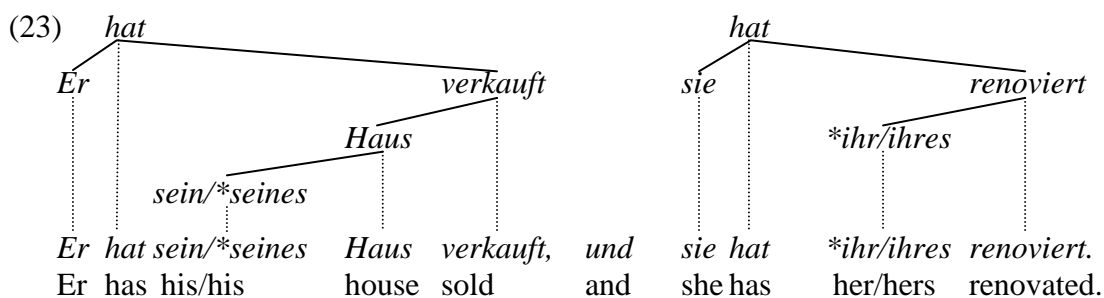
context. N-ellipsis of this sort is a restricted phenomenon in English; it occurs only with a limited set of adjectives, e.g. possessive adjectives (*mine, yours, his, hers, etc.*) and ordinal adjectives (*first, third, etc.*). In German, in contrast, the phenomenon occurs much more freely; all pre-noun modifiers can introduce an N-ellipsis.

Our dependency grammar analysis of N-ellipsis does not see such cases involving ellipsis in the literal sense, i.e. the noun has not been elided, but rather the pre-noun modifier slides into the position of the omitted noun and in so doing, functions as a pronoun.



The pre-noun modifier of the object phrase in the second clause takes on the role of the noun. The contrast in forms, i.e. possessive adjective vs. possessive pronoun, supports the account. When the pre-noun modifier is indeed a modifier, the possessive adjective must appear, when the noun is omitted, the pre-noun modifier becomes a pronoun, which means the possessive pronoun must appear.

This same sort of data occurs in German. The contrast shows up with the alternating strong vs. weak endings on pre-noun adjectives:



When the pre-noun modifier is a dependent of its noun, the adjective takes a weak ending (which in this case is no ending at all), but when the noun is missing, the pre-noun modifier becomes a dependent of the verb and takes the strong ending *-es*.

Now the particular evidence in favor of rising occurs with instances of splitting in German (Riemsdijk 1987; Holmberg 1997: 14f.).¹¹ Splitting occurs when (what is normally) a pre-noun modifier rises to follow its governor:

- (24)
- | | | | | |
|-------------------------|--------------|------------|----------------------|-------------|
| <i>haben</i> | | | | |
| / | / | / | / | / |
| <i>Mehl_g</i> | <i>haben</i> | <i>wir</i> | <i>*kein/keines</i> | – Splitting |
| ⋮ | ⋮ | ⋮ | ⋮ | |
| <i>Mehl_g</i> | <i>haben</i> | <i>wir</i> | <i>*kein/keines.</i> | |
| flour | have | we | no/none | |
| ‘We have no flour.’ | | | | |
-
- (25)
- | | | | | |
|--------------------------|--------------|---------------------|-------------|-------------|
| <i>kommt</i> | | | | |
| / | / | / | / | / |
| <i>Fleiß_g</i> | <i>kommt</i> | <i>*kein/keiner</i> | <i>auf</i> | – Splitting |
| ⋮ | ⋮ | ⋮ | ⋮ | |
| <i>Fleiß_g</i> | <i>kommt</i> | <i>*kein/keiner</i> | <i>auf.</i> | |
| effort | comes | no/none | up | |
| ‘No effort is exerted.’ | | | | |

Modifiers like the quantifier *kein/keiner* ‘no/none’ normally precede the nouns that they modify. But in these cases, the root verb splits the modifier from its noun. The key aspect of such data is that the risen modifier takes the strong ending, i.e. *-es* in (24) and *-er* in (25). The appearance of the strong endings is consistent with the strong ending that appears in (23). Such endings must appear when the modifier becomes the dependent of the verb (as opposed to of the noun). This account provides an explanation for the obligatory appearance of the strong endings in splitting.

3.2.3 The ambiguity of negation

Aspects of the ambiguity of negation in German (and English) are explainable in terms of rising. Consider first the ambiguity of the following sentence:

¹¹ A special long-term project (Potsdam Split Noun Phrase Project) that explores split NPs in numerous languages is being conducted at the University of Potsdam: http://www.ling.uni-potsdam.de/cgi-split/index.py?site=a_Home

- (26)
- | | |
|--|---|
| <p style="margin-left: 40px;"> <i>darf</i>
 <i>Sie</i> <i>nicht</i> <i>essen</i>

 </p> | <p style="margin-left: 40px;"> <i>darf</i>
 <i>Sie</i>

 </p> |
| <p>a. <i>Sie darf nicht essen.</i>
 she may not eat
 'She is not allowed to eat.'</p> | <p>b. <i>She darf NICHT essen.</i>
 She may not eat.
 'She is allowed to not eat.'</p> |

The ambiguity is explainable in terms of the attachment point of the negation. When the negation attaches to *darf*, just *darf* is negated. Similarly, when the negation attaches to *essen*, just *essen* is negated. The latter structure receives special intonation: a pause after *darf* and emphasis on *nicht*.

Alternative orderings of the words in (26) demonstrate that this analysis of negation is accurate. When the negation must attach to *darf*, only the first reading is possible:

- (26)
- | |
|--|
| <p style="margin-left: 40px;"> <i>darf</i>
 <i>Essen</i> <i>sie</i> <i>nicht</i>

 </p> |
| <p>c. <i>Essen darf sie nicht.</i>
 eat may she not
 'She is not allowed to eat.'
 *'She is allowed to not eat.'</p> |

Since the position of *nicht* prevents it from attaching to *essen*, only the reading is available where *darf* is negated. If the position of the negation requires it to attach to *essen*, however, then only that reading is available:

- (26)
- | |
|--|
| <p style="margin-left: 40px;"> <i>darf</i>
 <i>essen</i> <i>sie</i>

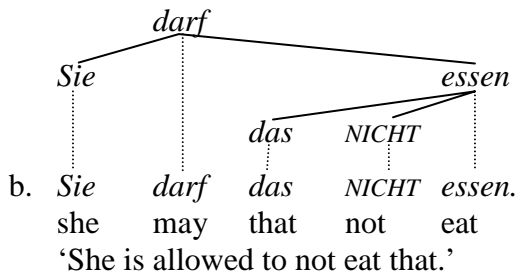
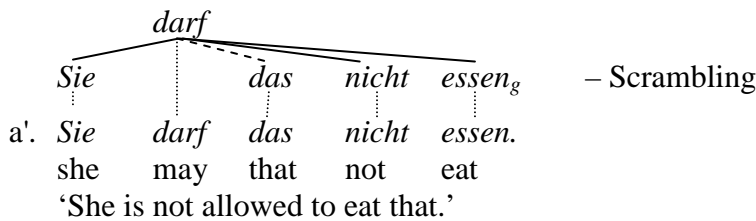
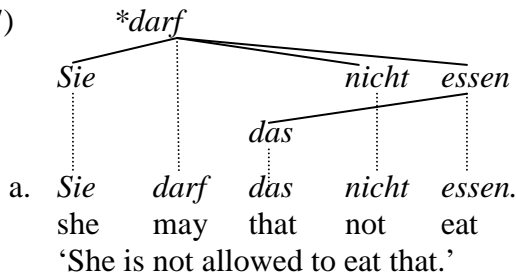
 </p> |
| <p>d. <i>Nicht essen darf sie.</i>
 not eat may she
 *'She is not allowed to eat.'
 'She is allowed to not eat.'</p> |

Examples (26a–d) thus demonstrate that the position of negation determines the predicate that can be negated. If the negation appears in a position where it can attach to both predicates, then ambiguity is the result.

If the position of the negation requires that it attach to one of the predicates rather than to the other, then only that predicate is negated.

Now the particular evidence in favor of rising occurs when an object appears in the sentence.

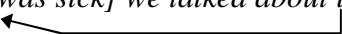
(27) **darf* – Star indicates disallowed structure



The sentence is again ambiguous. The crucial aspect of these structures is that the governor of *das* is *essen*. The structure in (27a) is blocked because of the projectivity violation, i.e. the crossing lines. The non-availability of the structure in (27a) suggests that the rising shown in (27a') has indeed occurred. Only if the object *das* has risen and attached to the matrix predicate *darf* can the negation also attach to *darf*. Without the potential of rising, the availability of the first reading would be difficult to explain. Finally, the structure in (27b) obtains when just the lower predicate is negated.

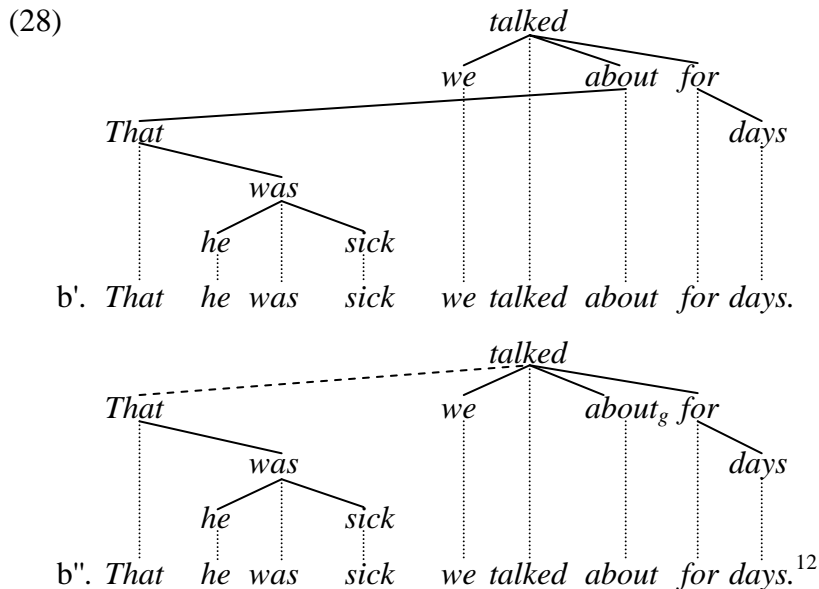
3.2.4 The non-derivational argument

Non-derivational frameworks (e.g. HPSG and LFG) produce a strong argument against derivational theories of syntax. The following data are adapted slightly from Bresnan (2001: 17).

- (28) a. ^{??}*We talked for days about [that he was sick].*
 b. *[That he was sick] we talked about it for days.*
- 

Sentence (28a) is strongly marginal because the preposition *about* has the full clause *that he was sick* as its dependent. Prepositions readily take NPs and adverbs as their dependents, but they dislike full clauses. Sentence (28b), where the clause has been topicalized, is much better than (28a). Derivational theories are challenged by such data, since they incorrectly predict (28b) to be just as bad as (28a), the full clause having appeared in the position of the trace at an early point of the derivation.

These data also support the current approach in terms of rising. The following data illustrate the non-rising and rising analyses of (28b):



The non-rising analysis shown in (28b') cannot be correct, since it shows the full clause *that he was sick* as a dependent of the preposition *about*.

¹² An alternative analysis of (28b'') would view the matrix clause as a dependent of the topicalized object clause. See footnote 23.

Sentence (28a) demonstrates, namely, that prepositions do not take full clauses as their dependents. This insight thus supports the rising analysis shown in (28b").

There is a second aspect of example (28) that suggests that rising has occurred. Compare (28b) with (28c).

(28) c. ^{??}*That he was sick we talked for days about.*

This sentence is bad due to weight; the constituent *about* is lighter than *for days* and should therefore precede *for days*. This situation is contrary to what one would expect if *That he was sick* were a surface dependent of *about*. The fact that *about* should precede *for days* indicates that *about* is lighter than *for days*. This ‘lightness’ is explainable only if *about* has no surface dependent.

4. Inversion and shifting

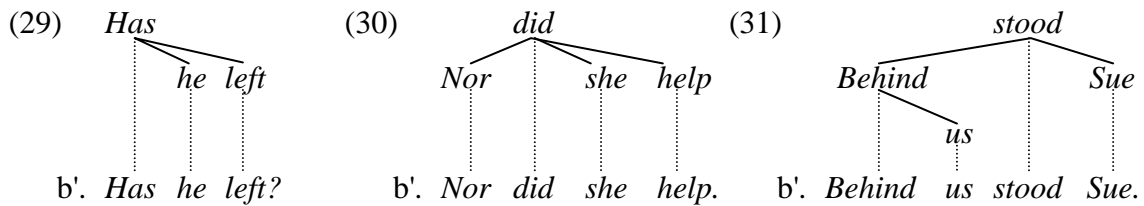
The following two sections examine two ordering mechanisms that must not be confused with rising, namely *inversion* and *shifting*. Inversion and shifting generate serializations that are (in some sense) non-standard or “marked”, but that do not involve rising.

4.1 Inversion

Typical instances of inversion in English have the subject and the finite verb in some sense switching positions (Steele 1981; Fillmore 1999; Goldberg & Del Giudice 2005). Inversion occurs, for instance, with interrogatives, negation, and locatives (to name just three examples):

- (29) a. *He has left.*
 b. *Has he left?* – Interrogative inversion
- (30) a. *...and he did not help.*
 b. *...nor did he help.* – Negative inversion
- (31) a. *Sue stood behind us.*
 b. *Behind us stood Sue.* – Locative inversion

The key aspect about the b-serializations is that they do not contain discontinuities. The subject in each case has merely switched to the other side of its head.



The subjects *he* in (29b'), *she* in (30b'), and *Sue* in (31b') have become post-dependents of their heads; they have inverted.¹³

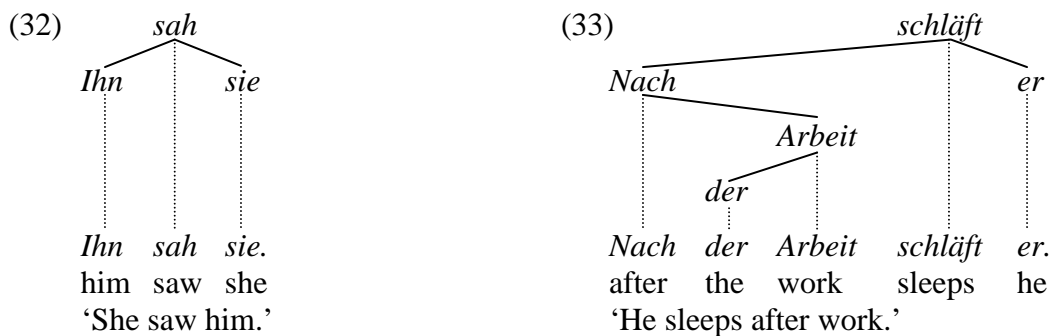
Given this analysis, inversion is defined as follows:

Inversion

Inversion occurs when a dependent appears on the non-canonical side of its head.¹⁴

This definition of inversion results in a broader understanding of inversion than one normally encounters. Many instances of topicalization and scrambling will involve inversion rather than rising.

German illustrates well cases of inversion that would in other frameworks be analyzed in terms of movement and raising. Frequently occurring cases of topicalization involve inversion on two counts.



The canonical position of the subject is as a pre-dependent of the finite verb in both English and German. These sentences have the subject appearing as a post-dependent of the finite verb, however, which means the subject has inverted. Similarly, the canonical position of an object like *ihn* in (32)

¹³ A post-dependent is a dependent that follows its head and a pre-dependent is a dependent that precedes its head.

¹⁴ We are relying on intuitive notions of canonical word order: SVO in matrix clauses in German and in all clause in English, and SOV in subordinate clauses in German. Deviations from these orders necessarily involve rising, inversion, and/or shifting.

would be as a post-dependent of the finite verb, yet in this case, *ihn* appears as a pre-dependent, which means it has inverted. Whether this analysis can also apply to *nach der Arbeit* in (33) is unclear.¹⁵ Since a canonical position for many adjuncts is often not evident, it is debatable whether or not they should be viewed as having inverted in cases like (33).

Evidence for this non-rising understanding of inversion is seen in the constituents that can be topicalized. Most dependents of the finite verb in declarative sentences can be topicalized. The same cannot be said about most constituents lower down in the hierarchy.¹⁶

- (34)
-
- a. *Er stand um zwei Uhr vor dem Haus*
He stood at two o'clock in front of the house.
- b. *Vor dem Haus stand er um zwei Uhr.*
- c. *Um zwei Uhr stand er vor dem Haus.*
- d. **Dem Haus stand er um zwei Uhr vor.*
- e. **Dem stand er um zwei Uhr vor Haus.*
- f. **Zwei Uhr stand er um vor dem Haus.*
- g. **Zwei stand er um Uhr vor dem Haus.*

Sentences (34b–c) are possible in part because no rising has occurred, but rather just inversion. Sentences (34d–g), in contrast, fail in part because rising out of the PPs is necessary. Prepositions in German are strict barriers to rising.

4.2 Shifting

Rising has occurred when a chain is separated from its governor by one or more words that dominate its governor. In this regard, one should not

¹⁵ The adjunct *nach der Arbeit* is a clause adjunct. As such, it is a predication over the entire clause. Such clause adjuncts are optional and their position varies greatly. For these reasons, it is difficult to acknowledge a canonical position for such adjuncts.

¹⁶ Unlike German, English likes to strand prepositions. In this regard, the complements of prepositions are often topicalized in English even though they are not technically the dependent of the finite verb, e.g. (...) *that house he stood in front of*.

confuse rising with *shifting*. Shifting has occurred when sister constituents have in a sense “swapped positions”.

- (35)
-
- a. *He shared a very interesting secret with us.*
- b. *He shared with us a very interesting secret.*

These examples do not involve rising. The sister constituents *with us* and *a very interesting secret* have, rather, simply shifted. Shifting occurs between *co-sister constituents*, whereby co-sister constituents are sister constituents that appear on the same side of their head. In (35), *with us* and *a very interesting secret* are co-sisters because they appear on the same side of their head *shared*.

Shifting is motivated by the relative weight of the constituents involved, a fact that is empirically verifiable (e.g. Hawkins 1994; Stallings et al. 1998; Staub et al. 2006). Heavier constituents tend to follow lighter constituents. The relative ‘heaviness’ of a given constituent is determined by a number of factors, e.g. grammatical function, grammatical category, focus, definiteness, amount of linguistic material, etc. When the discrepancy in the relative weights of the co-sister constituents involved is small, two (or more) orderings are possible, as illustrated in (35a–b). But when the discrepancy is great, the necessity that shifting occur becomes compelling.

- (36) a. *He said that to us.*
 b. **He said to us that.*
- (37) a. **He said that he really wanted to help out to us.*
 b. *He said to us that he really wanted to help out.*

Notice that the demonstrative pronoun *that* in (36) corresponds to the embedded clause *that he really wanted to help out* in (37). Shifting cannot occur in (36) because the demonstrative pronoun is much lighter than the prepositional phrase. Shifting is obligatory in (37), in contrast, because the embedded clause is much heavier than the prepositional phrase.

In English, shifting appears to be limited to the post-verb domain, i.e. it occurs only after the verb (chain). In German, however, shifting is a more common occurrence; it takes place quite often in the midfield as well as in the post-verb domain. The following examples illustrate shifting in the midfield in German:

- (38)
- a. *Sie hat meiner Schwester einen Blumenstrauß gegeben.*
 she has my sister a bouquet.of.flowers given
 ‘She gave a bouquet of flowers to my sister.’
- b. *Sie hat einen Blumenstrauß meiner Schwester gegeben.*
 she has a bouquet.of.flowers my sister given
 ‘She gave a bouquet of flowers to my sister.’
-

With a normal intonation curve, sentence (38a) is preferred over (38b). Sentence (38b) is, however, also acceptable, especially if *meiner Schwester* receives contrastive stress. The crucial point here is that rising has not occurred, which means there is no discontinuity.

Shifting in German is not limited to just objects (and adjuncts), but rather the subject can also take part. The following examples show shifting involving the subject constituent:

- (39)
-
- a. *Gestern besuchten die Kinder mich.*
 yesterday visited the children me
 ‘Yesterday the children visited me.’

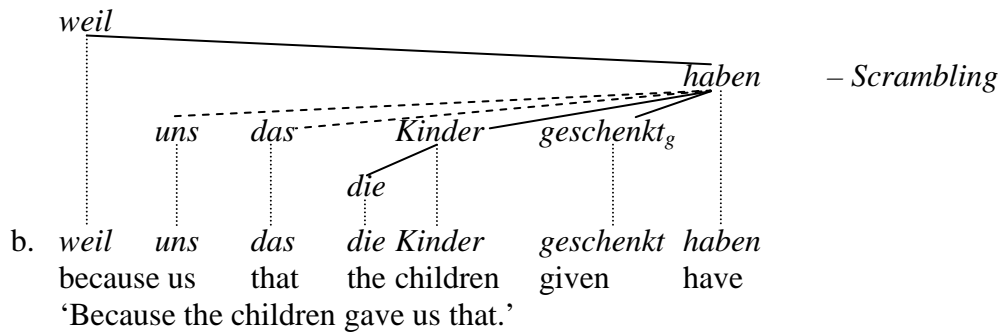
-
- b. *Gestern besuchten mich die Kinder.*
 yesterday visited me the children
 ‘Yesterday the children visited me.’

Subjects are lighter than objects, and definite pronouns are lighter than full NPs. These competing aspects of weight result in flexible word order.

Examples (35–39) are cases that involve just shifting (and inversion in the case of (39)), meaning that rising has in no way occurred. It is not unusual, however, for rising to occur in concord with shifting. Such cases are usually addressed in terms of scrambling. The following examples illustrate the possibilities:

- (40)
-
- a. *weil die Kinder uns das geschenkt haben*
 because the children us that given have
 ‘Because the children gave us that.’

-
- a'. *weil die Kinder uns das geschenkt haben*
 because the children us that given have
 ‘Because the children gave us that.’



Example (40a) illustrates a structure that does NOT show rising.¹⁷ Example (40a'), in contrast, illustrates rising. Finally, example (40b) illustrates both rising and shifting. Since the subject is (most) always a dependent of the finite verb, the object pronouns in (40b) must rise in order to precede the subject. The (40a) and (40a') structures represent competing analyses. Because we assume non-rising structures whenever possible, we prefer the analysis in (40a) over the one in (40a').

Our account of shifting is motivated by a far reaching difference across English and German: English does not know scrambling, whereas German of course does. The fact that shifting occurs in English, as illustrated in Section 4.1, but that the type of discontinuities associated with scrambling do not occur in English suggests that shifting is an ordering mechanism that is distinct from scrambling. The current system distinguishes between various types of rising, whereby the rising illustrated in (40b) shall be called simply *scrambling*. English, unlike German, does not allow scrambling.

One must consider this account with the alternative in mind. Derivational constituency-based theories of syntax that assume strictly binary right-branching structure – such as those associated with Kayne’s Antisymmetry Theory (1994) – cannot acknowledge the distinction drawn here between shifting and scrambling. Instances of shifting like in (35–40) must be addressed in terms of movement, which means that in some sense a discontinuity is perceived. In contrast, the flatter dependency-based account presented here acknowledges no discontinuities in (35–40). The fact that scrambling does not occur in English but that shifting does,

¹⁷ A shifting analysis is, however, possible. If one views the order nominative-accusative-dative as canonical, then these structures contain shifting, the dative *uns* having shifted in front of the accusative *das*.

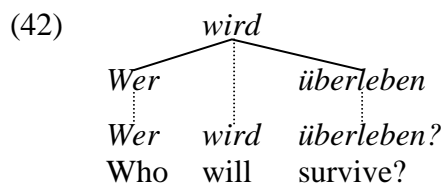
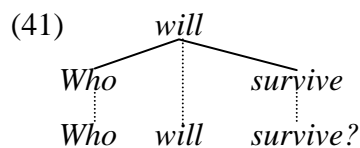
receives a straightforward explanation. Scrambling is rising, whereas shifting is not.¹⁸

5. *Wh*-discontinuities

The following two sections examine *wh*-elements and relative pronouns. The special syntax of these elements demands a certain analysis. Relative pronouns and *wh*-elements in indirect questions are the roots of their clauses.

5.1 Direct *wh*-questions

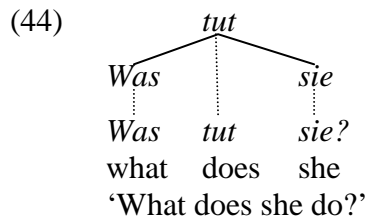
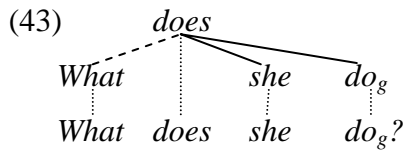
Depending on the *wh*-element, direct questions may or may not involve rising. When the subject of the matrix clause is questioned, neither in English nor in German does rising occur.



Since the subject is always a dependent of the finite verb, there is no reason to assume a discontinuity in such cases. The subject appears as a dependent of the finite verb just as it would in a statement.

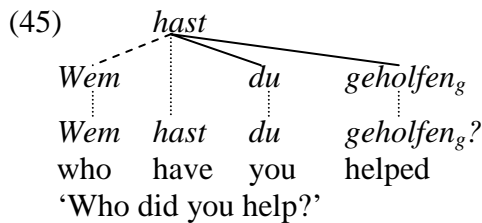
The obligatory appearance of an auxiliary verb (e.g. *do*-support) in English when something other than the subject is questioned is, however, an indication that rising has occurred. The questioned element rises to attach to the finite auxiliary. German, in contrast, can question non-subject constituents without the appearance of an auxiliary, meaning that rising may not occur (although inversion has):

¹⁸ This point should be considered in view of the lengthy accounts of various movement/shifting phenomena. So-called “object shift” in the Scandinavian languages, for instance, has received much attention in recent years (e.g. Neeleman 1994; Vikner 2006). Vikner (2006) argues convincingly that object shift and scrambling are indeed distinct mechanisms. This fact is not surprising given the distinction drawn here. The examples of object shift Vikner produces can all be analyzed as shifting, whereas his examples of scrambling are better addressed in terms of leftward rising.



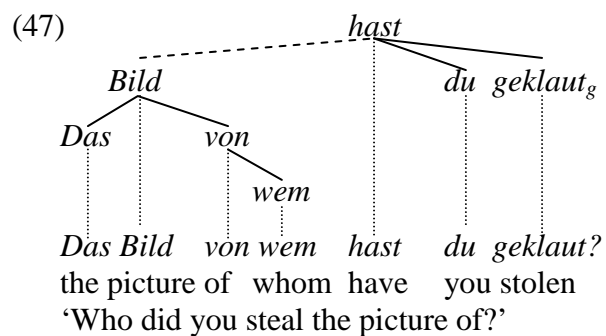
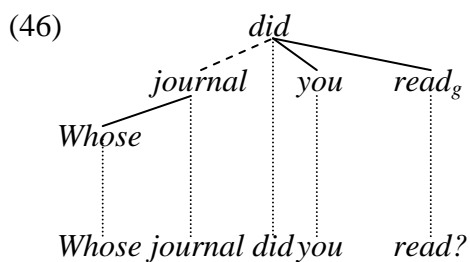
The obligatory appearance of the auxiliary *does* in (43) necessitates rising; the *wh*-element rises to attach to *does*. The Rising Principle is obeyed since *does* dominates *do*, the governor of *what*.

Direct *wh*-questions in German also obligatorily involve rising if a non-subject is questioned and an auxiliary verb is present.



Since the governor of *wem* is *geholfen*, *wem* has risen to attach to *hast*. The Rising Principle is again obeyed, *hast* dominating *geholfen*.

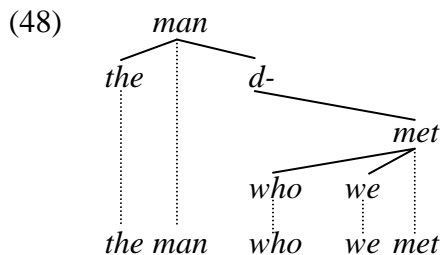
When an element is questioned that alone cannot rise (for whatever reason), it pied-pipes the constituent that contains it. This pied-piping may or may not result in rising.



These sentences both contain rising. In each case, the *wh*-element alone cannot rise, which means that it pied-pipes the entire noun phrase that contains it. Nothing about pied-piping of this sort challenges the current theory of discontinuities in terms of rising.

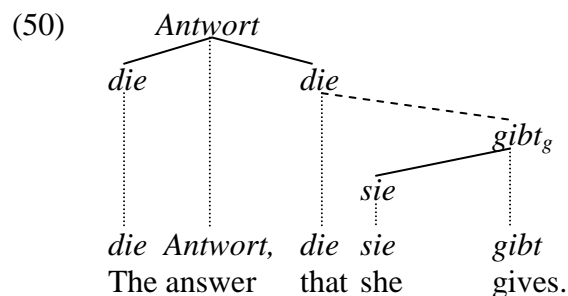
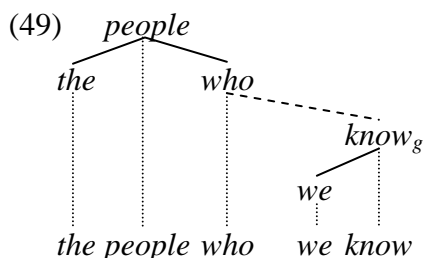
5.2 Indirect questions and relative clauses

The analysis of indirect questions and relative clauses is less obvious. Among proponents of dependency grammar, there is a lack of agreement in these areas. Some dependency grammars see the finite verb as the root of the relative clause (e.g. Kunze 1975: 160; Hajičová & Sgall 2003: 583). Many others, however, assume an interdependence between the relative pronoun and the finite verb (e.g. Tesnière 1969: 561; Engel 1994: 218; Eroms 2000: 289ff.; Hudson 2000: 32; Van Langendonck 2003: 185). This interdependence is sometimes expressed in terms of a split relative pronoun, the one part of the pronoun being the root of the relative clause and the other part being a standard dependent of the verb:



The relative pronoun in such cases is partitioned, the one part being an empty demonstrative element (= d-) and the other part being a normal dependent of the finite verb. This analysis is rejected here for a couple of reasons. The one reason is that the existence of empty elements is hard to verify empirically. The second reason is that such an account is faced with difficulties when the relative pronoun pied-pipes other material with it.

Instead of a split node, we view the relative pronoun as the root of the relative clause.

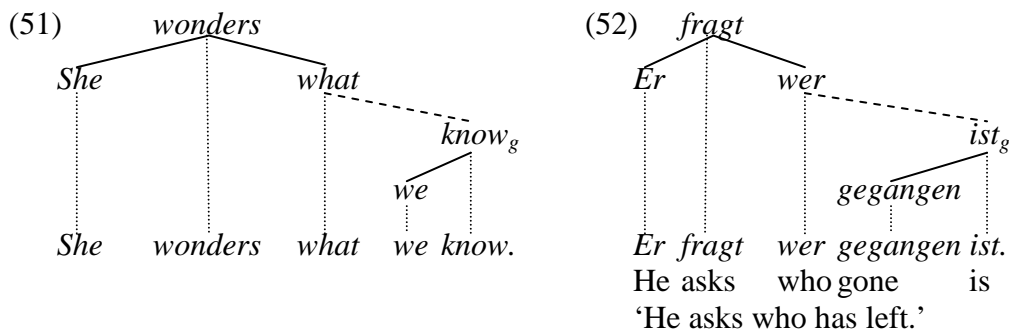


The dashed dependency edge still marks a constituent the head of which is not its governor: *who* is not the governor of *we know* in (49) and *die* is not

the governor of *sie gibt* in (50). Note also that the Rising Principle is still obeyed: the risen chain *who* in (49) has attached to *people*, which dominates *know*, the governor of *who*. Similarly, the risen chain *die* in (50) has attached to *Antwort*, which dominates *gibt*, the governor of *die*.

The curious thing about relative pronouns like the ones in (49–50), then, is that they appear to have two governors, the one being the noun that immediately dominates them and the other being the verb that they dominate. However, this appearance is deceptive. The verb that they dominate is their true governor, whereas the noun that immediately dominates them is the governor of the entire relative clause, not just of the relative pronoun.

The account of indirect questions is similar. The *wh*-question word is the root of the indirect question clause.



The account is consistent. The dashed-dotted dependency edge again marks a constituent the head of which is not its governor. The Rising Principle is also again obeyed: the risen *wh*-element in each case attaches to a word that dominates its governor.

5.3 Evidence for *wh*-roots

The following three subsections present three empirical arguments supporting the stance just outlined, i.e. that the *wh*-element is (usually) the root of indirect questions and relative clauses.

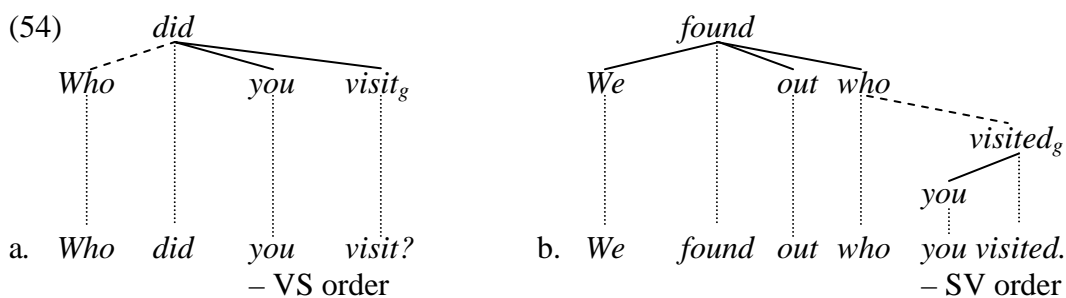
5.3.1 SV order in English

Indirect *wh*-questions in English differ significantly from direct *wh*-questions with respect to subject-verb inversion. The frequent subject-auxiliary inversion of direct questions does not occur in indirect questions.

- (53) a. *What has he done?*
 b. *We don't know what he has done.*

The direct question in (53a) shows VS order, whereas the indirect question in (53b) shows SV order.¹⁹ This contrast can be explained by acknowledging the varying status of the *wh*-element.

The head of the *wh*-element in direct questions is the finite verb, whereas the relation is reversed in indirect questions, as presented in Sections 5.1–5.2.



By viewing the *wh*-element as the root of the indirect question, as shown in (54b), we have a principled means of addressing the VS vs. SV distinction. Apparently, a non-subject *wh*-element may not be a pre-dependent of a lexical verb in English; this explains the obligatory *do*-support in (54a) and the resulting subject-auxiliary inversion. In contrast, the *do*-support and resulting subject-verb inversion do not occur in (54b) because the *wh*-element is not a pre-dependent of the finite verb, but rather it dominates the finite verb. If this account were not to view the *wh*-element as the root of the indirect question in (54b), the distinction between VS and SV order would be difficult to explain.

5.3.2 VF order in German

A similar observation from German provides a second source of empirical support for our account of *wh*-elements. Subordinate clauses in German typically show VF (= verb final) order instead of the V2 order of declarative matrix clauses. That is, the finite verb follows the nominal arguments in non-matrix clauses.

¹⁹The “V” in “SV” and “VS” represents the finite verb, which is quite often an auxiliary.

- (57)
-
- a. *wenn er heute kommt*
when he today comes
'When he is coming today.'
- b. (*Wir wissen,*) *wann er heute kommt*
we know when he today comes
'We know when he is coming today.'

The parallelism between the subordinator *wenn* 'when' in (57a) and the *wh*-element *wann* 'when' in (57b) is apparent. In both cases, the subordinator/*wh*-element is the root of the clause that it introduces. When such an element is present, VF order is forced.

Consider next the parallelism across the following subordinate clauses:

- (58)
-
- a. *die Tatsache, dass er das erwähnte*
the fact that he that mentioned
'The fact that he mentioned that.'
- b. *das Problem, das er erwähnte*
the problem that he mentioned
'The problem that he mentioned.'

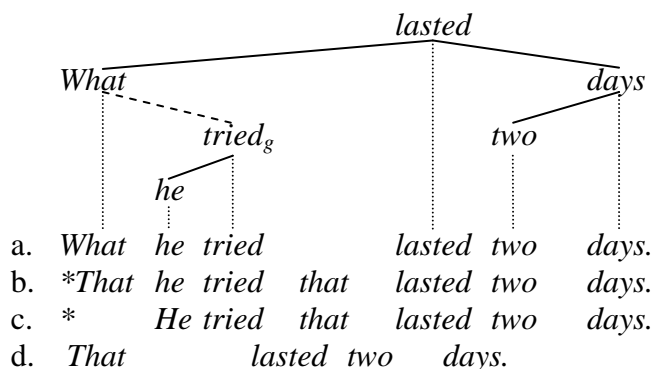
The similarity is again apparent. The subordinator *dass* introduces a content clause and forces VF order. Likewise, the relative pronoun *das* 'that' introduces an embedded clause and forces VF order. If we were not to take the relative pronoun as the root of the embedded clause in (58b), this parallelism would be mysterious.

5.3.3 Free relative clauses

Free relative clauses provide a third source of support for our account of *wh*-elements. Two empirical facts about free relatives support our view, namely that the relative pronoun is the root of its clause. The first concerns subcategorization requirements and the second concerns case limitations in German.

The fact that free relative clauses can have the distribution of noun phrases means that the relative pronoun must be the root of its clause.

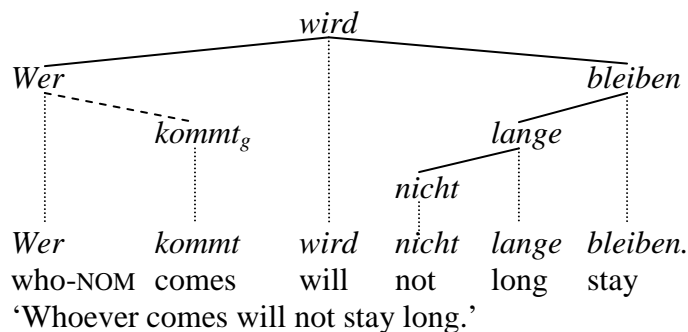
(59)



Sentence (59d) illustrates that a demonstrative pronoun can appear as the subject of the predicate *lasted*. Sentences (59b) and (59c) suggest strongly, in contrast, that a canonical clause cannot appear as the subject of *lasted*. The fact that sentence (59a) is fine like sentence (59d), therefore, indicates that the relative pronoun *what* must be the root of the relative clause. The relative pronoun in (59a) and the demonstrative pronoun in (59d) satisfy in a like manner the subcategorization requirements of *lasted*. If the relative pronoun were not the root of free relative clause, these data would be difficult to explain.

The second aspect of free relatives that supports our account of *wh*-elements is seen in case limitations on the relative pronoun in German.

(60)



(61) **Wem wir helfen wird nicht lange bleiben.*
 Who-DAT we help will not long stay.
 ‘Whoever we help will not stay long.’

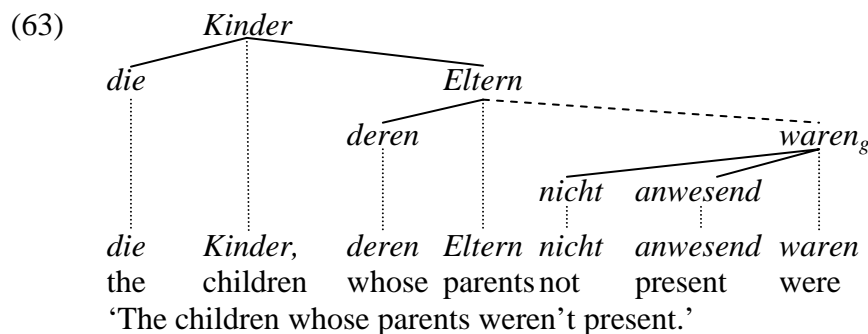
(62) **Wen wir unterstützen wird nicht lange bleiben.*
 who-ACC we support will not long stay
 ‘Whoever we support will not stay long.’

The predicate chain *wird...bleiben* demands a nominative subject. The relative pronoun *wer* in (60), since it shows nominative, is therefore fine.

When this relative pronoun shows dative, as in (61), or accusative, as in (62), ungrammaticality is the result. If the relative pronoun were not to appear as the root of the relative clause, these data would be opaque. As the root of the relative clause, however, the relative pronoun can receive case from the matrix predicate, which means these data are as expected.²⁰

5.4 Pied-piping

One final aspect of *wh*-elements must be addressed, namely pied-piping. When a relative pronoun pied-pipes the phrase that contains it, the root of the pied-piped phrase is the root of the relative clause. Thus nouns, prepositions, and adverbs can be the roots of relative clauses.



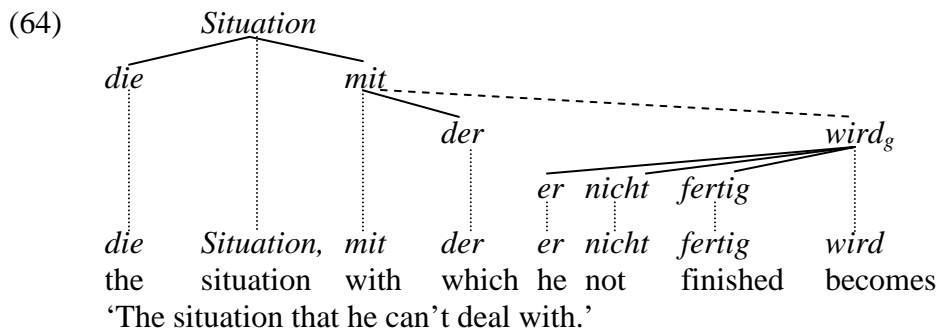
The risen chain in this case is *deren Eltern*, which means the root of the relative clause is the noun *Eltern*. Notice that the constituent *nicht anwesend waren* cannot attach to the relative pronoun *deren* because if it did, a projectivity violation would occur.

The following example involves a risen prepositional phrase:

²⁰ Certain aspects of free relatives are still less than fully understood. Observe the following contrast:

- (i) *Wem du geholfen hast ist zufrieden. (Compare: Wer-NOM hilft ist zufrieden.)
whom-DAT you helped have is satisfied
Intended: ‘The person who you helped is satisfied.’
- (ii) Wem du geholfen hast ist mir egal.
whom-DAT you helped have is me even
‘I don’t care who you helped.’

The contrast between (i) and (ii) is explainable by acknowledging what the matrix predicate subcategorizes for. Sentence (i) is bad because *ist zufrieden* demands a nominal subject in the nominative case, not a clausal subject. Sentence (ii), in contrast, is fine because the predicate *ist...egal* can take a clausal subject.



The risen chain in this case is *mit der*, which means the root of the relative clause is the preposition *mit*. The constituent *er nicht fertig wird* has attached to the preposition.

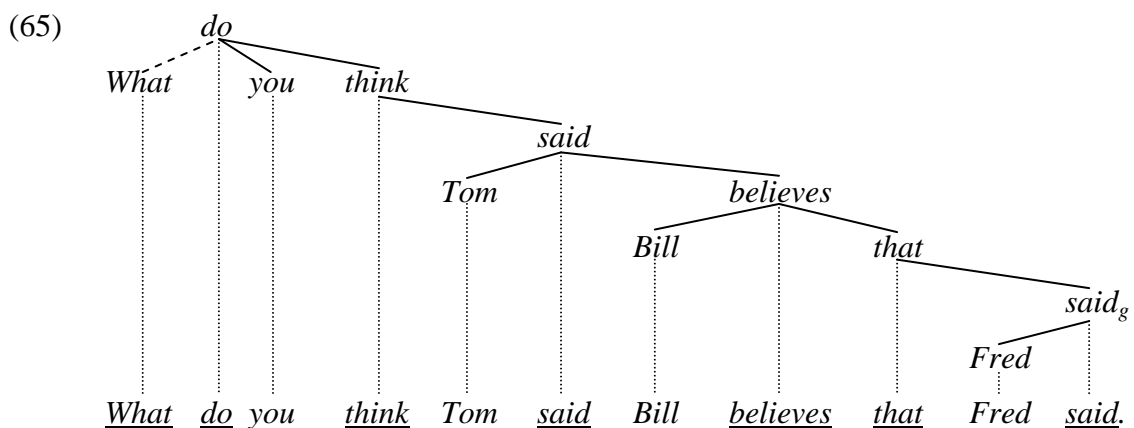
6. Rising chains

The current theory investigates discontinuities in terms of chains. The syntactic unit that is most relevant for our theory of discontinuities is the chain, more exactly the *rising chain*. The rising chain is defined as follows:

Rising chain

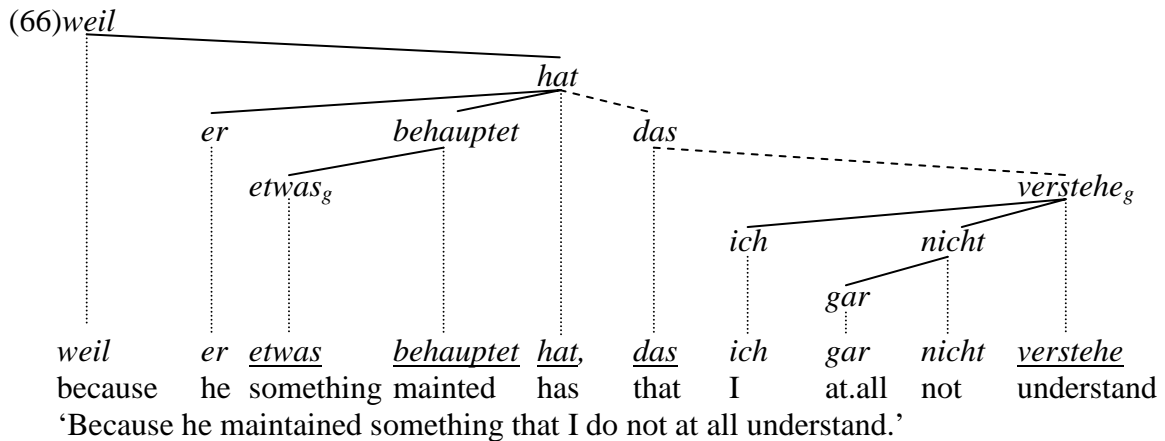
The minimal chain containing the root of the risen chain and the risen chain’s governor.

The following example illustrates an extended rising chain:



The risen chain is *what* and the governor of this risen chain is *said*. The rising chain, which is underlined, is therefore *what do...think...said...believes that...said*; the words *you*, *Tom*, *Bill*, and *Fred* are excluded from this chain.

A second example, this time from German, containing two rising chains further illustrates the concept:



The relative clause has been extraposed. Since the root of the relative clause is *das* and its governor is *etwas*, the relevant rising chain is *etwas behauptet hat das*. Within the relative clause itself, the risen chain is *das* and its governor is *verstehe*, therefore the rising chain there is *das...verstehe*.

Given these rising chains, a theory of discontinuities is within reach. The particular aspects of various types of discontinuities can be identified and described in terms of the rising chains involved. A particular instance of a particular type of rising is allowed or disallowed based upon the traits of its rising chain. Various aspects of the rising chain can be relevant, e.g. the position of the risen chain with respect to its governor, the syntactic category of the governor, the syntactic category of the root of the risen chain, the syntactic category of the intermediate links in the rising chain, the syntactic functions of the dependencies in the rising chain, etc.

The following subsections illustrate the role of rising chains for describing discontinuities. Ross’ (1967) Left Branch Condition and Right Roof Constraint are briefly discussed.

6.1 The Left Branch Condition

Ross’ Left Branch Condition (1967) observes that pre-noun modifiers cannot be separated from their nouns.

- (67)
-
- Diagram (67) shows a dependency tree for the sentence "Whose did you borrow bicycle?". The root node is *did*. It has three children: *Whose* (labeled DET), *you*, and *borrow*. *borrow* has a child *bicycle_g*. Dotted lines connect the words to their corresponding nodes in the tree. Below the tree, the sentence is written as "a. *Whose did you borrow bicycle?", with the underlined words corresponding to the nodes in the tree.
- a. *Whose did you borrow bicycle?
- (68)
-
- Diagram (68) shows a dependency tree for the sentence "Freundliche habe ich Menschen kennengelernt.". The root node is *habe*. It has three children: *Freundliche* (labeled ATTR), *ich*, and *kennengelernt*. *kennengelernt* has a child *Menschen_g*. Dotted lines connect the words to their corresponding nodes in the tree. Below the tree, the sentence is written as "a. *Freundliche habe ich Menschen kennengelernt.", with the underlined words corresponding to the nodes in the tree. Below the sentence is the translation: "friendly have I people got.to.know" and the German sentence: "‘I got to know friendly people.’"
- a. *Freundliche habe ich Menschen kennengelernt.
friendly have I people got.to.know
‘I got to know friendly people.’

The rising chains are again underlined. The examples show that pre-noun modifiers such as *whose* in (67) and *freundliche* in (68) may not be extracted out of the noun phrases that contain them. These discontinuities fail due to the determiner (= DET) and attribute (= ATTR) functions that appear in the discontinuity chains. To overcome the violations, the entire NP that contains the pre-noun modifier must be pied-piped with the modifier, i.e. *Whose bicycle did you borrow* and *Freundliche Menschen habe ich kennengelernt*.

Dependency grammars assume an inventory of syntactic functions as a primitive (e.g. Schubert 1988: 52ff.; Bröcker 2003: 297ff.; Menzel 2003: 691; Mel'čuk 2003: 209ff.). Each and every dependency carries a syntactic function. The standard means of representing these functions is to show them as labels on the dependency edges. The following examples are similar to those Mel'čuk (2003: 53ff.) assumes:

- (69)
-
- Diagram (69) shows six dependency trees labeled a-f. Each tree has a root node and children, with syntactic functions labeled on the edges. Dotted lines connect the words to their corresponding nodes in the tree. Below each tree is the corresponding sentence with the underlined words corresponding to the nodes in the tree.
- a. *feature* (DET) → *a* → *feature*. Sentence: *a feature*.
- b. *activity* (ATTR) → *laboratory* → *activity*. Sentence: *laboratory activity*.
- c. *am* (SUBJ) → *I* → *am ...*. Sentence: *I am ...*.
- d. *see* (OBJ) → *me* → *see*. Sentence: *see me*.
- e. *have* (PERF-ANAL) → *written* → *have*. Sentence: *have written*.
- f. *fact* (CONTENT) → *the* → *fact that...*. Sentence: *the fact that...*.

The dependencies shown are those of DETERMINER, ATTRIBUTE, SUBJECT, OBJECT, PERFECT-ANALYTICAL, and CONTENT. The discussion here does not attempt an inventory of these functions, but it does assume that the functions exist and that they play a central role in determining the discontinuities that a given language does and does not allow.

Acknowledging these syntactic functions, Ross' Left Branch Condition receives the following formulation in the current theory:

Left Branch Condition

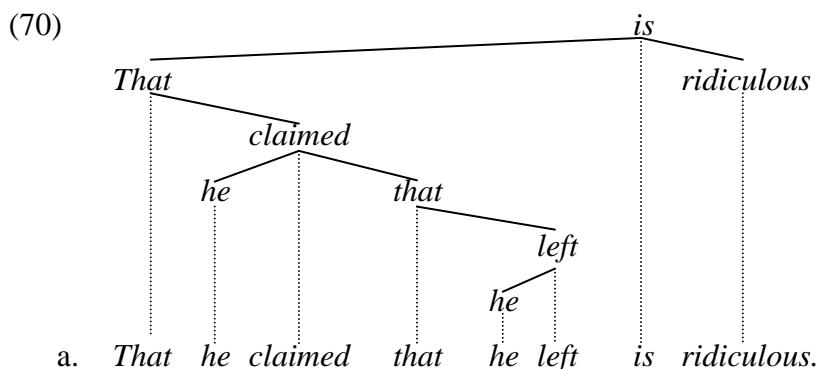
A rising chain that has the risen chain preceding its governor may NOT contain a determiner or attribute function.

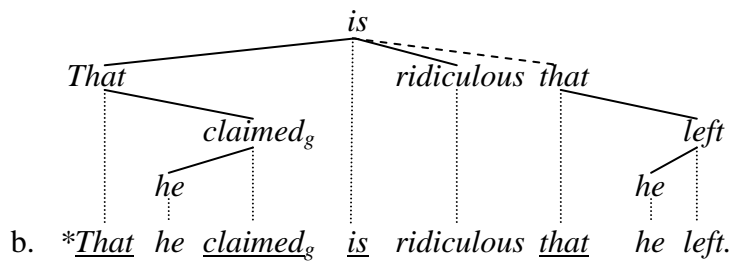
According to this formulation, then, (67) is ungrammatical because the determiner function appears in the rising chain and (68) is ungrammatical because the attribute function appears in the rising chain.

The formulation of the Left Branch Condition is valid for both English and German. In this regard, English actually acknowledges a more general version of the condition, i.e. *a rising chain may not contain a determiner or attribute function*. German, in contrast, allows these functions to appear on occasion in a rising chain if the risen chain follows its governor, e.g. *Zeit habe ich keine* 'Time have I none' (= I have no time). As discussed in Section 3.2.2, we call such instances of rising *splitting*.

6.2 The Right Roof Constraint

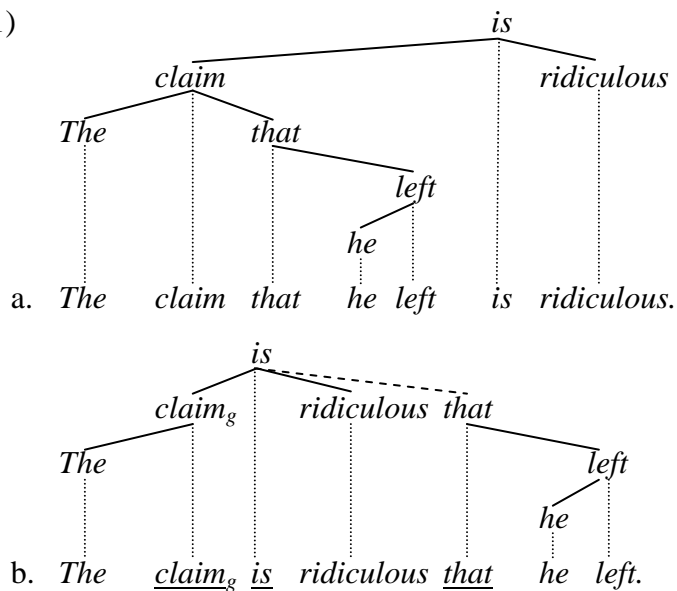
Ross' Right Roof Constraint (1967) observes that extraposition may not occur out of a finite clause.





Sentence (70b) illustrates that extraposition cannot occur out of a subject clause. The following cases illustrate that extraposition, in contrast, can occur out of a subject NP:

(71)



What is the relevant difference between (70b) and (71b) that can explain this contrast? The answer is that extraposition in (71b) occurs out of an NP, whereas in (70b), it occurs out of a clause. The verb in the subject clause in (70b) is a barrier to extraposition.

Given this insight, Ross' Right Roof Constraint can be expressed as a limitation on backward rising (i.e. on rising where the risen chain follows its governor):

Right Roof Constraint

A rising chain may not have the risen chain following its governor and containing a non-root finite verb.

In other words, a finite verb is a barrier to extraposition (and scrambling). This constraint correctly predicts (70b) to be unacceptable, since the finite

verb *claimed* is a non-root link in the rising chain. At the same time, sentence (71b) is predicted to be fine because the finite verb there *is* the root of the rising chain.

The Right Roof Constraint is valid for German as well.

7. Summary and conclusion

This paper has presented the foundational assumptions and principles for a dependency grammar theory of discontinuities. The major innovation that enables the entire account is the chain, a unit of syntax unique to dependency grammar. The chain was defined as follows:

Chain

A word or a combination of words that is top-down (or bottom-up) continuous.

This definition identifies a large number of word combinations of a given structure as chains. A constituent is always a chain, but very many chains are not constituents. While the chain is a flexible unit of syntax – much more flexible than the constituent – it is also limited. Most structures contain many more non-chain than chain word combinations.

Dependency grammar has traditionally identified discontinuities in terms of projectivity violations. When a discontinuity in a grammatical sentence is perceived, however, the projectivity violation has been reanalyzed in accordance with the Rising Principle.

Rising Principle

The head of a given chain must either be that chain's governor or dominate that chain's governor.

This principle is the basis of our dependency grammar account of discontinuities. It helps our theory distinguish between those projectivity violations that result in grammatical sentences, as opposed to those that result in ungrammatical ones. In grammatical sentences with projectivity violations, these violations are recovered by the Rising Principle. In ungrammatical sentences with projectivity violations, no such recovery is possible.

Further central aspects of the account concern the analysis of inversion, shifting, *wh*-fronting, and rising chains. Inversion and shifting are two mechanisms that result in non-standard word orders, but that do not involve rising. Inversion occurs when a dependent appears on the non-

canonical side of its head, and shifting occurs when co-sisters “swap” their positions, the heavier of the two appearing to the right. The analysis of *wh*-fronting assumes that the *wh*-element in matrix clauses is a dependent of the finite verb, whereas the *wh*-elements of embedded clauses are always the clause root.

Finally, the type of chain that the account acknowledges in order to address discontinuities is the rising chain.

Rising chain

The minimal chain containing the root of the risen chain and the risen chain’s governor.

By acknowledging rising chains, the characteristics of the various types of discontinuities – those of *wh*-fronting, topicalization, scrambling, extraposition, and splitting – can be identified. This point was exemplified by the brief analyses of Ross’ Left Branch Condition and Right Roof Constraint.

We see that the concepts and principles presented above serving as the basis for a practical and comprehensive dependency grammar theory of discontinuities. Particular and detailed dependency grammar accounts of *wh*-fronting, topicalization, scrambling, extraposition, and splitting (and whatever other types of rising are ultimately identified) are now possible.

References

- Abney, Steven (1987) *The English Noun Phrase in its Sentential Aspect*. Ph.D. dissertation, MIT.
- Ágel, V.; Eichinger, L.; Eroms, H.-W.; Hellwig P.; Heringer, H.J. & Lobin, H. (eds.) (2003) *Dependency and Valency: An International Handbook of Contemporary Research*, vol.1. Berlin: Walter de Gruyter.
- (2006) *Dependency and Valency: An International Handbook of Contemporary Research*, vol.2. Berlin: Walter de Gruyter.
- Bech, Gunnar (1955–57) *Studien über das deutsche Verbum infinitum. Historiskfilologiske Meddelelser udgivet af Det Kongelige Danske Videnskabernes Selskab* 35–2 (1955), 36–6 (1957), Copenhagen. 2e, onveranderde uitgaven (1983). Tübingen: Niemeyer.
- Besten, Hans den & Rutten, Jean (1989) On verb raising, extraposition and free word order in Dutch. In Dang Jaspers et al. (eds.), *Sentential Complementation and the Lexicon: Studies in Honor of Wim de Geest*, pp. 41–56. Dordrecht: Foris.
- Bresnan, Joan (2001) *Lexical-Functional Syntax*. Malden, MA: Blackwell Publishers.
- Bröker, Norbert (2000) Unordered and non-projective dependency grammars. In Sylvaine Kahane (ed.), pp. 79–111. Paris: Hermes Sciences Publications.

- (2003) Formal foundations of dependency grammar. In Vilmos Ágel et al. (eds.), pp. 294–310. Berlin: Walter de Gruyter.
- Duchier, Denys & Debusmann, Ralph (2001) Topology dependency trees: A constraint based account of linear precedence. *Proceedings from the 39th annual meeting of the Association Computational Linguistics (ACL) 2001*, Toulouse, France, 180–187.
- Engel, Ulrich (1994) *Syntax der deutschen Gegenwartssprache*, 3rd rev. ed. Berlin: Erich Schmidt.
- Engelen, Bernhard (1986) *Einführung in die Syntax der deutschen Sprache*, vol. 2, Baltmannsweiler: Pädag. Vlg. Burgbücherei Schneider.
- Eroms, Hans-Werner (2000) *Syntax der deutschen Sprache*. Berlin: Walter de Gruyter.
- Eroms, Hans-Werner & Heringer, Hans Jürgen (2003) Dependenz und lineare Ordnung. In Vilmos Ágel et al. (eds.), pp. 247–262. Berlin: Walter de Gruyter.
- Fillmore, Charles (1999) Inversion and constructional inheritance. In Gert Webelhuth, Jean-Pierre Koenig & Andreas Kathol (eds.), *Lexical and Constructional Aspects of Linguistic Explanation*, pp. 113–128. Stanford, CA: CSLI Publications.
- Gaifman, Chaim (1965) Dependency systems and phrase-structure systems. *Information and Control* 8: 304–337.
- Gazdar, Gerald; Klein, Ewald; Pullum, Geoffrey & Sag, Ivan (1985) *Generalized Phrase Structure Grammar*. Cambridge, MA: Harvard University Press.
- Gerdes, Kim & Kahane, Sylvain (2001) Word order in German: A formal dependency grammar using a topology model. *Proceedings from the 39th annual meeting of the Association Computational Linguistics (ACL) 2001*, Toulouse, France, 220–227.
- Goldberg, Adele & Del Giudice, Alex (2005) Subject-auxiliary inversion: A natural category. *Linguistic Review* 22: 411–428.
- Groß, Thomas (1992) Konstruktive Stemmologie. *Papiere zur Linguistik* 47: 115–139.
- (1999) *Theoretical Foundations of Dependency Syntax*. Munich: Iudicium.
- (2003) Dependency grammar's limits – and ways of extending them. In Vilmos Ágel et al. (eds.), pp. 331–351. Berlin: Walter de Gruyter.
- Haider, Hubert (2003) V-clustering and clause union – causes and effects. In Pieter Seuren & Gerard Kempen (eds.), *Verb Constructions in German and Dutch*, pp. 91–126. Amsterdam: Benjamins.
- Hajičová, Eva & Sgall, Petr (2003) Dependency syntax in Functional Generative Description. In Vilmos Ágel et al. (eds.), pp. 570–593. Berlin: Walter de Gruyter.
- Hawkins, John (1994) *A Performance Theory of Order and Constituency*. The Cambridge University Press.
- Hays, David (1964) Dependency theory: A formalism and some observations. *Language* 40: 511–525.
- Hellwig, Peter (2003) Dependency Unification Grammar. In Vilmos Ágel et al. (eds.), pp. 593–635. Berlin: Walter de Gruyter.
- Heringer, Hans Jürgen (1996) *Deutsche Syntax Dependentiell*. Tübingen: Stauffenburg.
- Hinrichs, Erhard & Nakazawa, Tsuneko (1998) Third Construction and VP extraposition in German: An HPSG analysis. In Erhard Hinrich, Andreas Kathol

- & Tsuneko Nakazawa (eds.), *Complex Predicates in Nonderivational Syntax. Syntax and Semantics* 30, pp. 115–157. London: Academic Press.
- Holmberg, Anders (1997) Introduction: Some reflections on movement. In James Black (ed.), *Clitics, Pronouns, and Movement*, pp. 9–22. Amsterdam: Benjamins.
- Hudson, Richard (1984) *Word Grammar*. New York: Basil Blackwell.
- (1990) *An English Word Grammar*. Oxford: Basil Blackwell.
- (2000) Discontinuities. In Sylvaine Kahane (ed.), pp. 7–56. Paris: Hermes.
- (2007) *Language Networks: The New Word Grammar*. Oxford University Press.
- Hyvärinen, Irma (2003) Der verbale Valenzträger. In Vilmos Ágel et al. (eds.), pp. 738–763. Berlin: Walter de Gruyter.
- Jung, Wha-Young (1995) *Syntaktische Relationen im Rahmen der Dependenzgrammatik*. Hamburg: Buske.
- Kahane, S. (ed.). (2000) *Les grammaires de dépendance (Dependency grammars), Traitement automatique des langues* 41. Paris: Hermes.
- Kahane, Sylvaine (2003) The Meaning-Text Theory. In Vilmos Ágel et al. (eds.), pp. 546–569. Berlin: Walter de Gruyter.
- Kay, Paul & Fillmore, Charles (1999) Grammatical constructions and linguistic generalizations: The What's X doing Y? construction. *Language* 75(1): 1–33.
- Kayne, Richard (1994) *The Antisymmetry of Syntax*. Linguistic Inquiry Monograph Twenty-Five. MIT Press.
- Kiss, Tibor (1995) *Infinitive Komplementation: neue Studien zum deutschen Verbum infinitum*. Tübingen: Niemeyer.
- Kunze, Jürgen (1975) *Abhängigkeitsgrammatik*. Studia Grammatica 12. Berlin: Akademie Verlag.
- Kvam, Sigmund (1983) *Linksverschachtelung im Deutschen und Norwegischen: Eine kontrastive Untersuchung zur Satzverschränkung und Infinitivverschränkung in der deutschen und norwegischen Gegenwartssprache (= Linguistische Arbeiten, Nr. 130)*. Tübingen.
- Langendonck, Willy van (1994) Determiners as heads? *Cognitive Linguistics* 5: 243–259.
- (2003) The Dependency Concept and Its Foundations. In Vilmos Ágel et al. (eds.), pp. 170–188. Berlin: Walter de Gruyter.
- Lobin, Henning (1993) *Koordinationsyntax als prozedurales Phänomen*. Studien zur deutschen Grammatik 46. Tübingen: Narr.
- Lombardo, Vincenzo & Lesmo, Leonardo (2000) A formal theory of dependency syntax with empty units. In Sylvain Kahane (ed.), pp. 179–210. Paris: Hermes
- Matthews, Peter (1981) *Syntax*. Cambridge University Press.
- (2007) *Syntactic Relations*. Cambridge University Press.
- Mel'čuk, Igor (1988) *Dependency Syntax: Theory and Practice*. Albany: State University of New York Press.
- (2003) Levels of dependency description: Concepts and problems. In Vilmos Ágel et al. (eds.), pp. 188–229. Berlin: Walter de Gruyter.
- Menzel, Wolfgang (2003) Semantische Netze und Dependenzgrammatik. In Vilmos Ágel et al. (eds.), pp. 691–703. Berlin: Walter de Gruyter.

- Müller, Gereon (1998) *Incomplete Category Fronting: A Derivational Approach to Remnant Movement in German*. Dordrecht: Kluwer.
- Müller, Stefan (2002) *Complex Predicates: Verbal Complexes, Resultative Constructions, and Particle Verbs in German*. Dordrecht: Kluwer.
- Neeleman, Ad (1994) Scrambling as a D-Structure Phenomenon. In Norbert Corver & Henk C. van Riemsdijk (eds.), *Studies on Scrambling*, pp. 387–429. Berlin: Mouton de Gruyter.
- O'Grady, William (1998) The Syntax of Idioms. *Natural Language and Linguistic Theory* 16: 79–312.
- Osborne, Timothy (2005a) Coherence: A dependency grammar Analysis. *SKY Journal of Linguistics* 18: 223–286.
- (2005b) Beyond the constituent: A dependency grammar analysis of chains. *Folia Linguistica* 39/3–4: 251–297.
- (2006) Shared material and grammar: A dependency grammar theory of non-gapping coordination. *Zeitschrift für Sprachwissenschaft* 25: 39–93.
- (2007) The weight of predicates: A dependency grammar analysis of predicate weight in German. *Journal of Germanic Linguistics* 19/1: 23–72.
- (2008) Major constituents: And two dependency grammar constraints on sharing in coordination. *Linguistics* 46/6: 1109–1165.
- Pickering, Martin & Barry, Guy (1993) Dependency Categorical Grammar and coordination. *Linguistics* 31: 855–902.
- Pollard, Carl & Sag, Ivan (1994) *Head-Driven Phrase Structure Grammar*. University of Chicago Press.
- Reis, Marga, & Sternefeld, Wolfgang (2004) Review article: Susanna Wurmbrand Infinitives, Restructuring and Clause Structure. *Linguistics* 42(2): 469–508.
- Richter, Michael (2002) Der Fokus im Mittelfeld. *Linguistik online* 12, 3/02 (http://www.linguistik-online.de/12_02/richter.html).
- Riemsdijk, Henk van (1987) Movement and regeneration. In Paola Benincà (ed.), *Dialect Variation and the Theory of Grammar*, pp. 105–136. Dordrecht: Foris.
- Robinson, Jane (1970) Dependency structures and transformational rules. *Language* 46: 259–285.
- Ross, John R. (1967) *Constraints on Variables in Syntax*. Ph.D. dissertation, MIT.
- Schubert, Klaus (1988) *Metataxis: Contrastive Dependency Syntax for Machine Translation*. Foris, Dordrecht.
- Stallings, Lynn; MacDonald, Maryellen & O'Seaghdha, Pádraig (1998) Phrasal ordering constraints in sentence production: Phrase length and verb disposition in heavy-NP shift. *Journal of Memory and Language* 39.3: 392–417.
- Starosta, Stanley (1988) *The Case for Lexicase: An Outline of Lexicase Grammatical Theory*. New York: Pinter Publishers.
- (2003) Lexicase Grammar. In Vilmos Ágel et al. (eds.), pp. 526–545. Berlin: Walter de Gruyter.
- Staub, Adrian; Clifton, Charles & Frazier, Lyn (2006) Heavy-NP shift is the parser's last resort: Evidence from eye movements. *Journal of Memory and Language* 54(3): 389–406.

- Stechow, Armin von (1990) Status government and coherence in German. In Günther Grewendorf & Wolfgang Sternefeld (eds.), *Scrambling and Barriers*, pp. 143–195. Amsterdam: Benjamins.
- Steele, Susan (1981) *An Encyclopedia of AUX*. Cambridge, MA: MIT Press.
- Stucky, Susan (1987) Configurational variation in English: A study of extraposition and related matters. In Geoffrey J. Huck & Almerindo E. Ojeda (eds.), *Syntax and Semantics 20: Discontinuous Constituency*, pp. 377–404. Academic Press.
- Tarvainen, Kalevi (2000) *Einführung in die Dependenzgrammatik*. 2. Auflage. Tübingen: Niemeyer.
- Tesnière, Lucien (1959) *Éléments de syntaxe structurale*. Klincksieck: Paris.
- (1969) *Éléments de syntaxe structurale*. 2. éd. rev. et corr., nouv. tir. Klincksieck: Paris.
- Uzonyi, Pál (2003) Dependenzstruktur und Konstituenzstruktur. In Vilmos Ágel et al. (eds.), pp. 230–246. Berlin: Walter de Gruyter.
- Vennemann, Theo (1977) Konstituenz und Dependenz in einigen neueren Grammatikmodellen. *Sprachwissenschaft* 2: 259–301.
- Vikner, Sten (2006) Object shift. In Martin Everaert & Henk van Riemsdijk (eds.), *The Blackwell Companion to Syntax*, pp. 392–436. Malden, MA: Blackwell.
- Weber, Heinz (1997) *Dependenzgrammatik: Ein Arbeitsbuch*. Tübingen.
- Wittenberg, Kent (1987). Extraposition from NP as anaphora. *Syntax and Semantics 20: Discontinuous Constituency*: 427–445.
- Wurmbrand, Susi (2007) How complex are complex predicates? *Syntax* 10(3): 243–288.

Contact information:

Thomas Groß
 Department of Language Communication
 Faculty of International Communication
 Aichi University
 Machihata-cho 1-1, Toyohashi-shi, Aichi-ken
 441-8522 Japan
 Fax 81-532-47-4129
 e-mail: tmgross(at)vega(dot)aichi-u(dot)ac(dot)jp

Timothy Osborne
 Department of Germanic and Slavic Languages and Literatures
 Pennsylvania State University
 427 Burrowes
 University Park, PA 16802
 USA
 e-mail: tjo3ya(at)yahoo(dot)com